International Workshop on Domestic Biogas

'How to improve and scale up practices?'

Kathmandu, Nepal
10-12 November, 2009

Workshop Report

December 2009

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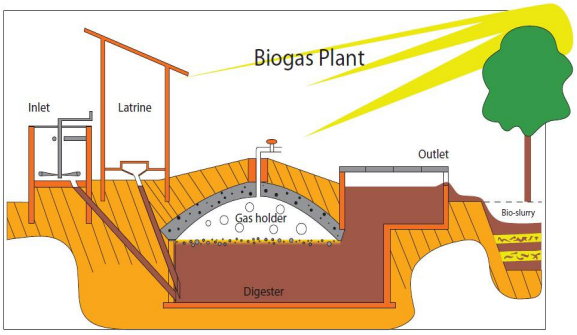
1. Workshop Rational

1.1 Background

The dissemination of domestic biogas plants around the world is sharply rising, both in terms of numbers as well as geographic coverage. More than 35 million biogas units have been installed by the end of 2008, most of them in China and India, providing about 175 million people access to multiple benefits of biogas products. Equally important is that more and more countries are embarking on market-based national programmes on domestic biogas and have started to develop a biogas sector, not only in Asia but also in Africa. To efficiently and effectively utilise both public and private resources to further improve and scale up practices, and to prevent unnecessary failures, it is paramount to broker knowledge and experiences between the various parties involved. In this respect, SNV Netherlands Development Organisation and Asian Development Bank (ADB) organized the International Workshop on Domestic Biogas in Kathmandu, Nepal during the period November 10-12, 2009. One hundred and fifty representatives of private and civil society organisations, government institutions, knowledge centres, development agencies and international donors from 25 countries in Asia, Africa, North & Central America and Europe participated in the workshop. The details of the participants are given in Annex-1.



1.2 Objectives

The objective of the International Workshop was to intensively exchange knowledge and experience between practitioners, experts and policy makers on the dissemination of domestic biogas plants. The core theme of the workshop was 'How to improve and scale up practices?'

2. Programmes

The programmes of the workshop included an inaugural session, four plenary presentations, six parallel sessions on different topics related to dissemination of biogas technology, field visit to a rural biogas village, exhibition and demonstration of biogas related products in a market place, plenary reporting and evaluation sessions, and a closing session. After the closing session on 12th November, a special ceremony was organised to celebrate the installation of the 200,000th biogas plant in Nepal. The workshop schedule and details on parallel sessions have been given in Annex-3. The following section highlights brief description of events and outcomes of each session.

2.1 Day-1: November 10, 2009

2.1.1. Inaugural Sessions

a. Welcome Address form Mr. Hans Heijdra

Welcoming the participants Mr. Hans Heijdra, Country Director of SNV-Nepal, expressed his views that the selection of Nepal as the workshop venue has been a privilege and honour to a pioneering biogas programme in the country supported by SNV Nepal for the last 18 years which has successfully assisted the installation more than 200,000 functional biogas plants across the country. According to him, besides being a best development effort which has shown a successful example of public private partnership, donor harmonisation, building local ownership, and leading to impact at scale; biogas programme in Nepal has been exemplary in the sense that its success paved ways for SNV to start domestic biogas programmes in many other countries in Asia and Africa. In closing, he expressed his expectations that the international gathering of

representatives of governments, development organisations and private sectors from across the world including the biogas giants like China and India, will contribute to better understanding, innovative initiatives and stronger partnerships.

b. Statement from Mr. Barry Hitchcock

Ms. Shaanti Kapila, ADB Consultant, delivered the opening statement from Mr. Barry Hitchcock, Country Director, Nepal Resident Mission, ADB. In his statement, Mr. Hitchcock mentioned that reliable and efficient energy services underpin the expansion of economic and employment opportunities, continuing progress in social development and gender equity, and sustained improvement in standards of living. ADB is committed to helping achieve energy access for all people in its developing member countries. This commitment is in line with Strategy 2020, ADB's corporate strategy focusing on inclusive and sustainable growth, and is reaffirmed in ADB's 2009 Energy Policy, which includes maximizing access to energy as one of three pillars guiding ADB's energy sector operations. Citing the example of Energy for All Initiative of ADB, which focuses on scaling up access to electricity and modern fuels among the poor, he highlighted ADB's partnership with SNV with a view to replicate the proven approach of sector development elsewhere. He explained that the Energy for All Partnership brings together key stakeholders from business, financial institutions, governments, and non-government organizations with a goal to provide access to energy to 100 million people in Asia and the Pacific region by 2015. Congratulating the Biogas Support Programme on its success to install more than 200,000 biogas plants in Nepal, he extended recognition to the many organizations that have played a crucial role in implementing and supporting this program: Alternative Energy promotion Centre (AEPC), the Biogas Sector Partnership – Nepal (BSP-Nepal), the Government of Nepal, SNV, the Netherlands' Directorate-General for International Cooperation (DGIS), and the German Development Bank (KfW). Welcoming the participants in the workshop, he longed for fruitful and inspiring interactions during the workshop, leading to the formation of lasting partnerships to provide clean, affordable, and reliable energy for all.

