CAPACITY ASSESSMENT OF BIOGAS COMPANIES AND APPLIANCE MANUFACTURING WORKSHOPS

BIOGAS SECTOR PARTNERSHIP-NEPAL
(BSP-NEPAL)

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ABBREVIATIONS

ADB/N	Agricultural Development Bank/Nepal
AEPC	Alternative Energy Promotion Center
BSP	Biogas Support Programme
BSP-N	Biogas Sector Partnership-Nepal
CBO	Community based Organization
CDM	Clean Development Mechanism
DGIS	Directorate General for International Cooperation of the Netherlands
FGD	Focus Group Discussion
GoN	Government of Nepal
KfW	Kreditanstalt fuer Wiederaufbau of Germany
LPD	Low Penetration District
MDG	Millennium Development Goal
NBPA	Nepal Biogas Producers Association
NGO	Non Government Organization
PRSP	Poverty Reduction Strategic Paper
SNV/N	Netherlands Development Organization in Nepal
VDC	Village Development Committee

.1.
INTRODUCTION

Background

Since its initiation in 1992, the Biogas Support Program (BSP) in Nepal has proved to be a highly successful program in developing and disseminating biogas plants as a mainstream renewable energy in rural Nepal and, through it, providing significant contribution to improve the living condition of rural households and reduce environmental pollution. The BSP has been credited as the first program in the country to benefit from the Clean Development Mechanism (CDM) project. The systematic growth in installations of high class biogas plants in rural areas indicates that biogas technology is suitable and affordable to Nepalese farmers. Till December 2007, more than 172 thousand plants have been installed covering 68% of the total VDCs and 67 districts in the country. In the fourth phase of BSP which started from July 2003 with a revised set target of achieving 135,000 plants (by June 2009). By the end of December 2007 of the Phase IV, 62,680 plants have been installed.

The Biogas Sector Partnership - Nepal (BSP-Nepal), an NGO, is executing the BSP Phase-IV with the financial and technical support from Alternative Energy Promotion Centre (AEPC) of Government of Nepal (GoN) and Netherlands Development Organization in Nepal (SNV/N). The subsidy component in the BSP program is financed through assistance from donors such as Kreditanstalt fuer Wiederaufbau of Germany (KfW) and the Directorate General for International Cooperation of the Netherlands (DGIS) and GoN.

A major part of the BSP objectives is to ensure enhanced commercialization and sustainability in terms of market oriented biogas sector. For this, BSP-Nepal strives to strengthen the capability of the private sector biogas companies to disseminate quality plants in a competitive situation. These companies are expected to construct biogas plants by adhering to optimized designs and standards set by BSP, and at the same time properly manage their operations to provide optimum cost benefits to the rural users of the plants.

Due to the positive results of BSP in terms of meeting its development objectives and the acknowledged necessity to continue catering to the intrinsic geo-socio-economic characteristics of the nation vis-à-vis the nation's PRSP and Millennium Development Goals, and the recent scope opened through benefits provided by CDM regime, there has been a general understanding among the programme partners for the extension of BSP beyond 2009, that is, execution of Phase V.

BSP has executed different strategies to expand the market for biogas plants in rural households through a number of interventions on the supply and demand sides. It has been striving to institutionalize the sector by promoting commercialization and self-sustainability of the biogas market through the private sector involvement in a fairly competitive market. It has a stringent quality control system which is tied up with an incentive (in the form of subsidy) and penalty mechanism. This, along with measures for after sales services and the practice of approving annual quotations, BSP tries to ensure that the biogas users, comprising mostly of the rural poor, get fair treatment in terms of price and service. On the other hand, BSP also promotes awareness programmes educating rural population on the environmental and household-level benefits of adopting biogas as an alternative energy. In terms of capacity building, BSP-Nepal has been instrumental in setting up Nepal Biogas Producers Group, later rechristened Nepal Biogas Producers Association (NBPA) and its regional offices and the biogas workshops for manufacturing standard appliances used in biogas plants. To mitigate

the perennial problem of working capital faced by the biogas companies and its effect extending to the whole programme, BSP has implemented the advance subsidy payment mechanism which is tied up with the performance of the companies. For those that do not qualify for such a facility, credit facility has been made available on the purchase of components and appliances from NBPA through a credit fund extended by BSP. So far, 72 qualified biogas companies and 16 appliance manufacturing companies are involved in the sector. Over 4,000 masons and 1,000 supervisors have been trained under the programme.[1]

Rationale for Capacity Assessment

As mentioned earlier, BSP has set a revised target of 135,000 plants (from the original target of 200,000) for Phase IV period. Although BSP has been pursuing an annual (revised) target of 22,500 plants, the average plant construction has been only around 16,000 to 17,000. Going by the present trend, it is quite clear that even the revised target may not be achieved by June 2009 when this phase ends. On top of this, BSP Phase V has set a time frame of 6 years (FY 2009/10 to 2014/15) and an ambitious target of 300,000 biogas plants (275,000 household and 25,000 institutional/community).

Despite all efforts and the numerous local and global benefits accruing from the sector, and wide appreciation of the modality adopted by the BSP programme, it has been felt that not much progress has been forthcoming and the pace of market expansion of biogas plants has been very slow. The programme has been barely catering to only 10% of the total 1.9 million feasible households. With over 50 years of history of promotion of biogas technology and, over 30 years within formal institutional set up, this is definitely not a good progress to show. The social and environmental benefits are however the redeeming factors of the programme, and the compelling reasons for the programme partners to commit support for Phase V. Nevertheless, there is no denying the fact that the programme needs a strong and multi-pronged impetus to effect a rapid and substantial development in this sector.

One major focus of such an impetus should no doubt be the strengthening of the capacities of the existing companies to deliver better and more. In this context, it is necessary to assess the capacities of the biogas companies and the workshops, to identify the constraints they are facing both at the organization-level and market-level, and to design and execute effective intervention programmes accordingly. Intervention programmes should enhance the managerial and technical efficiency of the companies, increase access to resources, and broaden the market for the biogas plants, and contribute to higher profitability and sustainability of the business.

Conceptual Framework

The study views capacity assessment from the input-output framework, and on similar line, the supply-demand framework. The supply-side interventions of through BSP or NBPA or other concerned institutions support the strengthening of input resources of the individual companies, while the demand inducing programs support the companies and workshops to strengthen their outputs.

i) Input-Output Model

As with any institution – commercial or developmental – the development of biogas sector can be viewed from the system approach or the input-output model. The functioning of biogas companies and workshops can also be viewed through the same approach. It would be

[1] However, it is reported that the retention rate of these trained manpower is only 30%.

pertinent to specifically assess input-side, process-side and output-side subsystems. The quality of the inputs and the quality of the process of using these inputs are largely responsible for the quality of plants and appliances produced by the biogas companies and workshops respectively. Likewise, quantitative aspect of the inputs is also equally important to assess capacity to increase outputs and achieve higher targets. The constraints can then be viewed from the input-output perspective.

- *Input-side*: At the company-level, the input side deals with the resources that are needed for the construction of biogas plants and manufacture of workshop appliances and components used in the plants. As a precursor to assess the production capacity, the assessment takes into consideration the strength of inputs such as materials, manpower, finance, machines and equipments/tools available and the capacity or otherwise of the companies to use these resources. A general company profile shows what the biogas companies and workshops have in terms of manpower, investment, logistics, inventory, machines, tools/ equipments etc. The assessment then deals with the constraints faced in acquiring these resources.
- *Process aspect*: Without going into the technical side of production of the biogas companies and the workshops, the assessment looks into the managerial/administrative aspects of marketing, financials and services, such as the managing working capital, proper costing, planning and controlling, sales and after sales services, communication and coordination with relevant branches, financial institutions, sub-contractors/dealers, biogas users, and other stakeholders. The study also deals with the capacity to fulfil procedural requirements of BSP, and the constraints in these areas.
- *Output-side*: The output-side deals with the number and quality of plants installed and/or the appliances manufactured, and the after sales services to the users. The assessment deals with the ability of the companies and workshops to fulfil BSP's stringent product and service standards.

An integral part of the whole system is the environment or the environmental forces that influence the capacity of the companies to function well while pursuing their goals. This strong factor cannot be ignored if one is to make a balanced assessment. There is only so much that the biogas companies or the workshops can do to enhance their capacities to produce more, and to support BSP's quantitative target achievement. Much of their individual capacities are conditioned by the environment which BSP tries to smoothen to some extent through its supply and demand interventions.

ii) Supply and Demand Perspective

The systemic approach cannot be limited to the companies alone as there are a number of cross-cutting issues involving BSP and institutional roles of AEPC, BSP-Nepal and NBPA. From the same input-output perspective at the organizational level, the capacity assessment deals with aspects of supply side and demand side of BSP.

On the *supply-side* of BSP, there are training programs for masons, supervisors and quality controllers to maintain plant standards, and occasional training programs on management basics. Technicians are provided certificates after they undertake certain training. Likewise, there is the provision of government subsidy to stimulate the market, and mechanisms to supplement working capital for companies through advance subsidy and NBPA credit facilities. There is also the random monitoring of plants by BSP-Nepal to ensure that companies abide by certain standards set by it. This is also used as a tool for annual grading, awarding and or penalizing purpose.

On the *demand-side*, are awareness-building and promotional programmes directed to the market. These are carried out by BSP-Nepal and through its network of partner institutions

located in different parts of the country. Micro-finance institutions are linked with the programme for financing biogas plants in rural Nepal and especially targeted to the poor. Likewise, there are facilities for quality assurance available for workshop appliances and biogas plants.

Overall, the assessment looks into the capacities of the biogas companies and the workshops to absorb benefits out of these program features, and to identify the constraints they are facing at the organizational, market and sector-levels so as to design and execute effective intervention programmes. The objective is to enhance the managerial and technical efficiency of the companies, broaden the market for the biogas plants and correspondingly increase the market of workshops, and contribute to higher profitability and sustainability of the business. This assumes all the more urgency in the context of implementation of the BSP Phase V.

Objectives

The overall objective of the study is to assess the capacity of private sector biogas companies and appliance manufacturing workshops to provide valuable inputs to design and support intervention efforts by BSP-Nepal in the Phase V of BSP.

The specific objectives are:

(a) To assess and establish the current level of capacity of biogas companies and appliance manufacturing workshops.

(b) To assess and identify capacity building needs of the biogas companies and the workshops so as to design necessary capacity building interventions in BSP V.

(c) To assess and identify other factors that constrain capacity in the supply side of the biogas market.

(d) To recommend necessary but practical interventions and other actions to address the problems and constraints.

Methodology

A good understanding of the major issues involved in the capacity assessment and the expectations of BSP was established through preliminary discussion with BSP-Nepal, SNV/Nepal, NBPA and AEPC. The conceptual framework and major issues to be covered by the capacity assessment study were established during the meeting.

i) Data Collection

(a) **Secondary Data Collection:** A desk study of previous reports and surveys conducted by the consultants themselves and by other organizations was carried out. Documented inventory of different companies were collected from BSP-Nepal and NBPA. Specifically, information on the number and size of biogas plants installed in different districts in the last 3-4 years, number of branches etc. were collected. Information on number of biogas appliance manufacturers was acquired from the same sources.

(b) **Primary Data Collection:** Primary data relating to capacity level of biogas companies and of appliances manufacturers was collected through a limited survey of sample biogas companies and workshops in Kathmandu and select districts outside. Specifically, information was sought to collate secondary information collected from BSP-Nepal and NBPA. Structured questionnaires were used to collect data on intrinsic capacity features, while interviews were done with open-ended questions to understand the extrinsic factors that affect their capabilities.

Additional information on strengths and weaknesses, constraints, intervention needs and other collective issues were also collected through group discussions with select companies and respective regional offices, NBPA. A focus group discussion (FGD) was conducted on the issue of mason retention.

- **Structured Questionnaire:** Appropriate questionnaire was designed for establishing the current capacities of both biogas companies and the workshops. Questionnaire was used to gather information on installed capacity, capacity utilization in terms of plant installations or appliances manufactured, qualitative and quantitative gaps and reasons for gaps in installation/production; supports, collaborations and networks utilized in marketing, purchase, installation/manufacture and quality control/assurance activities. The same questionnaire was used for both biogas companies and workshops.[2]

  The questionnaire composed of two parts namely company profile and specific assessments and constraints. [Refer *Annex 2: Biogas Survey Questionnaire*]

- **Field Visit:** A limited field visit was undertaken by two members of the study team for the survey covering both biogas companies and appliance manufacturing workshops in seven districts outside Kathmandu valley namely Pokhara (Kaski), Bharatpur (Chitwan), Butwal (Rupandehi), Birtamod (Jhapa), Itahari (Sunsari), Biratnagar (Morang) and in Banepa (Kavre).

- **Selection of Survey Samples:** The samples for the field survey were selected randomly within the approved districts for visit. Care was taken to ensure the participation of maximum number of biogas companies and workshops under the regional offices. Altogether 28 companies comprising of individual biogas companies and appliance manufacturing workshops and biogas companies also running workshops.[3]

- **Interviews/discussions:** Interviews and discussions were held with key stakeholders in Kathmandu as well as staff of different regional offices of NBPA, biogas companies and workshops in the field.

- **Focus Group Discussions:** FGDs were held with members of NBPA regional offices in Birtamod, Chitwan, Butwal and Pokhara on the two topics: *retention of masons* and *biogas market growth*.

ii) Analysis and Presentation:

(a) **Stratification**: For the purpose of analysis, the companies surveyed were stratified on the following parameters:

- Geographical (Terai and Hill districts covering western, central and eastern regions)
- Company type (biogas companies and workshops)
- Size of company (based on number of plants constructed in FY 2007/08; grouped in four groups)
- Inclusiveness (gender and community-specific)

[2] Except for one question specific to the two types of companies, the questions were designed on common frame.

[3] Nepal's oldest biogas company – Gobar Gas Tatha Krishi Yantra Bikash P Ltd. (GGC), being a semi government undertaking, was omitted from the sample for quantitative analysis as the emphasis of the study was on the private sector. However, interaction was held with the company to learn from its experience.

- Single product-based (biogas only) or multi product-based (biogas, solar, micro-hydro etc.)

(b) **Analysis:** Qualitative and quantitative analyses were based on both secondary data and data collected from the field. The data was analysed statistically and summarized in an easy to understand format.

Different parameters such as past installation or manufacturing trends, logistics availability, financial capacity, manpower strength, market coverage, access to financial and technical support were considered in assessing the capacity of the companies and workshops. Efforts were also made to assess the entrepreneurial capabilities and motivational state of the heads of the companies in relation to their willingness to make their businesses sustainable and strengthen the biogas sector in general. This, and opinions on impacts of intervention programs of BSP and NBPA were useful in analyzing potential for growth of the companies.

(c) **Cause and effect analyses:** The cause and effect analyses of the following issues are presented:

- Growth of market
- Retention of masons

Scope and Limitation

The capacity assessment study is based on information provided directly by the respondents since it was not possible to visit offices and branches of all individual biogas companies and appliance manufacturing workshops to observe their logistics and administrative set-up. As many companies as possible were included in the survey and FGD in select regions during the field visits. The study could not adhere strictly to planned stratification of the companies especially regarding the inclusion of companies from gender and community-specific perspectives, and product-based companies.

Companies of Far-Western Region falling under Regional Office at Dhangadi were not covered by the study. The survey also does not cover the Remote Hill area directly, and information regarding branches and sub-branches of companies in this area has been acquired from their head offices or NBPA regional offices which are all situated in the Terai or Hill areas.

Survey data has been analyzed by combining the data of both biogas companies and appliance manufacturing workshops as a number of respondents represented both the types of companies. It was not possible to segregate them under one of the types.

.2.
INSTITUTIONAL CAPACITY OF BIOGAS COMPANIES

On the input side, biogas companies have manpower that can be categorized as managerial and technical. Masons and supervisors are involved in field in the construction and supervision of biogas plants. The management deals with the overall administration of the business activity. It is mandatory for masons and supervisor to be qualified by BSP. Among the total materials used in the construction of biogas plants, the companies procure pipes and fittings and workshop appliances from the local market, normally from their regular suppliers. The users or the farmers are responsible for the procurement or mobilization of construction materials like bricks/stones, grave, cement, reinforcement iron rods. Users provide the labour for preparing the site for biogas plant construction, whereas, the companies send their masons with a helper for the construction. The financial inputs constitute the investment of the owner, the advance subsidy made available by BSP and bank loan and micro-credit linked with BSP.

The companies have their own office structure and certain logistics used to facilitate their business. Many have branch offices located in different parts of the country as per their capacity. According to the BSP guidelines, each branch should possess a minimum of six personnel and basic office facility. Offices are characterized by two or more furnished rooms, may or may not be equipped with telephone, computers and office gadgets, and possess bicycles, motorcycles or other vehicles for transportation.

On the process-side, the main production activity of the companies is the construction of biogas plants. This is done through a set of pre-construction activities involving marketing, mandatory agreements with users and setting of conditions for services. The construction is done on the guidelines set by BSP. The managerial process consists of financials and services, such as managing working capital, proper costing, planning and controlling, sales and after sales services, communication and coordination with relevant branches, financial institutions, sub-contractors/dealers, biogas users, BSP-Nepal, AEPC, NBPA and other stakeholders.

The number and quality of plants and the after sales services to the users are the outputs of the companies. The plants are expected to be constructed as per the requirement of BSP standards, and BSP-Nepal has a random inspection program to verify this.

Different variables of the companies are considered to assess the capacities of companies in the context of the above discussion based on sample survey of 28 companies[4].

General Industry Profile

The general profile characterizes the biogas companies under titles such as age of the company, number of different types of manpower and its breakdown, number of branches, outputs and capacity, etc. They are supported by tables, and most of them are quite self-explanatory.

[4] Some of the tables contain combined data representing both biogas companies and appliance manufacturing workshops as it was not possible to segregate them as some respondents represented both. The survey sheet consisted of organizational questions common to both the types of companies. Only five respondents represented workshops alone.

1. Age of Business

The average age of companies is 8.6 years with a standard deviation of 4.4 years. Similarly, the oldest company is 16 years old and the youngest one is just one year old resulting into a range of 15 years. Many companies have long experience in the biogas sector.

Table 1: Age of business

(in years)

Valid	27
Missing	1
Mean	8.6
Std. Deviation	4.4
Range	15
Minimum	1
Maximum	16
Sum	233

2. Branches and Contact Offices

Table 2: Branches and Contact Offices

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Branches	28	0	16	97	3.46	4.13
Contact offices	28	0	22	91	3.25	4.84
Valid N (list-wise)	28					

The average number of branches and contact offices per company are 3.5 and 3.25 with the standard deviation of 4.13 and 4.84 respectively. The 28 companies in sample have altogether 97 branches and 91 contact offices respectively.

3. Investment Status

Table 3(a): Paired Samples Statistics of Investment Capacity

(Amount in Rs)

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Beginning Investment	25	15,000	1,100,000	10,551,000	422,040	301,398
Ending Investment	21	40,000	4,000,000	18,453,000	878,714	870,958
Valid N (list-wise)	21					

The paired samples statistics (descriptive statistics) of investment shows that the average investment of Rs. 422,040 at the beginning (at the time of establishment of the company) has almost doubled the present average investment. There is positive correlation between the initial investment and ending investment which shows that the biogas entrepreneurs have increased their investment over the period of time.

Table 3(b): Correlations of Initial and Present Investments

		N	Correlation	Sig.
Pair 1	Beginning Investment & Ending Investment	21	.549	.010

Table 3(c): t-Test of Initial and Present Investments

		Paired Differences (in Rs.)					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Beginning Investment - Ending Investment	-457,238.10	744,038.10	162,362.42	-795,920.18	-118,556.01	-2.82	20.00	.01

The paired sample t-test conducted to determine whether the investment overtime has increased significantly or not shows that the ending investment is significantly higher than the beginning investment at 95% of confidence.

The above analyses show that biogas companies have been gradually increasing their investment in their business over the time. This is a good sign that indicates the companies are seriously into the business.

4. Educational Qualification

Table 4(a): Owner – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelors and Above	9	32.1	52.9	52.9
	Intermediate or Plus two	7	25.0	41.2	94.1
	Class 8 to 10	1	3.6	5.9	100.0
	Total	17	60.7	100.0	
Missing	System	11	39.3		
Total		28	100.0		

Out of 17 companies that reported the educational qualification of owners, 52.9% of the owners are of bachelor level and above, and 41.2% have intermediate level or Plus Two.

The academic qualification of other manpower has been given in the following self-explanatory frequency tables.

Table 4(b): Accountant – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelors and Above	1	3.6	7.1	7.1
	Intermediate or Plus two	12	42.9	85.7	92.9
	Class 8 to 10	1	3.6	7.1	100.0
	Total	14	50.0	100.0	
Missing	System	14	50.0		
Total		28	100.0		

More than 93% of accountants are found to have educational qualification of intermediate level or Plus Two.

Table 4(c): Supervisor – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intermediate or Plus two	5	17.9	55.6	55.6
	Class 8 to 10	3	10.7	33.3	88.9
	Below Class 8	1	3.6	11.1	100.0
	Total	9	32.1	100.0	
Missing	System	19	67.9		
Total		28	100.0		

More than 50% the supervisors are educated up to intermediate level or Plus Two.

Table 4(d): Branch Manager – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intermediate or Plus two	11	39.3	78.6	78.6
	Class 8 to 10	3	10.7	21.4	100.0
	Total	14	50.0	100.0	
Missing	System	14	50.0		
Total		28	100.0		

Branch managers of 78.6% of the sample companies have educational qualifications equivalent to intermediate or Plus Two. The remaining has education between classes 8 to 10 only.

Table 4(e): Mason (Permanent) – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Class 8 to 10	4	14.3	44.4	44.4
	Below Class 8	5	17.9	55.6	100.0
	Total	9	32.1	100.0	
Missing	System	19	67.9		
Total		28	100.0		

Table 4(f): Mason (Contract) – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelors and Above	1	3.6	7.7	7.7
	Class 8 to 10	2	7.1	15.4	23.1
	Below Class 8	9	32.1	69.2	92.3
	No Formal Schooling	1	3.6	7.7	100.0
	Total	13	46.4	100.0	
Missing	System	15	53.6		
Total		28	100.0		

None of the masons (permanent) are found to have education higher than class 10. More than 50% of them are educated below class 8.

Likewise, masons on contract accounting up to 69% of total masons in the study also have education below class 8. On the other hand, while a few have not undergone any formal schooling, some possess Bachelors level education.

Table 4(g): Junior Technician – Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intermediate or Plus two	5	17.9	45.5	45.5
	Class 8 to 10	5	17.9	45.5	90.9
	Below Class 8	1	3.6	9.1	100.0
	Total	11	39.3	100.0	
Missing	System	17	60.7		
Total		28	100.0		

More than 90% of junior technicians have education equivalent to class 8 or above with half of them possessing intermediate or Plus Two education.

5. Training of Manpower

The self-explanatory frequency tables on training are given below. Among the respondents, 87% of owners, 76 % branch managers, and 80% accountants have reported that they have undergone relevant training. Likewise, 90% of the supervisors and, as expected, all masons are reported to have relevant training. However, only 60% of junior technicians have undertaken relevant training.

Table 5(a): Owner – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	3	10.7	13.0	13.0
	Yes	20	71.4	87.0	100.0
	Total	23	82.1	100.0	
Missing	System	5	17.9		
Total		28	100.0		

Table 5(b): Branch Manager – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	5	17.9	23.8	23.8
	Yes	16	57.1	76.2	100.0
	Total	21	75.0	100.0	
Missing	System	7	25.0		
Total		28	100.0		

Table 5(c): Accountant – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	4	14.3	20.0	20.0
	Yes	16	57.1	80.0	100.0
	Total	20	71.4	100.0	
Missing	System	8	28.6		
Total		28	100.0		

Table 5(d): Supervisor – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	7.1	9.1	9.1
	Yes	20	71.4	90.9	100.0
	Total	22	78.6	100.0	
Missing	System	6	21.4		
Total		28	100.0		

Table 5(e): Mason (Permanent) – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	100.0	100.0
Missing	System	5	17.9		
Total		28	100.0		

Table 5(f): Mason (Contract) – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	67.9	100.0	100.0
Missing	System	9	32.1		
Total		28	100.0		

Table 5(g): Junior Technician – Training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	21.4	40.0	40.0
	Yes	9	32.1	60.0	100.0
	Total	15	53.6	100.0	
Missing	System	13	46.4		
Total		28	100.0		

6. Experience of Manpower

A descriptive statistics of the experience of different personnel of the companies in the biogas sector, including the owners, is given in the table below. None of the owners possess experience less than 5 years, indicating most of them have long experience in the sector. However, there are other personnel who are relatively new and others with long experience. Owners possess the highest average years of experience in the trade at 13 years followed by masons at 9 years.

Table 6: Experience of Personnel

	N	Minimum	Maximum	Mean	Std. Deviation
Owner	25	5	22	13.1	4.12
Branch Manager	20	0	14	7.0	3.82
Accountant	20	0	14	4.6	3.83
Supervisor	22	0	16	7.8	3.98
Mason (Permanent)	18	0	16	9.0	5.24
Mason (Contract)	16	0	14	6.9	5.46
Junior Technician	16	0	17	4.2	5.53
Valid N (list-wise)	12				

(Experience in years)

Gender and community composition of owners and staff

Biogas companies and workshops are predominantly manned and owned by men. Four companies have women registered as managing director or chairperson. It appears that the names have been registered only for convenience, and the companies are in reality managed by their spouses or others. However, few female staffs are present in managerial and administrative activities in some companies and branch offices. Some branch offices are even managed by women. BSP has tried to promote women in supervisory tasks, but this has not proved to be very successful. There were no reported women supervisors in any company.All the masons are invariably men.

The biogas entrepreneurs are dominated by Bhramin/Chhetri community with a very few among the Newar, Gurung and Madhesi communities. The other employees except the masons also exhibit almost the same community constitution. However, the masons constitute more diverse groups – mostly of the Chhetri, Madhesi, Tharu, Gurung, Rai and other minor communities. No significant difference is noted in the performance of people of

the different communities. However, in-depth behavioral study may enlighten more on the specific working nature of the different communities.

Manpower strength

Biogas companies have adequate manpower in number in administration and technical areas. While the number is not a problem, the quality of the manpower especially with appropriate managerial skill and knowledge is a matter of concern. The performance of the manpower is based on knowledge and experience acquired by being in the sector, and adopting methods and techniques of the more experienced companies. Apart from technical ability to construct plants and provide after sales services, as mentioned earlier, the companies lack knowledge, ability and experience in basic management and administrative practices leave alone modern practices of business planning, marketing and financial management.

They operate under virtually uniform four P's of marketing, that too, within a limited market. Therefore, management is relegated at the operational level only which comprises of merely abiding by the norms and procedures and minimum requirements of BSP and other interrelated agencies.

Training and development programs pursued

The training programs pursued by the biogas companies are limited to the ones occasionally organized by or through BSP-Nepal and NBPG. None of the companies appear to have conducted any in-house training or participated in other training on their own initiative. All masons undergo mandatory technical training under CTEVT to qualify to construct plants. BSP-Nepal has also provided training programs in accountancy, sales management, quality management, and supervisory training etc. Some organization chiefs in lieu of being members of NBPG or otherwise, attend occasional seminars on alternative energy themes both within and outside the country. None of the companies have taken initiatives in any business management or technical training and education programs other than organized by BSP-Nepal, and the mandatory technical training for masons and supervisors.

New operators and assistants in workshops learn by doing on the job from the experienced ones. They are provided the technical specifications and blueprints handed down by BSP for different appliances which they simply comply.

Possession of assets for construction of targeted plants

Most biogas companies claim to possess the capable to construct larger number of plants if only they get the orders. They have no problem accessing any quantity of materials such as pipes and fittings, workshop appliances and construction materials. They possess tools and equipment necessary for the construction of plants.