c. Opening Remarks by Mr. Jean de Matha Ouédraogo

Mr. Jean de Matha Ouédraogo, SNV Corporate Renewable Energy (RE) Sponsor Director and Country Director of SNV Rwanda, welcoming the participants, expressed that the presence of so many professionals from across the globe is a sign of engagement to contribute to a better life for the populations who continue to suffer from poverty in the developing countries. He highlighted the importance of modern and renewable energy sources as a precondition for development and achievement of the Millennium Development Goals (MDGs). According to him, access to adequate, affordable and sustainable energy service is necessary for good life and to fulfil most of the development objectives. He also highlighted the critical connection between energy and poverty alleviation as well as the importance of clean energy in mitigating the adverse impacts of climate changes. Elaborating SNV's strategy on renewable energy that comprises two complementary approaches: promoting more efficient, clean and sustainable use of traditional biomass; and encouraging people to switch to modern fuel sources and technologies including RE; he highlighted the efforts of SNV in creating and strengthening Knowledge Networks to maximise the application of individual knowledge to meet organisational objectives. In closing, Mr. Ouédraogo iterated that the workshop will be beneficial for SNV and partners to share knowledge and experience, to strengthen the partnership, to improve the governance of the sector and to advocate for better access of people to clean energy.

d. Inauguration of the Workshop and Opening remarks by Mr. Dirk Elsen

Mr. Dirk Elsen, Chief Executive Officer of SNV, formally inaugurated the workshop by lighting the artistic traditional Nepali 'Panas' (Lamp). Addressing the august gathering, Mr. Elsen expressed his pleasure to be

in Kathmandu to open the important international event. He was quick to point out that the presence of the international community in this workshop is a sign of support and goodwill as Nepal is going through challenging transition period at present. Emphasising the importance of energy as the prime movers of all social and economic activities in a modern society, he mentioned that access to clean energy is essential for the enhancement of livelihood from the perspective of health, climate change and economic development. Elaborating the support of SNV since 1989 to successfully disseminate biogas technology in Nepal, Mr. Elsen told that over 1.8 million people are now benefiting from SNV supported biogas programmes in Asia. He also mentioned that the experience and lessons learned from biogas programmes in Nepal and other Asian countries have been instrumental in technology transfer to the countries in Africa where SNV has partnered with Hivos and other local partners to implement biogas programmes in six countries with an aim to install 70,000 biogas plants till the end of 2013. According to Mr. Elsen, through various initiatives being carried out under the framework of biogas programmes, SNV is helping to generate business and enhance employment opportunities, reducing the risk of global warming, safeguarding energy security and supporting to achieve the MDGs. Stressing the urgency to meet the energy needs of the people in Asia, he expressed his high expectations that the recent partnership with ADB and other organisations to build a network would provide an ample opportunity to share experiences and provide clean energy access to all in Asia.

In closing, Mr. Elsen said that biogas has been successfully exposed in the media and at various national and international events. With special mention to the BBC world documentary on biogas in 2008, he expressed satisfaction that SNV has been able to demonstrate that there are concrete, local solutions that really make a difference and that scaling these up is the key to long-term growth in the developing world. Wishing the success of the workshop, he called upon all the participants to watch the video clip on Biogas in Cambodia which was broadcasted on a mega screen in Stockholm at the European Development Days, the gathering on development cooperation by the European Union.

2.1.2. Plenary Presentations

Four presentations were delivered in the plenary session chaired by Mr. Hongpeng Liu of United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). The following section summarises major issues included in these presentations.

Presenting a country paper from Nepal, Mr. Saroj Rai, Executive Director of BSP-Nepal described: (i) multiple benefits of biogas plants (ii) progress and achievements of Biogas Support Programme (BSP), (iii) different stages of biogas development and promotion in Nepal, (iv) market development and regulation (v) market expansion and regulation, (vi) consolidation, and (vii) major challenges in improvement and scaling up. According to Mr. Rai, the following are the major challenges in improvement and scaling up of biogas programme in Nepal:

- Programme externalities: mainly political instability and geographical and socio-economic diversity of the country

- Working with or for private sector and others: mainly due to differing perspectives among players, public vs. private, company vs. Micro Finance Institutions (MFIs); limitation in capacity building of biogas companies and workshops; MFIs are limited to better off parts of the country.
- Making markets work for the poor: market often doesn't work for the poor masons and results in low retention; biogas companies generally fail to value the poor and backward as potential clients.
- After-sale service, not that satisfactory: often resulting in bad words-of-mouth that damages the market and kills the good demonstration effect.
- Bioslurry in shadow of benefits from biogas: degree of effective use of bioslurry and composting varies from place to place.