All companies have their own offices, big or small, and basic logistics. Apart from the challenges borne out of competition and frequent political disturbances, the larger companies do not appear to face much problem concerned with physical assets for achieving their targets. They have access to their regular vendors to acquire materials at ease. Larger companies are able to maintain some level of stocks of various materials and appliances used in the construction of plants. However, unlike what they claim, the smaller companies are constrained in accessing materials and appliances due to their inability to purchase in bulk or maintain stock.

Logistics and access to facilities

The result of the survey of various logistics owned by the companies and their ability to access different logistical facilities are given below:

Table 7(a): Computer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	12	42.9	52.2	52.2
	Yes	11	39.3	47.8	100.0
	Total	23	82.1	100.0	
Missing	System	5	17.9		
Total		28	100.0		

52% of the respondents have reported that they have computers in their offices. The computers are used to maintain the accounts and write reports or letters etc.

Table 7(b): Internet/Email

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	53.6	65.2	65.2
	Yes	8	28.6	34.8	100.0
	Total	23	82.1	100.0	
Missing	System	5	17.9		
Total		28	100.0		

35% of the companies use email and internet for the purpose of their business. A large number of the companies do not have access to internet and email.

Table 7(c): Telephone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	78.6	95.7	95.7
	No	1	3.6	4.3	100.0
	Total	23	82.1	100.0	
Missing	System	5	17.9		
Total		28	100.0		

Telephone and mobile sets are quite common among the companies. 96% of the companies have telephone in their office while 85% of the owners possess mobile sets. This indicates that the companies have good access to communication facility.

Table 7(d): Mobile (Cell phone)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	78.6	84.6	84.6
	No	4	14.3	15.4	100.0
	Total	26	92.9	100.0	
Missing	System	2	7.1		
Total		28	100.0		

Table 7(e): Motorcycle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	89.3	92.6	92.6
	No	2	7.2	7.4	100.0
	Total	27	96.4	100.0	
Missing	System	1	3.6		
Total		28	100.0		

Likewise, 93% of the companies have reported that they possess motorcycles. Motorcycles are the chief means of transportation in the local town or even in the highways for most personnel including the owners. Only 35% of the companies possessed other forms of vehicles like cars.

Table 7(f): Other Vehicle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	39.3	64.7	64.7
	Yes	6	21.4	35.3	100.0
	Total	17	60.7	100.0	
Missing	System	11	39.3		
Total		28	100.0		

Besides possessing the various logistical facilities, companies expressed their ability to access to other forms of logistical facilities such as public transportations, telecommunication, security and insurance which are perceived as important to their business. Access to public transportation to visit rural households is very vital that have implications on costs of materials and service delivery.

Table 8(a): Public Transportation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	21.4	24.0	24.0
	Yes	19	67.9	76.0	100.0
	Total	25	89.3	100.0	
Missing	System	3	10.7		
Total		28	100.0		

More than 75% of the companies expressed that they have good access to public transportation, and 92% felt that access to telecommunication facilities was satisfactory.

Table 8(b): Telecommunication Facility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	7.1	8.0	8.0
	Yes	23	82.1	92.0	100.0
	Total	25	89.3	100.0	
Missing	System	3	10.7		
Total		28	100.0		

Table 8(c): Security

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	39.3	50.0	50.0
	Yes	11	39.3	50.0	100.0
	Total	22	78.6	100.0	
Missing	System	6	21.4		
Total		28	100.0		

Interestingly, security was still perceived to be a big concern by the respondents as half of them felt that the security situation was not very reassuring. However, slightly less than half (46%) have had their business insured.

Table 8(d): Insurance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	13	46.4	54.2	54.2
	Yes	11	39.3	45.8	100.0
	Total	24	85.7	100.0	
Missing	System	4	14.3		
Total		28	100.0		

Most companies have no problem reaching their client users in different parts of the country. They generally limit their activities in areas which, for obvious reasons, are accessible by road transportation, and/or in nearby vicinities of the nearest road heads. However, the locations could be anywhere from an hour or a whole day's walk from the nearest road heads. Since the users are entrusted with the responsibility of transporting up to the site the different materials used in the plant, including pipes and fittings and workshop appliances, the companies only have to send the masons and supervisors to the sites. They take the same mode of transportation as the users. Most often, the lodging and fooding of the masons are arranged at he households of the users either in cash or kind.

Managerial Issues of Companies

Target and actual achievement

Table 9: Targets for Plant Construction

	N	Minimum	Maximum	Mean	Std. Deviation
Plant goal in 2065/66	24	50	2500	511	515
Plant goal in 2064/65	25	36	2500	452	520
Plant goal in 2063/64	21	100	2800	497	589
Plant goal in 2062/63	19	0	2700	492	590
Valid N (list-wise)	19				

Table 10: Actual Plant Construction

	N	Minimum	Maximum	Mean	Std. Deviation
Plant actual in 2064/65	23	61	1764	340	387
Plant actual in 2063/64	21	51	2080	417	462
Plant actual in 2062/63	19	0	2270	402	505
Valid N (list-wise)	19				

Comparing the target and the performance in terms of plant construction as shown by descriptive statistics in the tables above, it is seen that companies are not able to meet the goals they have set to achieve. Even more alarming is the fact that the average actual plant construction per company has not increased; rather it has decreased in 2064/65. There appears to be a problem for the companies to forecast the potential markets properly.

Capacity to increase plants

As mentioned earlier, the biogas companies are in the position to construct plants in larger numbers than they are doing at present in case of bigger business orders. Biogas companies claim that they could increase their plant number by 25% to 30% if only adequate number of masons were available.

Networks pursued in different functions

- ***Procurement of materials:*** Biogas companies appear to have no problem sourcing for pipes and fittings, appliances and other materials used in the construction of biogas plants. Most companies have their regular local sources for procuring hardware materials and availing credit for limited periods. The same applies in the procurement of biogas appliances. Some companies have their own workshops to manufacture appliances for their own consumption as well as for sale to other companies. Materials like pipes and cement and reinforcement iron rods (if required) are procured from authorized dealers, retailers or directly from manufacturers as per the purchasing and payment capacity and convenience of the companies. Main gas valve is one item that is supplied by NBPA to all companies, while some companies also procure other materials like emulsion paint and gas pipes from this institution.
- ***Marketing and promotions:*** Marketing is a big concern for the companies especially in the context of prevailing competition. The companies utilize a number of methods of promoting themselves and getting orders for the plants. The entrepreneurs, supervisors and other staff are all involved in marketing. Many companies bid for tenders called by different I/NGOs or get direct orders from some institutions to construct a number of plants in certain areas.

  Many times, the masons are also involved in this because of their being directly in the field most of the time. Seeing masons constructing plants, neighboring farmers or others make enquiries with them expressing their interest in having plants in their households too. Some companies are also requested or referred to by other biogas companies to construct plants in certain areas where the former's involvement may not be possible due to various reasons. A number of companies also seek services of middlemen or favour of local influential persons, (social or political), motivators or facilitators of some agencies etc. to promote themselves in the areas. Companies provide certain commission to persons for 'getting business' for them.

  The following tables highlight the different means of marketing and promotion adopted by the companies.

Table 11(a): Promotion through Company Staffs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1	3.6	4.8	4.8
	Yes	20	71.4	95.2	100.0
	Total	21	75.0	100.0	
Missing	System	7	25.0		
Total		28	100.0		

Table 11(b): Promotion through Commission Agents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	5	17.9	26.3	26.3
	Yes	14	50.0	73.7	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

95% of the companies use their own staffs for biogas promotion while about three-fourths of them utilize the services of local agents for the same.

The companies also work with local CBOs or NGOs who give them orders to construct plants in their respective programme areas. 80% of the companies claim that promotion is done by these CBOs/NGOs, while 40% benefit from the promotional activities of other companies.

Table 11(c): Promotion through CBOs/ NGOs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	4	14.3	20.0	20.0
	Yes	16	57.1	80.0	100.0
	Total	20	71.4	100.0	
Missing	System	8	28.6		
Total		28	100.0		

Table 11(d): Promotion through Other Companies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9	32.1	60.0	60.0
	Yes	6	21.4	40.0	100.0
	Total	15	53.6	100.0	
Missing	System	13	46.4		
Total		28	100.0		

- ***Dealership****:* There are also instances when the companies outsource the job of plant construction to some local 'dealers'[5]. These dealers construct the plants for the companies and are compensated for the labour cost involved. The responsibility for the timely completion and quality assurance of the plants however rests on the concerned companies themselves.
- ***Quality control and assurance****:* At present, quality control is based solely on BSP-Nepal modality. The companies are pressed to stick to technical specifications and quality parameters laid down by BSP for the construction of biogas plants and manufacture of workshop appliances. Barring few instances, companies by and large face no problem in adhering to the requirements. As part of quality assurance to plant users, companies are expected to provide after sales service for two years for the plants. The plants are monitored and inspected randomly by BSP-Nepal, and defaulting companies are penalized based on different performance evaluation criteria.

[5] BSP-Nepal has floated the concept of dealership to facilitate increased plant construction by companies

Timely completion of installation

The majority of the companies have mentioned that they have no problem in the timely completion of construction and handover of plants as per the Sales Agreement. However, delays in construction and completion that do occur are mostly due to non-fulfillment of obligations on the part of the users. The various reasons are delays in digging and preparing the site for gas dome construction, delay in arranging for necessary construction materials or labour, financial issues, difficulty in reaching the sites on time by masons/supervisors, etc.

Forms of working capital used

Most biogas companies get by with advance subsidy of AEPC provided on the basis of their previous fiscal year's plant construction and new targets. This is a very novel arrangement for cheap source of fund requiring bank guarantee from the companies. For those that cannot produce bank guarantees, there is the NBPA credit facility for the raw materials supplied by the Association. There are complaints that BSP-Nepal delays the release of the advance subsidy causing working capital apprehensions. Otherwise, the companies appear very satisfied by the facility. Besides these, most companies are tied up with loans from commercial banks or other financial institutions. Small companies and others not in the position to show assets in urban areas as collateral face the problem of availing loans easily. They have to resort to other arrangement for loans in high interest rates.

Capability for preparing business plans and following them

All companies claim to follow some annual plans, but it is obvious that none of them follow any strict business plan. In fact, none of them are capable of making any formal business plan, and the plans they follow are mostly based on rough estimates and mental forecasts of the market demand and their own personal capacity to perform. These companies set their targets haphazardly and are not able to attain them either. They rationalize their inability through excuses and blame games. Most of them have no idea of proper costing mechanism, and lack knowledge of basic accountancy. The companies need to strengthen their capability to make good business plans and follow them.

Financial capacity to support targets

None of the companies are willing to divulge their financials, or hesitantly discuss them, as they are considered sensitive matters. The reality is that, barring a few, none of the companies maintain proper financial discipline or adopt appropriate financial management practices. They resort to simple accountancy practices and can estimate their 'profitability'. They are also quick to mention though that 'there is no profit', that their funds are tied up due to delay in release of subsidies by BSP, that they operate on very low margin due to competition, etc. However, it can be said that most of the companies face working capital problem, and the smaller companies virtually operate under crisis situations. To maneuver through this, companies have to resort to credit or loans for their working capitals. Except for some larger ones, most companies cannot meet their targets as seen by the performance of the companies.

Capacity to manage different branches

Many companies have established branches in different parts of the country to promote their business, and as seen in the survey, there are 3.5 branches and 3.25 contact offices on average per company. As per the BSP regulations, a branch should possess a minimum number if personnel and minimum office logistics. It is another thing that many branches do not fulfill these minimum criteria. Despite their wish to operate the branches on self-sustaining basis in terms of business, most companies have not succeeded in doing so. Many branches are being

discontinued due to lack of adequate business. At the same time, a number of branches have been disqualified by BSP-Nepal for failing to achieve the set targets, which, for an old company, is a minimum of 50 plants.

However, there is generally good communication and coordination between the head offices and the branch offices and contact offices. The ease in telecommunication in the country has facilitated quick coordination with the branches and contact offices most of the time. There is a major problem though involving the sending/receiving of completion reports from branches causing delay in the submission of the reports to BSP-Nepal. Branch offices fail to forward completion reports on time due to lack of different information and documents, or other reasons. There are also instances when demand for certain materials are not communicated properly or timely; and, even if they are, the materials do not arrive on time

BSP-Nepal has tried to promote the concept of 'dealership' for increasing plant targets and new market development through the involvement of different CBOs, NGOs, legally set up local companies or even individuals such as ex-branch managers or masons in the construction of plants. It appears that most companies have not taken this concept too well, and do not see much scope in the management of dealers. Right now, there appears to be limited scope to consider dealers in the broader scheme of their business, but this concept can be fine tuned in the days to come.

Plans for expansion and proposal to support them

The survey has indicated a very alarming situation where none of the companies are enthusiastic on expansion of their business as they find it difficult to even sustain their existing businesses. In fact, as mentioned earlier, some have even warned that they may have to close down their present business and/or phase out to other areas. The conditions are not favorable for many companies, especially the older ones, as the newer and smaller ones take them on in their once stable turfs through unhealthy competition, and now on uneven playing field.

The owners of larger companies, therefore, are not very motivated for pursuing programs and initiatives to strengthen their companies beyond what are expected by BSP-Nepal and meeting the minimum requirements. This may be a serious wakeup call for the BSP and the policy makers pursuing renewal energy through biogas. This could have implications on the future of CDM just when the country is bracing for larger benefits from this mechanism.

Progress in performance

In terms of annual overall plant constructions, the progress has been quite negative in the sense that the number of total plants after FY 2061/62 has decreased. *Table 12: Plant Number and Growth* highlights the comparative annual plant constructions from FY 2061/62 to 2064/65. In fact, the year 2064/65 has shown the lowest number of plants in the four years. Only a handful of companies have succeeded in maintaining a steady output. In the year 2064/65, while almost one-fourth of the companies did not even manage to construct the minimum 50 number of plants, another one-fourth managed to cross 200 numbers.

.3.
CAPACITY ANALYSIS OF WORKSHOPS

Presently, there are altogether 16 biogas appliance manufacturing workshops. These are mostly located in Butwal (7) and Bharatpur (4), and one unit each in Hetauda, Damauli, Biratnagar, Banepa and Morang. These workshops are of two categories – first, those owned or operated by people that also own or operate biogas companies, and the second, the independent workshops that do not have such vertical linkage. Two-thirds of the workshops are of this category. Being owned by the owners of biogas companies, the first category of workshop has the advantage of manufacturing different biogas appliances for self-consumption. The biogas companies enjoy cost and delivery benefits with regard to the appliances used in the plants constructed by them. Most of these workshops manufacture appliances for the consumption of their own biogas companies only. Financial matters are settled internally.

The one-third independent workshops depend on other companies for their marketing. They manufacture appliances on order mostly from biogas companies that do not have their own workshops, or may manufacture in advance based on annual sales estimates and forecast. These companies face irregular payments from companies.

Both the categories of workshops have to be qualified by BSP to participate in the program. These companies are equipped with necessary infrastructure and facilities to function as full-fledged workshops that can carry out many mechanical and electrical engineering jobs besides manufacturing appliances required by BSP. They produce appliances such as angle stove, dome gas pipe, slurry mixture set, inlet pipe, and gas tap as per specifications developed by BSP-Nepal, and they are subject to random inspection for quality control by BSP-Nepal. The workshops depend on other jobs from non-biogas clients for the sustainability of their business. Interestingly, most of these workshops are owned by ex-employees of GGC of ADB/N, the semi-government pioneering company in this sector. They have possessed certain skills and knowledge of operating workshops.

The field survey and FGD included the owners of a number of these workshops. As mentioned earlier, most of the survey is based on general opinions and information provided by both the representatives of biogas companies and workshops. In fact, some respondents and participants of FGD represented both the companies. Some of the tables with quantitative data in the previous chapter also reflect the status of the workshops. The general findings of the survey pertinent to workshops are provided here.

Institutional capacity of the workshops

General profile[6]

- ***Age of workshops:*** As with the age pattern of the biogas companies, most workshops have been in the trade for as long since the start of the BSP. The average age would be around 8 years whereas the latest one has been established barely two years back.
- ***Gender and social composition:*** The workshops are invariably owned and run by men, and the employees are also all men. Barring three companies, the owners of all other

[6] As mentioned earlier, separate quantitative data on most of the features of workshops has not been possible, as they are combined with the data shown for biogas companies in the earlier chapter.

workshops are owned by Brahmins and Chhetris. The same composition applies to the staff and technicians, except for a few from Tharus, Madhesi and Dalit communities.

- ***Education, training and experience:*** All workshop owners have completed formal schooling and some have even completed bachelors level university education. However, the same is not true with the other employees. Most helpers have not proceeded beyond class five while technicians have passed class ten or equivalent. While some experienced technicians have undertaken formal technical training course, others learn the trade on the job and under the guidance of the senior technicians.

Possession of assets for manufacture of appliances

All workshops have their own offices with basic logistics like telephone, mobiles, computers and workshop premises equipped with machines and facilities for lathe work, turning, cutting, punching, welding etc. They do not appear to face much problem concerned with physical assets in achieving their targets. They have access to their regular vendors to acquire materials at ease, and few maintain some level of stocks of various raw materials and appliances. But many are unable to purchase in bulk or maintain stock to tide over increasing prices of metals. However, those with the capability have even benefited from direct sale of metal angles and stripes during last year's drastic increases in prices of the metal items. For them, the margins from the sale of the metals were higher than they would have received by producing appliances.

Manpower strength

Adequate manpower is available to work in workshops, except for skilled technicians. The office administration is virtually managed more or less by the owner only who also double as the main technician. Few technicians have undergone formal training, but the rest rely on knowledge and experience acquired through on-the-job learning and following instructions of the workshop owners. The workshops too lack the knowledge, ability and experience in basic management and administrative practices. Job hopping and outward migration of technicians are also experienced as a major problem by the workshops.

Managerial Issues of Workshops

Training and development programs pursued

The workshops have not and do not pursue any training other than the occasional orientation or management programs organized by BSP-Nepal. The owners have attended a few such programs, that too, along with participants of biogas companies. New operators and assistants in workshops learn by doing on the job from the experienced ones. They are provided the technical specifications and blueprints handed down by BSP for different appliances which they simply comply.

Capacity to increase production

The growth in target or manufacture of appliances depends on the growth in the number of plants constructed by biogas companies. The workshops are in the position to manufacture appliances in larger numbers than they are doing at present in case of bigger business orders. The workshops claim they can increase their production by more than 100% just as much as the biogas companies can consume. The workshops are all being operated at under-capacity as the total capacities of the present 16 workshops are much higher than the actual demand

for appliances. Thus, the workshops also manufacture other products besides appliances used in biogas plants.

Networks pursued in different functions

- ***Procurement of materials****:* Workshops appear to have no problem sourcing for iron stripes, angles, pipes and fittings, and other auxiliary materials needed in the manufacture of appliances. Most companies have their regular local sources for procuring hardware materials and availing credit for limited periods. Most iron and other metals are procured from authorized dealers and retailers in the local markets and directly from manufacturers by some. Galvanization of some parts of slurry mixture set has to be outsourced to factories in Butwal or Chitwan, just as the production of aluminum gas burner and cap sets. The rest of the jobs are carried out at the workshops themselves.
- ***Marketing and promotions****:* The workshops do not worry about marketing their produce as all workshops produce the same products. The competition does not seem to affect the workshops as they deal comfortably with their regular clients on credit basis.
- ***Quality control and assurance****:* The workshops have to strictly follow the technical specifications of different appliances and quality parameters laid down by BSP. Barring few instances, companies by and large face no problem in adhering to the requirements. Likewise, random inspections are carried out by BSP-Nepal in workshops to ensure that appliances meet the set standards. Materials and components used in the manufacture of appliances are periodically tested for quality in institutions like Rural Energy Testing Station (RETS).

Timely completion of production

Workshops have no problem in executing the orders for different appliances for the biogas companies. In fact, most workshops manufacture the appliances ahead of season based on the demand estimates of their regular client biogas companies. There are few cases when workshops have to actually manufacture only after receiving specific orders. Despite being assailed by working capital shortage, as is their unanimous complaint, the workshops buy necessary raw materials such as pipes, metal angles and stripes, fittings etc. in advance to benefit from the prices.

Forms of working capital used

Workshops in particular, especially those that do not have their own biogas companies, complain of payments not made in time by biogas companies. This upsets their working capital balance, and they have to invariably resort to loans. In fact, they have to wait for payments from companies till they have their subsidies released from AEPC mostly toward the end of the fiscal year. This used to be a very grave matter until BSP-Nepal intervened with norms requiring clearance of past dues by companies as pre-requisite for renewing their annual agreement with BSP-Nepal. However, working capital shortage still persists as a perpetual problem with the workshops.

Capability for preparing business plans

The workshops are also incapable of making formal business plans, although they are better off in the matter of planning and costing. Since they have different workshop machines and have a number of workshop employees, they are found to be able to apportion the per appliance breakdown costs for power, manpower, overheads and materials used. They are found to closely follow the changes in prices of different raw materials such as GI pipes and

fittings, CI angles and other metal materials. Since they rely on their limited regular buyers (the biogas companies), they forecast their sales on their tentative demands. Most biogas companies also operate their own workshops, but six of the 16 workshops have to rely solely on other biogas companies to sell their products. The latter category of workshops have no way of leveraging on the costing aspects as others having biogas companies. Since they have to stick to annual price agreement for the manufactured appliances, they set the prices considering the whole year's potential increases in the costs of different materials and overheads.

The workshops owned by biogas companies plan to manufacture appliances to the extent that their own biogas companies would consume considering the number of plants they would construct and the tentative additional retail sales to the farmers during the year. These workshops also rely on the manufacture other goods besides the appliances used in biogas plants. This makes it quite difficult for them to stick to a stable overall business plan, but since they are under agreement with BSP, priority is given to the manufacture of appliances for biogas plants.

Financial capacity to support targets

Workshops too are under similar financial situation as the biogas companies and also speak the same language when it comes to profits. However, they are better off in the context of financial discipline and costing of their products. In terms of revenues, the independent workshops are virtually at the mercy of the biogas companies which rather take longer time to make payments for the appliances bought from them. They manage to tide over the working capital problem with other products and services provided to non-biogas companies or clients, and thus face little problem achieving their targeted quantities of plant appliances. At the same time, almost all workshops have been managing their financials through loans.

Plans for expansion

The same feeling of dissatisfaction with the business persists among the workshop owners especially those that are not vertically integrated into biogas construction as well. However, equipped with appropriate machines and facilities for various iron and engineering works, they are more versatile than the biogas companies. They are learning to be less dependent on manufacturing biogas appliances. However, none of the workshops have any expansion plans as they depend on the growth of plants and biogas market in which they too do not have very positive perception of the future.

.4.
RISE IN COMPANIES, FALL IN OUTPUTS

Increase in the number of companies has not necessarily increased the overall number of plants. In fact, despite the increase in the number of companies, the number of plants has decreased as observed by last year's data. It appears that the size of the pie has remained the same and only those seeking a share have increased. It is important to address this issue and explore how individual company's capacity can be increased to contribute to the overall total target of biogas plants.

Analysis of Plant Number and Growth

The following table shows the annual plants constructed by different biogas companies in the fiscal years 2061/62 to 2064/65, and the annual growth analysis of the plants.

Table 12: Plant Number and Growth

	Company	Annual Plant Number				Position	Annual Growth of Plants		
	Code	2061/62	2062/63	2063/64	2064/65	2064/65	2062/63	2063/64	2064/65
1	ANB	405	481	546	259		19%	14%	-53%
2	BBI	981	953	1050	821	4	-3%	10%	-22%
3	BCE		258	211	101			-18%	-52%
4	BGC	95	50	52	16		-47%	4%	-69%
5	BGG	144	184	177	184		28%	-4%	4%
6	BGY-	37	1	1			-97%	0%	
7	BMS			5	18				260%
8	BRI	50	60	99	100		20%	65%	1%
9	BUB	70	85	111	109		21%	31%	-2%
10	DEU	436	329	277	131		-25%	-16%	-53%
11	DGG			181	281				55%
12	DUV	99	74	106	128		-25%	43%	21%
13	EGC	18	114	207	187		533%	82%	-10%
14	EPC*				39				
15	GGC	2328	1772	1677	1109	2	-24%	-5%	-34%
16	GGK	398	431	423	285		8%	-2%	-33%
17	GPC	838	661	682	723	5	-21%	3%	6%
18	GUC-	77	57	1			-26%	-98%	
19	GUD	31	53	83	90		71%	57%	8%
20	HED	62	120	146	55		94%	22%	-62%
21	HGG-	70					-100%		
22	HTC	201	235	191	56		17%	-19%	-71%
23	JAN-	78					-100%		
24	JBI*				44				
25	JGG	241	256	234	184		6%	-9%	-21%
26	JGY	54	42	62	53		-22%	48%	-15%
27	JPG	105	111	106	85		6%	-5%	-20%
28	KBU	113	99	124	71		-12%	25%	-43%
29	KGY	76	50	84	56		-34%	68%	-33%
30	KML	114	69	117	59		-39%	70%	-50%
31	KNT	173	69	133	138		-60%	93%	4%
32	KRI	364	208	50	33		-43%	-76%	-34%

33	LAL-	14	26				86%	-100%	
34	LBN			27	65				141%
35	LBU*				49				
36	LEC	57	122	367	303		114%	201%	-17%
37	LGG-	104	31				-70%	-100%	
38	LOC			51	71				39%
39	LOK-	103	51	5			-50%	-90%	
40	MAN*				54				
41	MBC	67	66	70	4		-1%	6%	-94%
42	MBG	160	175	138	52		9%	-21%	-62%
43	MEC	417	536	633	599	6	29%	18%	-5%
44	MEG-		10	58				480%	
45	MGC	311	317	487	488	9	2%	54%	0%
46	MGU-	25					-100%		
47	MJB*				32				
48	MKG	176	156	167	140		-11%	7%	-16%
49	MSG	98	33	46	54		-66%	39%	17%
50	MUC			49	82				67%
51	NDP	116	92	96	114		-21%	4%	19%
52	NGU*				23				
53	NIA*				13				
54	NIC*				23				
55	NIP	65	71	49	61		9%	-31%	24%
56	NKG	314	339	393	341		8%	16%	-13%
57	PAR	225	92	147	114		-59%	60%	-22%
58	PDG	337	281	234	193		-17%	-17%	-18%
59	PEC*				20				
60	PED	1049	649	670	114		-38%	3%	-83%
61	PGC	333	465	386	316		40%	-17%	-18%
62	PGG	803	748	885	903	3	-7%	18%	2%
63	RAN	153	5	25	158		-97%	400%	532%
64	RAP	607	681	860	547	7	12%	26%	-36%
65	RBU-	56	55	24			-2%	-56%	
66	RGG	2288	2245	2036	1760	1	-2%	-9%	-14%
67	RMG	55	30	51	26		-45%	70%	-49%
68	RUB			10	46				360%
69	SAM*				29				
70	SBU	72	46	136	58		-36%	196%	-57%
71	SGC	342	576	466	539	8	68%	-19%	16%
72	SGG			59	164				178%
73	SHI	105	161	221	173		53%	37%	-22%
74	SID*				146				
75	SIT	75	56	48	31		-25%	-14%	-35%
76	SKG	522	448	483	423	10	-14%	8%	-12%
77	SPG	342	381	359	278		11%	-6%	-23%
78	SUG	47		45	182		-100%		304%
79	SUL	246	89	158	145		-64%	78%	-8%
80	TGG	361	258	282	239		-29%	9%	-15%
81	TPG	12	5	35	35		-58%	600%	0%
82	UNO			165	152				-8%
	Total	**17,715**	**16,118**	**17,557**	**14,771**		**-9%**	**9%**	**-16%**
	No. of cos.	62	61	66	72	Growth in co. no.	**-2%**	**8%**	**9%**

Note: Companies with * (asterisk symbol) are new entrants and those with - (minus symbol) are out of trade

The average annual biogas plant installed over the four years (2061/62 to 2064/65) is only 16,500, and at this rate, it is quite obvious that the BSP Phase 4 target cannot be met – this, despite the fact that the number of companies in the sector is increasing. Ironically, with the highest number of biogas companies in 2064/65, the total number of plants and the average plant per company has been the lowest in the four years.

Table 13: Plant Installation in 2064/65

Plant Installation	Companies
500 and above	8
200 to 500	10
100 to 200	21
50 to 100	16
Less than 50	17
Total companies	**72**

A look at the number of plants constructed by different companies in 2064/65 shows that 17 (23%) of the 72 qualified companies installed less than 50 plants and 33 (45%) installed less than 100 plants. 18 (25%) installed more than 200 plants including 8 companies that installed more than 500 plants.

Overall, the total number of plants under the BSP has reduced from 17,557 in the previous year to only 14,771 in 2064/65, a decrease by 16%. And, although there has been higher number of plants in 2063/64 as against the previous year, the actual growth is still negative (by 1%) compared with 2061/62 figures. Interestingly, only 3 of the top 10 companies had marginal increase in the number of plants installed in 2064/65 compared to the number of plants installed in the previous year. The rest of the 7 compared have lower number of plants this year than in the previous year. Number of plants of top companies like RBB and GGC has been consistently decreasing in the last three years.

Table 14: Increase/Decrease of Plants by Companies

Plant Increase	No. of Companies	Plant Decrease	No. of Companies
Up to10%	8	Up to10%	5
10% to 25%	5	10% to 25%	15
25% to 50%	1	25% to 50%	9
50% to 75%	2	50% to 75%	8
75% to 100%	0	75% to 100%	2
more than 100%	6		
Total cos.	**22 (31%)**	**Total cos.**	**39 (54%)**
New entrants in 2064/65	11 (15%)		

Note: Comparison of plants constructed in FY 2064/65 with that of FY 2063/64

Of the total 72 companies qualified for 2064/65, 61 are old companies while 11 were new entrants in the year. Five among 66 companies that were operating during the previous year left the trade largely because of very low number of plant constructions. Only 22 companies managed to construct higher number of plants compared to the previous year, while the number of plants of 39 companies decreased during the year.

The above discussion highlights the necessity to examine closely the reasons for companies not being able to increase their outputs, and whether increased number of companies would actually contribute to increase the overall number of plants.

New Entrants versus Old Companies

The new entrants in the present context are mainly the masons who were previously working in or for the old companies. With experience and field knowledge gained while constructing biogas plants and interacting and working with users, and contacts established with suppliers in the process, they feel confident to start their own company. The liberal entry policy of BSP has encouraged such companies.[7] The masons may possess good skill in constructing plants, but many have little or no knowledge of the costing, the financial and administrative management aspects of the enterprise they have established. They simply fulfill the minimum requirement to register a company and operate under BSP. In some cases, the manpower number and office set up requirements are just on the paper. These are virtually one-man enterprise. And that's where the problem lies.

Equipped with minimum overheads, the mason does what he is best at – that is, construct plants. Because of his contacts with the farmers, he manages to get hold of a number of orders, which he executes on his own. Most often, these orders are received because of low price offered to the farmers, lower than the annual quotation price. He does not care nor is he aware of the implications of undercutting price. Initially, he invests a little to buy materials from the market and workshop appliances. He cannot afford to avail materials in bulk. He can however afford to relinquish the office overheads simply because his overhead is very low. His office may virtually be in his bedroom or in a bag, and he is the manager-mason-supervisor-accountant all combined with or without help of immediate family members. Ultimately, he ends up getting more or less the mason wages only, something he had been earning all along while working as a mason for the old companies.

The older companies should not be complaining about BSP's open market policy, though. One of the major objectives of BSP is to achieve systematic and sustainable progress toward the development of a commercially viable and market-oriented biogas sector. Trying to create an environment of competition supports this objective. New companies should be able to enter the level-playing field; otherwise the old companies will be accused of 'owning the market by a handful'. Nonetheless, certain situations have been created by the emergence of these mason-established small companies, and these need to be understood.

Implications of mason-established companies

Firstly, when the masons start their own companies, their previous companies lose their employees and along with it, to some extent, their reputation as some skilled masons had been the real backbone or the face of these companies. Many of these masons had been doubling up their role in marketing for the companies as well. This advantage is lost. The companies may be able to use new masons but they may not really compensate for the older and experienced one who left them. Sending new staff becomes more costly. Thus, the number of plants installed by the older companies goes down.

Secondly, where do the new entrants go? Nowhere but to the same market where the old companies had been operating. Since they do not venture into new markets, they operate in the safe zones. Being virtually a one-man company with very low operating cost, they manage to get hold of plant orders by lowering their prices, or simply because the farmers are 'better acquainted' with the mason whom they have seen or heard of in the field. For many illiterate farmers, the 'face' appears to be more important than the company the masons represent. Thus, this also affects the plant installation capacity of the old companies. It is also

[7] It is reported that there have been cases where a mason fired from a company due to some misappropriation starts his own company.

felt that there has been gradual deterioration in the quality of biogas plants constructed by such small companies as they scurry to fulfill their targets to avoid BSP penalty.

A new company slows down the plant construction in two ways. It can offer the plants at lower prices than the old companies. Although, onset, this sounds good for the customer, the new entrant cannot meet the total demand of a particular area. Many customers are put on hold causing them to wait, and at the same time, creating dissatisfaction among the users who have got their plants constructed by the old companies. The new entrants would take years to construct what the old companies could make in one year.[8] On the other hand, it would take a long time for the old companies to recover what they had lost due to the new entrants. Thus, the market gets 'destabilized' as the market of old companies is curtailed and the customers are confused.

The old companies simply cannot compete with the new entrants in price. Mason-established companies may be happy with, say, a Rs. 500 margin after covering the labour cost which he himself gets as he used to while he was working for a company. Large companies cannot survive on that amount of margin. Unfortunately, some large companies have closed down or are contemplating closure of their existing branches in the areas where they feel insecure due to the new entrants. This has also led to the reduction of number of plants of companies.

A general apprehension prevails among the old companies and a number of them have voiced that they are half-heartedly into the biogas sector, and will have to reconsider their options.[9] Some companies already into other alternate energy sectors like micro-hydro or solar, are concentrating more resources on them where they feel more secure in terms of business opportunity and profitability. Some claim disillusionment with the sector, that it has lost its 'charm' and offers no 'prestige', and that profitability has been dwindling.

Finally, for some larger companies, having to scale down their operations and reduce their plant output due to the new entrants has brought them 'humiliation'. On the other hand, some cannot seem to come to terms with having to accept one's one-time mason as an equal – someone who has today become a 'general manager' of a company. And they blame BSP-Nepal for failing to make distinctions between the genuine and institutionalized companies and such small 'opportunist' new entrants, and putting them on equal terms.

Underlying Difficulties in Expanding Markets

- ***Market saturation and affordability*:** An interesting remark is that the accessible markets are more or less 'saturated' in terms of coverage. Those households that want and could afford have already had biogas plants installed, implying that those households that do not possess the plants are so poor that they simply cannot afford them irrespective of the subsidy or other facilities, or are simply not convinced enough to go for biogas.[10] Affordability is an over-arching issue for most of them. Purchasing capacity of rural poor is deteriorating due to lack of economic opportunities. Biogas plants are not a viable option for the truly marginalized or the real poor. Those in the upper income and social strata do not need them because they can afford to use kerosene, LPG or electricity.

[8] One good mason can construct 25 to 30 plants in one season.

[9] Reference to big companies like RGC and RES. GGC is mired into its own organizational problems and has failed to retain its leading position.

[10] The general quantification of potential biogas households (around 2 million) in the country may have been a simplistic assumption, that is, one biogas plant per household, and may not have taken into account the dynamics of the households in terms of income level, cattle possession, and physical space available for plant construction, or traditional practices or perception toward biogas.

- ***Traditional practices*:** There are certain segments of population that are hard to convince to 'protect' the environment and switchover to biogas fuel. Many communities cannot change their traditional fuel habits from firewood or use of *goitha* (cow-dung cakes). In some communities, the women do not come out of their households (or socially prohibited) to participate in biogas awareness programs conducted by 'outsiders' especially by other males. Even though the male members agree to have plants installed, the plants are soon abandoned because the women members, who are later expected to do the chores of mixing slurry, do not operate them properly due to lack of knowledge, or simply because they distaste the whole idea.
- ***Habitation issue***: Likewise, the habitation pattern of certain communities in the Terai is such that their households are joined or closely clustered and the cattle they possess are in the fields situated far away from the households, making it difficult to benefit from the biogas plants. Similar difficulty prevails in the hills where the household is in a small piece of land whereas the cattle are located in a distance somewhere else.
- ***Plant costs*:** The cost of plant construction has increased over the years. The previous year saw the biggest spiraling of prices of construction materials and pipes. Interestingly, the subsidy amount has not changed over the years, but the cost proportions of the plants have changed. Incomes have not increased with the increase in inflation. Thus, with the number of biogas plants increased over the years, the remaining few who do not possess the plants have to face higher costs of having them now.
- ***Benefits not going to real target people***: The construction of plants received some boost with the institution of grant amounts[11] made available to the poor through Rural Development Bank under the recommendation of respective VDCs. For this, the beneficiary who wanted to have a biogas plant installed had to be a certified member of a user's group. Despite the good purpose it purported, it was reported that a lot of this grant went to unintended target people, and the real beneficiaries had to undergo lot of hardship for this.
- ***Remoteness of areas*:** As observed earlier, the accessible areas are mostly covered. Most of the unexplored areas are in remote areas. The more remote the areas, the higher the cost of plant construction[12], and smaller the number of potential users who can afford the biogas plants constructed. Again, in this term, biogas plants have not become a viable project in the remote areas. Unless, of course, these are 100% subsidized through various programmes. In such remote places, firewood is still the preferred fuel, and no matter how expensive, kerosene is used.
- ***Low awareness***: Awareness about biogas as an alternative fuel, the global benefits and its benefits to households etc. is very low. Poverty and illiteracy have confined maneuverings along sustenance of life in most remote areas. In such a situation, people are not much concerned about saving the environment.
- ***Displacement of rural people*:** Another contributory element is the large-scale displacement of rural people to the district headquarters during the Maoist insurgency. Many potential users of biogas fled their households. Another effect of the insurgency, was the harassments biogas companies had to face from giving out forced donations or 'taxes' or seeking special permission to enter villages to construct plants.

[11] Rs. 1500 for Terai; Rs. 2500 for Hill; and Rs. 3500 for Remote Hill

[12] Considering the remoteness of areas, the actual cost of construction materials like cement, reinforced iron rod, sand etc. and other materials due to high transportation is much higher than the BSP quotation prices.

- ***Unhealthy competition*:** The prevailing unhealthy competition as mentioned earlier is a strong reason that has deferred many plants from being constructed especially by large companies. Large companies simply cannot compete in price with the smaller companies.

Exploring New Frontiers

The reason for all companies operating within the confines of limited market is simply the lack of resources and incentives besides the desire to avoid the risk involved in exploring new markets. They cannot involve in mass promotion on their own without 'assured' (and probably, 'exclusive') benefits for their efforts in creating the market. So far, BSP-Nepal has been taking the responsibility for promoting biogas. According to the companies, of late, biogas awareness programmes of BSP-Nepal have not been as effective as they used to be earlier, and they have not contributed much to creating newer markets.

With appropriate planning and budget, NBPA could play a role in doing that more effectively. NBPA seems keen on assuming that role provided it has access to necessary budget for it from BSP. BSP-Nepal could share its annual budget for awareness programme with NBPA and work out areas where they would be involved both jointly and individually. It would seem more appropriate for the regional offices of NBPA to go for promotions in areas that have the potential but not ventured so far due to various reasons constraints.

The regional offices could involve interested individual companies willing to partly contribute to such programs on the premise that they would have the exclusive rights to construct plants in these markets created by them on some proportionate basis.

On the other hand, BSP-Nepal could concentrate on awareness and promotional programs in remote areas. It is quite clear that companies will not venture into such areas for marketing purposes or even for plant construction unless there are extra incentives or they are allowed to charge more than the quotation prices. New companies henceforth should be given the mandate to operate in those new areas only. Those that have fulfilled certain level of plant installation in those new areas may later be allowed to enter and compete in the accessible market also.

.5.
MASON RETENTION

Masons are trained technical personnel that construct biogas plants on behalf of the companies. The survey shows that the average experience of masons is nine years, while some have been in the trade since last 16 years. Companies have their own ways of employing the masons. Biogas plant construction being a seasonal activity, companies cannot afford to employ them full-time, and so most masons are hired on piece-rate basis. These are commonly referred to as contract masons. However, some experienced ones are retained as permanent staffs that double up as supervisors. Some companies resort to differential payment to the masons combining a minimum level of fixed salary as well as certain amounts on the number of plants constructed by them. During off-season, these masons have to fend off on their own. They take up masonry jobs in civil construction or work in agriculture or other petty jobs. Once the season starts, they are again hired by the biogas companies. However, companies find it difficult to plan not knowing for sure whether their temporary masons will be available or not in the start of season.

So far, over 4,000 masons have been trained under the BSP, but according to BSP-Nepal, the retention rate is only 30%. The companies invest Rs. 5,000 to 6,000 per mason to have them formally trained, and it takes about two months to prepare a mason. Only certified masons are permitted to construct plants under BSP norms. It takes a long time to search for people who are capable and willing to be a mason to construct biogas plants, and this is especially so when young people are lured to more attractive prospects in other sectors and/or countries. Losing trained manpower is a drain on the investment made by BSP and the companies to strengthen the biogas sector. Yet, the reality is that the retention rate is very low.

The companies are always facing shortage of masons; and, this is one major reason for many companies not achieving their annual plant targets. The overall targets cannot be met without significantly increasing the number of masons. To overcome this constraint, some companies invest on producing new masons; others offer good compensation package and fringe benefits to ensure their retention, while some simply resort to luring away other companies' masons.

Difficulties in mason retention

- ***Outward-bound***: There is a tendency among large number of trained masons, especially the young ones, to migrate to the Gulf, Arabian and South Asian countries or to neighboring India for employment. The younger masons are more attracted to foreign jobs in comparison to the masons who are 40 or above. This is in line with the general trend among the Nepalese youth who are attracted to foreign employment where they perceive better prospects. The government's foreign employment promotion policy has aggravated this situation even further. These masons are willing to do any job in the Gulf countries where they are likely to earn somewhere between Rs. 10,000 to Rs. 12,000 per month. For them, this is more attractive than what they earn with Rs. 1,600 per plant they get in the plant construction.
- ***Seasonality nature of work***: Besides, plant construction work is seasonal, and except for only a few, most masons do not get full employment in biogas sector. They cannot sustain solely on this profession. Few get opportunities for other petty jobs. Therefore, they look for employment abroad that pays them more and regularly.

- ***Unethical practices***: Due to shortage of masons, there is the tendency among many companies to resort to unethical practice of luring in masons of other companies. Despite advance amounts (including advance Dashain allowances) normally given to masons, many tend to leave the companies without returning the advances. Besides, they get away with such practices simply because some other companies willingly employ them without so much even bothering to check with the companies where the masons were previously employed. Many established companies have to do with new masons who are less experienced.

  And, of course, such practices breed bad intentions among some masons who deliberately leave or run away since they cannot or have no intention of paying back the sizable advances taken from their company. Some join up companies in other districts or simply leave the trade altogether.

- ***Wage payments***: There are also cases where biogas companies do not or are not able to pay wages to the masons timely. This prompts masons to leave such companies and go to other companies. Small companies that rely on short cash flow have to wait for the release of subsidy from BSP to make payments.

- ***Advance payments***: The practice of giving advance payment to the masons has created financial burden to the companies especially when the masons hop from one company and to another.

- ***Mason-established companies***: Some masons have themselves set up their own companies and have begun competing with the companies in which they were previously employed. This reduces the availability of masons for the older companies. They possess the expertise to construct plants, and utilize the connection they had established during their field work earlier to prospect clients.

Measures for mason retention

- ***Mobilizing the 40 Plus***: Since many young trained masons are migrating for employment abroad, the focus should shift on training masons who are aged 40 or above in sufficiently large number. Provide special incentive for this age line for training. It is less likely for people of this age to migrate, and they would more or less remain stable in their trade in Nepal.

- ***Penalizing for infractions***: The practice of joining other companies without getting clearance and/or consent from companies the masons were previously associated with should be strongly discouraged. Companies must abide by the NBPA code of conduct relating to such practice of pulling away masons, and the companies that breach the code should be punished. NBPA must develop teeth to take actions on such issue.

- ***Increased wages***: Since the profession is less attractive in terms of earnings to masons, the present wage rate Rs. 1,600 should be increased to Rs. 2,200-2,500 per plant. The average earning should range from Rs. 8 thousand to 10 thousand.[13] Masons should be mobilized to repair old plants or deal with maintenance problems during the off-season. This will provide them the opportunity to earn extra income.

- ***Producing local-level masons***: Encourage interested local people to work with experienced masons as their assistants or helpers while making plants in the formers'

[13] A measure that could have been employed to turn around the difficulty in plant installation during the periods of insurgency and political turmoil. The masons could have been motivated to go to the field if only their wages had been increased by some Rs 300 to 400 per plant through some special arrangement with BSP-Nepal.

villages and in their vicinity. Subsequently, recommend such interested persons for NBPA mason training. Having a trained mason at local level is advantageous to companies as plant problems at local level do not have to be brought to the company.

- ***Bonus and commission***: Provide certain fixed amounts as bonus or commission to the masons for bringing new business (garnering demand for plants) to their companies. This could supplement their wages for plant construction and encourage them to remain in the trade. In fact, many masons are actually involved in talking to potential clients and bringing business for their respective companies.
- ***More trained manpower***: More masons should be trained rather than working with only few masons. The fact that they leave or migrate should not deter introducing new masons. To a large extent, this would also check problems associated with masons leaving a company and joining another one.
- ***Women masons***: Some women could also be encouraged to work as masons although they could be less efficient in terms of mobility to different places and terrains for plant construction or handling heavy objects during construction. However, female masons could be utilized for repair and maintenance of plants in convenient localities. Both BSP and NBPA should play constructive roles in promoting involvement of women in the sector.
- ***Multi-skilling***: Alternatively, special provisions could be worked out to pool interested trained masons of different companies to employ them in infrastructure development programs of the local government or development institutions. BSP-Nepal and AEPC could coordinate this with NBPA and concerned institutions for this. This would involve multi-skilling and training masons accordingly. Since the intention is to ensure full employment to the masons, this kind of involvement should be during the plant construction off-season.
- ***Pooling masons under Regional Offices of NBPA***: Masons, both old and new, of certain region could be pooled under the umbrella of the concerned regional offices of NBPA. Companies related to that regional offices of NBPA should apply for masons with that Regional office of NBPA specifying the VDCs and number of plants to be constructed. The Regional Office of NBPA would then plan and depute masons to those areas. This way, rather than masons belonging to specific companies, they will construct plants for different companies. This way, if a mason gets to construct 5 to 6 plants per month, that would give him a good earning, and this would probably deter him from migrating. Also, during off-season, these masons could be involved in maintenance of the old plants.

.6.
CONSTRAINTS AND CONCERNS

An opinion survey of the company owners on a 5-point Likert scale was conducted on five variables – viability of biogas sector without government subsidy; viability of one's company in the sector without subsidy; levels of satisfaction with one's present business, with the role of NBPA, and with the role of BSP-Nepal.[14]

Table 15: Opinions on Some Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Sector without subsidy	28	1	5	2.82	1.52
Your business without subsidy	26	1	5	2.69	1.57
Satisfaction with Business	28	1	5	3.89	1.23
Satisfaction with NBPA	28	1	5	3.75	1.27
Satisfaction with BSP	28	1	5	3.71	1.24

The result of the survey as shown in the above Table reveals that the biogas entrepreneurs are highly satisfied with their own business. This is a good sign for the sector. The average satisfaction level of is 3.89 out of 5 and this is supported by the lowest standard deviation of 1.23. Despite their expression of satisfaction, they appear less optimistic about the commercial prospects of the biogas sector and their own businesses if the government subsidy were to be taken away which is revealed by the average agreement of 2.82 and 2.69 respectively as shown in the table above. There were, however, a few companies that expressed confidence that they could do good business even if the subsidy was discontinued.

Low business confidence

Contrary to stated high level of satisfaction with their business, owners as well as staffs of different companies in general seem to voice low motivation and high degree of hopelessness as they feel the lowering of their profitability and uncertainty about the future of their business. It is learnt that some companies are gradually moving toward other business interests as well with the intention of phasing out of biogas sector.

Besides the expressed obvious reasons being unhealthy competition, shrinking market share, apathy of BSP etc., the underlying reason for such disenchantment is the lack of real entrepreneurial capability to improve their productivity and competitiveness through more efficient management of their businesses. This has brought about hopelessness as they fail to protect their turfs, and submit helplessness at the low level of accessibility to new markets. A lot of this feeling may have emerged due to their narrow mindsets, mostly conditioned by their dependence on BSP, which, among other things, may be due to the rigidity of the BSP. These owners need to be vitalized with effective entrepreneurship programs and orientation on open market economy.

They cannot conceive their business without subsidy, and extend this same feeling toward the whole biogas sector. On the other hand, their seemingly positive outlook toward BSP-Nepal or NBPA indicated in the survey (*Table 15: Opinions on Some Variables*) contradicts with their grievances and not-so-high opinion they have expressed during interactions with them.

[14] Scale of 1 to 5: 1 for 'Strongly Disagree' to 5 for 'Strongly Agree'.

Perceived threats and problems

Table 16: Opinions on Forces of Competition

		New entrants	Substitutes	Competition	Suppliers	Customers
N	Valid	28	28	28	28	28
	Missing	0	0	0	0	0
Median		4	2	4	3	3
Minimum		1	1	1	1	1
Maximum		5	5	5	5	5

According to the opinion survey based on the 5-point Likert scale, new entrants and competition are perceived as the largest forces that affect the business of the companies. New companies, especially set up by small entrepreneurs (including masons), are seen as potential threats that are likely to destabilize the sector rather than boost it. Industry competition is perceived to be very strong, and this is matter of concern to many companies especially in the emergence of unhealthy competition.

Table 17: Opinions on Other problems

		BSP Problem	Fund problem	Manpower problem	Awareness problem	Raw materials problem
N	Valid	28	28	28	28	28
	Missing	0	0	0	0	0
Median		2.00	4.00	3.00	3.00	2.50
Std. Deviation		1.47	1.26	1.30	1.41	1.20
Minimum		1.00	1.00	1.00	1.00	1.00

As seen in the above table based on the survey, the companies perceive financial problem as the biggest one among other problems that are related to BSP, manpower, awareness, and raw materials. They also strongly perceive manpower problem with special reference to masons, and lack of awareness among rural users.

Concerns for increasing targets

Hypothetically speaking, if the number of biogas plants is to be doubled, or, say, the target is to be significantly increased, the biogas companies would need to work together in a coordinated manner (as opposed to competing) not only among themselves, but also with concerned regional offices of NBPA and local agencies/communities. At the same time, institutions such as BSP-Nepal and AEPC and other stakeholders should be able to create the positive environment and support their efforts through multi-pronged approach in the form of a targeted campaign. Companies are concerned about increasing targets and raise a number of issues that need to be addressed. These issues concern the shrinking market, unhealthy competition, inadequacy of masons, low purchasing capacity of the rural poor, relationship between subsidy and costs, working capital and access to credit, shrinking profitability etc.

On the issue of increasing plants, it might be necessary to assess the number of plants in actually in operation among the total plants constructed so far under BSP. Do the 98% of plants that are said to be in actual operation include those plants that have crossed the 3-year guarantee period? It is important to ensure that plants older than three years are also contributing to the total targets. Neither the companies nor BSP looks into the old plants. Of course, farmers should take the initiative to ensure that their plants are properly maintained, should approach companies to seek solutions to their problems, and be willing to pay for services. Unfortunately, many farmers do not come forward with their problems; they would

rather resort to LPG or revert to fuel wood for cooking rather than stir *gobar* (slurry) either because they are too lazy to do so or that their standard of living has risen. These farmers end up blaming BSP-Nepal and the companies for neglecting them. On the contrary, some rural farmers are found to take very good care of their plants

Dole out mindset of farmers

There is a situation where farmers do not want to purchase plants if they have to pay any amount to the companies, that is, besides bearing the costs for construction materials and the labour cost, they are not willing to pay for other cost like the direct costs of the companies. This is normally the case if farmers agree to pay for the plants on their own initiative. That means the companies have to satisfy with only the subsidy amount (Rs 9,500) they would get from BSP for the plants constructed. Many farmers are beneficiaries of socio-economic development programs of different NGOs, donors and such agencies, and they get to possess biogas plants partially funded by such programs. Besides labour contribution, the farmers most often do not have to spend anything for the plants. And that's where the above mentioned situation arises. They demand for cement and other materials and costs even for maintenance. NGOs also cater to such demands of farmers. Heavy involvement of too many donor driven programs has spoilt the mindset of rural population. They correlate BSP program in similar line and expect to acquire plants without any financial contribution from them. Thus, they cause distortion by spoiling farmers and promoting dependency.

Most often, the biogas companies oblige to this term too. Interestingly, if the farmers do not agree to pay any cash, and companies are willing to construct plants, it means that they still make profit within Rs 9,500 despite having to bear the rest of the costs. This should raise the question of the quality of plants constructed under such conditions.

Entering Low Penetration Districts (LPDs)

Although the biogas companies would like to go to LPD, they are not attracted toward it because they feel that the costs outweigh the benefits in the present context. First, there are no incentives to enter those areas without assured market. If there is a mechanism to absorb the high marketing cost that is involved, and assured exclusivity for the individual or collective companies that create the market, then it might be possible to venture into the LPD. They are wary that the market once created by their effort will be overrun by others resorting to price cutting. Secondly, there should be special set of prices for plants applicable to those areas. The prices will be significantly high mainly due to the high transportation cost that would be entailed. The farmers would not be able to absorb these costs unless the product is tied up with some additional external funding. Here too, the subsidy has to be rationalized.

Roles of BSP-Nepal and NBPA

Despite the overall favorable impression of BSP-Nepal in the survey, both the biogas companies and workshops have grudges against it[15], inter alia, the service delivery mechanism of the programme, even to the extent of questioning the integrity and practices of personnel involved in monitoring and inspection activities of the programme. They look towards BSP-Nepal to bail them out of the present predicament.

They complain of being bound by strict policies and regulations and conformity leaving little scope for leveraging in the price or costs by exercising managerial differences among them. It

[15] Many times, respondents make reference to BSP and BSP-Nepal interchangeably causing confusion in making distinctions when it comes to people talking about the problems – whether the problem is BSP (the programme) or BSP-Nepal (the implementing body).

is as if entrepreneurship and managerial ingenuity are stifled by virtue of this sector being under the tight spanner (and scanner) of well-intentioned programme frameworks of BSP, AEPC and other developmental programs. BSP-Nepal appears to be concentrating its efforts more on monitoring and controlling rather than facilitating them. It is quite sad that with their feeling of disenchantment, they fail to see the holistic approach of BSP and the positive role of BSP-Nepal.

Companies complain that BSP has imposed unwieldy requirements like citizenship certificates, use of GPS, photographs etc. for approving subsidy payments. While BSP insists that these are necessary for monitoring purpose, the companies claim that they are administrative nuisances and raises costs. There appears to be some grave relationship problem and loss of faith between BSP-Nepal and the older companies.[16]

Companies do not grudge against NBPA. NBPA has not been able to play the active and effective role that it should have to strengthen this sector, and to facilitate both the companies and the workshops. It is their own association that should be empowered to handle many of the activities that BSP-Nepal is presently doing.

Though BSP-Nepal had made significant contribution in stimulating market awareness through different promotional programs in the past, of late, its efforts in this have not yielded very effective results. This is probably due to the fact that markets in accessible districts are almost saturated in the given socio-economic context. BSP-Nepal has not been able to effectively mobilize other institutions like NBPA, its regional offices, NGOs/CBOs, and even the biogas companies, to create awareness in remote districts and establish new markets. Unless BSP-Nepal coordinates with immediate institutions like NBPA and its regional offices in this effort, it is going to be quite difficult. They need to be strengthened with budgetary allocations and motivated toward this through incentives tied up with their efforts.

Working capital

Most biogas companies depend very much on advance subsidy of AEPC. But delays in the processing and release of the advance subsidy by BSP-Nepal or AEPC cause working capital apprehensions. Besides these, most companies are tied up with loans from commercial banks or other financial institutions. Companies have to resort to (private) loans at high interest rates due to lack of appropriate collateral or collateral acceptable to banks. ADB/N and other commercial banks barely accept physical assets located outside municipalities, and even if they do so, their valuation is done at low rates. This subjects borrowers to financial hardships. On top of this, the workshops are hard pressed by delayed payments by biogas companies.

Preparing business plans

Barring one or two big companies, none of the biogas companies or the workshops is capable of formulating or following qualified business plans. They resort rough estimates and mental forecasts of the market demand and their own personal capacity to perform. They make estimated income and expenditure statements. Targets are set haphazardly and are not able to attain them either. They have some idea of costing, though not very scientific. Some do not follow proper accounting. In fact, some companies do not even seek or use bank statements at the time of accounting.

[16] BSP-Nepal is accused to being more interested in policing, assuming negative 'attitude' towards companies (implying that companies are only seen as cheaters and dishonest), resorting to victimizing companies, promoting unethical practices in the field etc.

Subsidy disbursement

Advance subsidy is a big incentive to increase the number of plants. It is a novel and interest-free working capital available to companies. The faster the advance subsidy turnover, the better it is for the companies. However, companies often complain of delayed disbursement of this advance subsidy which causes difficulty in making financial plans. Besides, the delay in release of subsidy after submission of reports also adds to financial the woes. They say that subsidy release takes two or three months time and should be shortened to two weeks. Of course, BSP-Nepal has its own say that most companies fail to submit complete documents, evidences and other necessary details with their reports. And this causes the delay.

Concern about dealership

No strong resistance to the idea of dealership has been conveyed by the companies. Some agree that it is a good way to promote and increase plants number. Although not averse to the idea, they have reservations regarding quality control issue, and the fact that the companies themselves become accountable for the plants constructed by dealers makes them feel they actually do not gain much financially in this arrangement. The administrative and supervision costs that a company is perceived to save by delegating construction job to other party are not there. Unless the dealers themselves are made responsible for the quality of the plants, the companies may not be ready for this arrangement.

Fulfilling product quality standards

There is no argument about the rationale behind all the different technical specifications and quality parameters developed for biogas plants. However, there is a feeling that among the 70 odd points in the monitoring and inspection checklist based on which the performance of the companies are evaluated and graded, some requirements like soil topping over the gas dome, covering of slurry tank etc. are the responsibility of the users. Companies should not be penalized for the negligence of the users. Workshops have no problem fulfilling the quality standards for appliances. They strictly adhere to the technical specifications provided by BSP-Nepal.

Mason retention

One of the major constraints in increasing plant targets is the lack of adequate number of qualified masons. Many trained masons have either migrated abroad or changed their area of work due to better opportunities. Even among those that are engaged in the biogas sector, there is the unhealthy tendency of job hopping from one company to another raising financial implication. Many companies are not sure whether their mason will be available or not in the next season. (The detail discussion on mason retention is done in Chapter 5 which is dedicated to the issue.)

.7.
CONCLUSION AND RECOMMENDATION

Despite the increased number of companies under BSP, the number of plants has decreased. The number of companies under BSP has been the highest in 2064/65 with 72 numbers while the total number of plants and the average plant per company has been the lowest at 14,771 in 2064/65. The average annual biogas plants installed over the four years (2061/62 to 2064/65) is only 16,500. A number of top companies have seen their plants being reduced over the last three years. This is going to have serious implications on BSP's targets and promotion of this sector especially in the context of implementation of BSP Phase 5.

It is very important to revive and retain business confidence of entrepreneurs in this sector especially after it has come a long way and is making a dent in improving the environment and the lives of rural population, establishing itself as a viable and healthy alternative energy suited to the geo-socio-economy of the country, and show casing the success of the concept and disseminating the technology in other nations, and is beginning to taste the payoffs through CDM etc. The business confidence has to be revived by proving that commercial and development objectives of the sector can be complementary. The lack of confidence is related to disenchantment (not disillusion altogether) which is related to perceived limited market, unhealthy market practices in the industry, shrinking profitability etc. These are all interrelated issues and cannot be dealt in isolation. Appropriate interventions will have multi-pronged effect. A number of measures are dealt here that will address the different issues adversely affecting the sector.

Hypothetically speaking, if the number of biogas plants is to be doubled, or, say, the target has to be significantly increased, the biogas companies would need to work together in a coordinated manner not only among themselves (as opposed to competing), but also with workshops, concerned regional offices of NBPA, financial institutions and local agencies. At the same time, institutions such as AEPC, BSP-Nepal, donors and development agencies, micro-credit institutions, and other stakeholders should be able to support their efforts through multi-pronged approach in the form of a targeted campaign. Interventions are suggested to be extended from micro to policy levels.

Mason retention

If the plant target is to be increased, the number of masons needs to be increased significantly and maintained. This can be done through regular training of new batches of potential masons, inducting 40-plus people and women in the trade, making the trade more dependable and earning-profession by increasing wages and providing incentives, utilizing their services during off-seasons, multi-skilling, maintaining pools of these technicians at the regional office-level, etc. The issue of mason retention has been dealt in detail in Chapter 5.

Controlled induction of biogas companies

Considering the target BSP has to achieve during the current phase and the huge potential biogas households, it is obvious that many more biogas companies are needed in the field if BSP is to expedite extensive dissemination to remaining households in the existing markets and extend reach to least penetration areas. Controlled induction of new companies with commitment to pursue new markets will be beneficial for the sector. This will also ease the apprehensions of the old companies regarding the new entrants operating in the same markets as them.

A lot of effort needs to be put together by BSP-Nepal, NBPA and the companies to stimulate and hence open up new markets. These new markets could be designated to new companies. Some form of additional incentives need to be devised in this regard. For this, the present three-category subsidy mechanism needs to be reviewed. Hence on, biogas companies must be designated specific areas of operation to create a balance in the market.

As a measure to ensure only genuine entrepreneurs are involved in the sector, which is also a concern of BSP-Nepal, it might be worthwhile to enforce regulation requiring companies to produce a deposit/bank guarantee of, say, Rs. 5 lakh or higher instead of the present Rs. 1 lakh the companies are required to deposit. This will encourage companies to be serious in achieving their targets. Of course, the motive is not to create a deterrent to small entrepreneurs. This will also eliminate a number of distortions in the market created by small companies.

For those new companies that are already in the sector, give them two years to develop their capacity to achieve a target of, say, 400 plants. Provide them with whatever support they seek such as training and capacity building programs. If they cannot achieve the minimum target by two years, let them operate as dealers or subcontractors only rather than as a full-fledged company.

BSP has already tried to make some effort into institutionalization. Companies are required to have a minimum level of manpower and office setup to qualify to operate under BSP program. However, there are companies having only one or two active personnel running the whole show. BSP-Nepal must be able to effectively monitor and control this.

Policy review of some issues

Rationalization of subsidy provision: The present subsidy provisions do not match the cost of plants. Whereas the costs have increased very substantially, even so in the recent times, the subsidy amounts have not increased. Rather the subsidy has been decreased compared to FY 2050/51. The ratio of subsidy in total cost of the plant is very low. Companies cannot reduce the prices whereas the purchasing capacity of potential users is getting worse. Therefore, subsidy should be rationalized and made more realistic in the present macroeconomic context of the country. This will stimulate the market to a large extent.

Benefits of carbon trading: Since BSP has benefited from carbon trading, and this will be an endeavor, this benefit could be shared with the users as an incentive to them. They will share the joy and will realize that they should be serious about environment conservation, be serious about the operation and maintenance of their biogas plants, and that they need to propagate this in a concerted manner by supporting BSP.

At the same time, part of this fund could be used to leverage on increasing the subsidy provision of this sector, making the plants more affordable to the poor.

Rationalization of district categories: Current division of Terai, Hill and Remote Hill do not represent same demographic and geographic divisions from the view point of market niches. In the context of creating multiple market niches, the categorization of districts needs to be carefully redefined by considering approaches to major road heads as one major criterion.

Exploring new markets

The market has to be strongly stimulated and new markets created. Many believe that the market is almost saturated. Of course, this is may be true in the present context where the market concentration is in non-remote regions. There is vast market that needs to be explored in remote areas and LPDs. Going by BSP documents, so far, only 10% of the potential users have been reached by the program. Concerted efforts should be made in this regard. BSP

could involve biogas companies and the regional offices of NBPA in promotional activities involving masons and supervisors during off-season. Further details on new market creation have been dealt in Chapter 4.

Quotation practice

Learning from the past year's experience, it becomes imperative that the practice of developing annual quotations or price fixing should be reduced to shorter periods, say, half yearly. And these quotations should be made on regional-basis with the close involvement of regional offices of NBPA. Differential pricing should be developed for more categories of districts unlike the present three blanket categories of hill, remote hill and Terai. The hill category districts need to be carefully categorized based on topography and access to road heads[17].

Alternatively, the quotations should incorporate flexibility to maneuver through drastic price rises of major raw materials and components, or incorporate terms and conditions for validity stating that any significant increases in prices of major component beyond, say, 10% will cause revision of prices of appliances or plants. This may be difficult, but some form of flexibility needs to be incorporated to accommodate price changes.

Institutions like FNCCI, district chambers of commerce, local district administration or other credible bodies can be called upon to certify price changes and to adjust the quotation accordingly within the given year.

Special credit and subsidy schemes

Another important issue that must be addressed is the problem regarding easy access to credit for both the companies and farmers. Small companies and others not in the position to show assets in urban areas as collateral face the problem of availing loans easily. They have to resort to other arrangement for loans in high interest rates. Likewise, many farmers would rather seek private loans than go for micro-credit loans which they perceive is cumbersome.

Rural Development Bank's grant of Rs 1,500, Rs 2,500 and Rs 3,500 for biogas plants for Terai, hill and remote hill respectively has contributed to the plant growth to some extent. Farmers get the subsidy when they take loans from the bank, subject to 15% interest, of course. It would be only fair if other farmers who had plants constructed through their own resources without getting the loan also received the grant. This could stimulate the growth of plants further.

It appears that this scheme has not touched the real potential beneficiaries who are poor.[18] AEPC and BSP should intervene and take up this matter with the rural development banks to streamline the procedures and the interest rates to make this subsidy and credit accessible to the poor. It would also be beneficial if such a subsidy scheme like that of Rural Development Bank was extended to other areas including remote hill areas and with wider coverage.

[17] Transportation cost is a matter of big concern and a major constraint in the demand side of the biogas plants. The quotations must incorporate this issue directly, or have special provisions for this cost depending on rationalized district-category.

[18] This has benefited a very small proportion of potential users who are, in fact, those that are in the position to repay the loan (at such a high interest rate of 15%), and those recommended as eligible. Larger proportion of potential users, the real poor, do not benefit from this scheme. Besides, this scheme is limited to certain areas where the bank operates. Therefore, the scheme has not touched larger beneficiaries who are the real poor. On the other hand, ADB/N has been gradually pulling out its operation in rural areas and is concentrating its efforts more in district headquarters. Thus, the potential users have no benefits from this bank either.

Enhancing role of NBPA

Since the concept of regional offices of NBPA are coming up, they should be significantly empowered through capacity enhancement and allotment of numerous tasks such as coordinating mason and plant allocation, plant promotion, monitoring and training, facilitating quotation finalization etc. NBPA should handle the issue of proposing regional quotations for plants. They will collect local prices, discuss and forecast the price trends, and propose to the head office.

The concept of pooling masons under regional offices of NBPA needs to be considered. Masons will be pooled together and registered under NBPA in different regions. They will be deputed to jobs as companies apply for masons with these offices. The companies outsource the services of masons. This way they will be under the control of NBPA.

NBPA should enter into agreement with different workshops, especially those that are not owned by biogas company owners, to purchase certain number of appliance sets to supply to smaller biogas companies. This will be an arrangement like in the supply of main gas valves by NBPA.

Empower NBPA to carry out 100% quality inspection while BSP-Nepal limit to about half the number of random quality control. This will reduce the per plant inspection cost of BSP.

Regional offices of NBPA will conduct promotion activities in new and unexplored but potential areas in coordination with BSP-Nepal and interested companies. BSP should allocate necessary budget to NBPA for this. BSP-Nepal, with or without NBPA, will go to remote areas where the cost of promotion is likely to be high. The task of promoting biogas plants should be allotted to regional offices, which can also deal with equal or proportionate distribution of plants proposed by NGOs/CBOs in specific jurisdictions.

NBPA should be able to strictly implement its code of conduct devised for its members, among other things, to control mason snatching and to discourage job hopping of masons.

Enhancing management capability of companies

At the institution-level, the companies should strengthen themselves and move toward professionalism, improved management practices. It is very important that they develop understanding of the dynamics of biogas sector in a holistic manner, and not see it only as a profiteering venture.

These biogas companies and workshops must be supported at individual level in upgrading their capability in general management and especially in marketing, quality control, financial management, and costing.

Despite the different means adopted to mobilize orders for plant construction, the companies are weak in marketing management. More marketing research activities are required to better understand the needs and preference of the rural population from geo-socio perspectives.

Recognition of companies

It would be worthwhile to also consider the contribution of individual companies to the total number of plants of BSP in a fiscal year to evaluate companies rather than consider only the individual target and achievement. This could contribute to positive grading of the companies. Reward top three companies each year based on market share that they could cover. Provide continuous special incentives to companies for achieving certain targeted number of plants in a ladder format. Provide national recognition for highest three plants makers.

Reviewing plant feature of BSP

There is a feeling that the BSP has not been able to reach the 'real poor', but only the middle income population. One line of thinking is that the real poor and many others cannot afford to keep domestic cattle. In the present socio-economic setting, one could question the relevancy of linking plants with domestic cattle alone. It would be worthwhile to explore whether BSP modality regarding the design and feature of the plants can be reviewed to make it more versatile by making it possible to link it with other wastes also besides bio slurry. This could contribute to increased target of BSP. It is also time for developing alternative cheaper plant models that would be more economical and socio-cultural friendly. Biogas plants could be promoted in urban areas also that are linked to household wastes.

ANNEXES

Annex 1: List of Persons Interacted with

Mr. Saroj Rai	Executive Director, Biogas Sector Partnership–Nepal
Mr. Bala Ram Shrestha	Director, Biogas Sector Partnership–Nepal
Ms. Bindu Manandhar	Senior Officer, Biogas Sector Partnership–Nepal
Mr. Guru Prasad Shrestha	Officer, Biogas Sector Partnership–Nepal
Mr. Uttam Prasad Jha	OSID Advisor, Renewal Energy Sector, SNV-Nepal
Mr. Samir Thapa	Renewal Energy Project, Alternative Energy Promotion Center
Mr. Krishna Subedi	Chairman, Nepal Biogas Producers Association
Mr. Mohan Sharma	Executive Director, Nepal Biogas Producers Association
Mr. Surendra Kunwar	Director, Rastriya Gobargas Nirman Tatha Sewa, Kathmandu
Mr. Shekhar Aryal	Director, Rastriya Gobargas Nirman Tatha Sewa, Kathmandu
Mr. Surya Prakash Hada	GM Manager, Gobargas Tatha Krishi Yantra Bikash, Kathmandu
Mr. Upendra Rimal	MD, Rapti Gobargas Company, Chapagaun, Lalitpur
Mr. Durga Timilsina	Business Manager, Rapti Gobargas Company, Chapagaun, Lalitpur
Ms. Shanti Sapkota	Branch Manager, All Nepal Biogas Company, Banepa, Kavre
Mr. Rudra Prasad Timilsina	Technician, All Nepal Biogas Company, Banepa, Kavre
Mr. Ram Chandra Gautam	MD, Rastriya Gobargas Nirman Tatha Sewa, Bharatpur
Mr. Loknath Ghimire	MD, Biogas Tatha Urja Bikash Company, Bharatpur
Mr. Guru Dutta Timilsina	Chairman, Nil Kamal Gobargas Company, Bharatpur
Mr. Khil Bahadur Basaula	Manager, Janta Urja Bikash Company, Bharatpur
Mr. Ramesh Lohani	Manager, Baikalpik Urja Bikash Company, Bharatpur
Mr. Min Prasad Bhandari	GM, Tribeni Gobargas Company, Kawasoti, Nawalparasi
Mr. Shesh Raman Khanal	MD, National Iron & Alternate Power Development Co., Bharatpur
Mr. Prakash Shrestha	Director, National Biogas Construction and Services, Bharatpur
Mr. Mukti Adhikari	Manager, Galaxy Engineering, Bharatpur
Mr. Rishi Ram Timilsina	Manager, Nil Kamal Engineering, Bharatpur
Mr. Dom Bahadur Gurung	Regional Office, NBPA, Butwal and GM, Gharelu Gobargas Tatha Prabidhi Bikash Co., Butwal
Mr. Narayan Gyawali	MD, New Deep Public Gobargas, Dang (*met in Butwal*)
Mr. Laxman Aryal	Director, Rastriya Gobargas Nirman Tatha Sewa, Butwal Branch
Mr. Rukmangat Acharya	Manager, Rastriya Gobargas Nirman Tatha Sewa, Butwal Branch
Mr. Narayan Neupane	Executive Chairman, Paschimanchal Dhaulagiri Gobargas, Butwal
Mr. Kehar Singh Thapa	GM, Butwal Gobargas Company, Butwal
Mr. Rabi Lal Acharya	MD, Lekhbeshi Saurya Urja Tatha Gobargas Sewa Co., Butwal
Mr. Kamal Gyawali	GM, Bhrikuti Gobargas Company, Butwal
Mr. Keshab Raj Khanal	MD, Janapriya Gobargas Company, Butwal
Mr. Dhan Bahadur Thapa	Manager, Shital Gobargas Company, Butwal
Mr. Ram Bahadur Gurung	MD, Pokharel Biogas Products Industries, Butwal
Mr. Babu Ram Shrestha	Manager, Gobargas Tatha Krishi Yantra Bikash, Butwal
Mr. Kamal Dahal	Manager, Shikhar Biogas Products and Industries, Butwal
Mr. Narayan Bhattarai	Manager, Narayan Metal Cast, Butwal
Mr. Indra Bahadur Khatri	Manager, Asian Gobargas Products, Butwal
Mr. Arjun Prasad Gurung	Director, Gandaki Gobargas Sewa Kendra, Pokhara
Mr. Ramesh Ghimire	Manager, Pragati Gobargas Sewa Kendra, Pokhara Branch
Mr. Gopal Baral	MD, Bageswori Gobargas Company, Pokhara
Mr. Phani Narayan Bhattarai	Director, Manakamana Gobargas Sewa Kendra, Pokhara
Mr.	Program Officer, NBPA Regional Office, Pokhara
Mr. Harihar Bhattarai	GM, Danphe Biogas Company, Birtamod, Jhapa
Mr. Mitra Lal Chalise	Manager, Danphe Biogas Company, Birtamod, Jhapa

Mr. Chandra Prasad Sigdel	Director, Sidhhikali Gobargas Company, Jhapa
Mr. Pradab Lal Chaudhari	Manager, Kamala Gobargas Company, Birtamod, Jhapa
Mr. Netra Prasad Neupane	GM, Sana Krishak Samudaik Gobargas Company, Morang
Mr. Agam Dulal	Manager, Sana Krishak Samudaik Gobargas Company, Morang
Mr. Yam Nath Dahal	Director, Lokpriya Gobargas Tatha Saurya Shakti Bikash, Itahari
Mr. Mahendra Acharya	Manager, Mechi Gobargas Company, Morang
Mr. Thakur Bhatta	GM, Public Urja Bikash Company, Morang
Mr. Sanjay Raj Pokharel	Manager, Suryodaya Gobargas Company, Morang
Ms. Sabitra Silwal	GM, United Biogas Tatha Urja Bikash Company, Dhankuta
Mr. Shyam Subedi	Manager, Shiva Engineering Works, Biratnagar
Mr. Indra Karki	Staff, NBPA Regional Office, Itahari

Annex 2: <u>Capacity Assessment Survey Sheet</u>

बायोग्यास कंपनी तथा वर्कशपहरुको क्षमता संबन्धी प्रश्नावली

भाग १: कंपनी प्रोफाइल

१. कंपनीको नाम: ..... स्थापना (वि.सं.): .....

२. कंपनीको स्वरुप: ☐ एकलौटी ☐ प्रा.लि. ☐ साझेदारी ☐ अन्य (लेख्नुहोस्) .....

३. मुख्य कार्यालयको ठेगाना: ..... जिल्ला: .....

४. शाखाको संख्या: ..... सम्पर्क कार्यालयको संख्या: .....

५. शुरु लगानी: रु..... लाख वर्तमान लगानी: रु..... लाख

६. काम गरेको जिल्ला संख्या: .....

७. सक्रिय जनशक्ति (शाखा सहित गरेर)

जनशक्ति	मालिक	ब्रान्च मेनेजर	लेखापाल	सुपरभाइजर	मेसन (स्थायी)	मेसन (अस्थायी)	जुनियर टेक्निसियन	अन्य
संख्या:								
पुरुष								
महिला								
शैक्षिक योग्यता:								
बि.ए. सरह वा माथि								
आइ.ए. वा सो सरह								
कक्षा ८ वा १०								
८ कक्षा भन्दा कम								
स्कुल नगएको								
संबन्धित तालिम (छ।छैन)								
बायोग्यासमा अनुभव (बर्ष)								
नाम								

८. बन्दोबस्तीका सामान (Logistics)

८.१ बन्दोबस्ती (आफ्नो स्वामित्वमा रहेको)	कम्प्युटर	इमेल इन्टरनेट	टेलिफोन	मोवाइल	मोटरसाइकल	अन्य सवारी
छ।छैन						

८.२ बन्दोबस्ती (सुबिधा उपभोग)	यातायात	संचार	सुरक्षा	बीमा	अन्य
छ।छैन					

९. Operations Management

संख्या	शाखा	सम्पर्क कार्यालय	कतिवटा जिल्लामा काम हुन्छ?	एक ग्राहक बनाउन कति पटक भेट्नु पर्छ?	एक ग्राहक बनाउन कति समय लाग्छ?
दुर्गम पहाड					
पहाड					
तराई					

१०. Marketing Management

विज्ञापन गर्नुहुन्छ	रेडियो	टेलिभिजन	पत्रपत्रिका	अन्य मेडिया	
छ।छैन					

प्रबर्धनका सहयोगीहरु	आफ्नै कर्मचारी	कमिसन एजेन्ट	सीबीओ/एनजीओ	अन्य कंपनीहरु	
छ।छैन					

११.

Financial Management *(बायोग्यास कंपनीहरुले मात्र भर्ने)*

	प्लान्ट		ऋण (रु)	
	उदेश्य	वास्तविक	उदेश्य	वास्तविक
२०६५/६६ (अनुमानित)				
२०६४/६५				
२०६३/६४				
२०६२/६३				

१२. बयान

	बयान	पूर्ण सहमत	हल्का सहमत	न सहमत न असहमत	हल्का असहमत	पूर्ण असहमत
१	अनुदानको ब्यवस्था नभए बायोग्यास ब्यबसाय चल्छ।					
२	अनुदानको ब्यवस्था नभए तपाइको बायोग्यास ब्यबसाय चल्छ।					
३	तपाईं बायोग्यास ब्यवसायमा रमाउनुहुन्छ र सन्तुष्ट हुनुहुन्छ।					
४	एन.बि.पि.ए. को भुमिकादेखि सन्तुष्ट हुनुहुन्छ।					
५	बी.एस.पि. नेपालको भुमिकादेखि संतुष्ट हुनुहुन्छ।					

Perceived Constraints

१३. बजार बढाउने समस्याहरु केके हुन्?सबभन्दा ठुलो समस्यालाइ ५ र सानोलाई क्रमस ४, ३, २, १ नम्बर दिनुहोस।

	१	२	३	४	५
क) नबप्रबेशी (new entrants)					
ख) प्रतिस्थापन्न वस्तुहरु (substitutes)					
ग) हालका कंपनीहरुको प्रतिस्पर्धा (existing competitors)					
घ) सामान आपुर्तिकर्ताको समस्या (bargaining power of suppliers)					
ङ) बायोग्यास प्रयोगकर्ताको बार्गेनिंग शक्ति (bargaining power of customers)					

१६. बजार बढाउने समस्याहरु के के हुन्?सबभन्दा ठुलो समस्यालाइ ५ र सानोलाई क्रमस ४, ३, २, १ नम्बर दिनुहोस।

	१	२	३	४	५
क) बी.एस.पी. नेपालको भूमिका					
ख) आर्थिक समस्या					
ग) जनशक्ति अभाब					
घ) जनचेतनाको अभाव					
ङ) कच्चा पदार्थको अभाव					

भाग २: कंपनीको बिचार

Institutional capacity of the biogas companies *(गोबरग्यास साङ्गठिक क्षमता संबन्धी)*

- बिजनेस प्लान (Business Plan) बनाउने र लागु गर्ने गर्नु भएको छ?

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- कम्पनीका तालिम र बिकास संबन्धी के कस्ता कार्यक्रम छन्?

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- कम्पनीको नाफा प्रसस्त छ?जसले गर्दा ब्यबसायको बिस्तार गर्न सहयोगी होस।

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- बिक्री संझौता (Sales Agreement) लागु हुने गरेको छन?

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- चालु पूँजीकोलागि अग्रिम अनुदान (Advance Subsidy), एन.बि.पि.ए. क्रेडिट, तथा ऋण के के प्रयोग गर्नुहुन्छ?कत्तिको प्रयोग गर्नुहुन्छ?

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- तपाईंको कंपनी आगामी ५ बर्षमा कस्तो रुपमा बिकास होला?

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Constraints in supply side of the biogas market *(गोबरग्यास बजारको आपूर्ति पक्षका बाधा ब्यबधान बारे)*

- उत्पादन बढाउनकालागि जनशक्ति, सामग्री, पूँजी, प्रबिधि, ऋण, ज्ञान तथा सिपमा के बाधा ब्यबधान छन्?

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- उत्पादनको गुणस्तर बढाउन के के बाधा ब्यबधान छन्?

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- बिक्री संझौता (Sales Agreement) लागु गर्न के के बाधा ब्यबधान छन्?

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- मेशन (Mason) लाइ सँधै कंपनीमा राख्न के समस्या छन्?

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- मुख्य कार्यालय र शाखा कार्यालयका विचमा के समस्या छन्?

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- डिलर (Dealer) सँग काम गर्न के समस्या छन्?

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- अन्तमा केही भन्नु हुन्छ कि?

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वर्कशपहरुले मात्र भर्ने

सामानहरु	बार्षिक उत्पादन				
	क्षमता	२०६२/६३	२०६३/६४	२०६४/६५	२०६५/६६ (अनुमानित)
स्टोभ एंगल					
मिक्सर					
डोम ग्यास पाइप					
इन्लेट पाइप					
ग्यास ट्याप					
अन्य					

नाम : पद :

मिति : स्थान : सहि :