Mr. Li Qian, Director General of Biogas Institute of the Ministry of Agriculture (BIOMA), China, presented a paper on 'Biogas Experience in China'. According to him, the reasons for scaling up of biogas technology in China are: (i) the conducive government policy, (ii) rapid economic growth of the country, (iii) escalating demand of clean energy in rural areas, (iv) demand for environment friendly energy sources, (v) growth in research and development (R&D) activities on biogas product development, (vi) increased awareness of people on the benefits of biogas plant, (vii) increase in number of biogas enterprises, and (viii) realization of financial benefits of biogas plants by the people. Mr. Qian told that China has formulated a comprehensive management system related to biogas technology dissemination addressing needs at central and local levels. He mentioned that despite the tremendous growth, biogas programme in China is still facing problems such as, (i) non-compliances of quality standards, (ii) inadequate after-sales-services in some areas, (iii) insufficient training on operation and maintenance to users, (iv) lack of standardisation of some of the appliances, (v) lack of certification in some of the enterprises, and (vi) lack of effective promotional activities. He told that China is presently promoting wide international cooperation to promote south-south cooperation and to capacitate number of private enterprises to network and collaborate with international stakeholders.

Mr. G.L. Meena, Director of Biogas Section in the Ministry of New and Renewable Energy (MNRE) in India, presented a paper entitled, 'Domestic Biogas Development in India'. Mr Meena described the strategy, modality and achievements of three major programmes undertaken by the government, namely, National Biogas and Manure Management Programme (NBMMP); Biogas based Distributed Grid Power Generation Programme (BDGPGP) and Programme on Energy Recovery from Urban, Industrial and Commercial Wastes. He stressed the need of the following to ensure improvements in current practices and support up-scaling:

- Presently about 15-20% of the cost of installation is being supported in the form of subsidy, which is small and needs upward revision.
- Domestic biogas plants of about 2 cum gas production per day (8 cum fixed dome brick-masonry biogas plants) are being disseminated. There is need to formulate standards for large scale biogas plants.
- Enhancing the role of banks and other financial institutions.
- Utilizing the possible carbon revenues.
- Introduction of implementation through private companies.
- Mobilisation of cooperative societies and self help groups more effectively.
- Developing and establishing innovative models for wide-scale dissemination
- Introduction of effective scheme to repair non-functional biogas plants.
- Linkages and integration with other rural development programmes.
- Introduction of new, simple, cheaper and easy to operate efficient biogas plant designs.

Mr. Felix ter Heegde of SNV started his presentation entitled, 'Irresistible Attraction: Financial and Economic Performance of Domestic Biogas' with 'good news' that the dissemination of domestic biogas plants around the world is sharply rising, both in terms of numbers as well as geographic coverage. He pointed out that a biogas plant that could be installed with Euro 300 in some Asian countries costs Euro 800 in African countries. Likewise, the share of subsidy is 20% to 40% of the total cost of installation and share of GDP against the investment costs of an average biogas plant ranges from 20% in Vietnam to 120% in Tanzania. Keeping in view the high investment costs of installation of biogas plants especially in African countries, he emphasized on the urgent need to maximize multiple benefits of biogas plant to ensure financial and economic viabilities.

2.1.3. Parallel Sessions

Introducing the parallel sessions and delivering his introductory presentations, Mr. Wim van Nes of SNV urged the participants to keep in mind the key question, 'how to improve and scale up practices?' He stressed the need to be more effective and efficient in harnessing the huge potential of biogas plants around the world. According to him, Asia, Africa and Central & Latin America have the potential of 110, 20 and 25 millions of biogas plants respectively; most of which remains still untapped. He then provided a brief overview of the parallel sessions and expressed his expectations that the participants will provide every effort to get answer to the core question.

a. Session-1: Private Sector development

Mr. Sundar Bajgain of SNV facilitated the session on the 'Importance and need of private sector development to improve and scale up practices'. Highlighting the relevance of private sector in biogas programmes, he stressed the need of strong private sector to develop biogas sector as sustainable, market oriented and commercially viable industry. He then put forward the following key questions for further presentations and discussions in this session:

- What are the main problems/ barriers faced by the private sector in biogas programmes? (experience from both types of countries – with the strong presence of private sector and without such strong formal private sector)
- What supports/facilities are needed to attract and sustain private sector in biogas industry?
- What are key recommendations/action points for scaling up and further improvements of biogas sector?

The key presentation from Mr. Bajgain was followed by the presentations on private sector development on biogas sector under the frameworks of National Domestic Biogas and Manure Programme (NDBMP), Bangladesh; Biogas Sector Partnership (BSP), Nepal; Nepal Biogas Promotion Association (NBPA); and National Biodigester Programme (NBP), Cambodia respectively by Mr. Nazmul Haque Faisal, Mr. Saroj Rai, Mr. Mohan Raj Sharma and Mr. Jan Lam. Mr. Faisal told that lack of know-how; lack of working capital, proper human resources and marketing skills especially in case of smaller companies; difficulties to change people's traditional habits/behaviour; gender biases; difficulties in retention of trained personnel; and lack of tangible assets to put in collateral to secure loans, to be the major problems faced by the private sector in Bangladesh.

According to Mr. Saroj Rai, there is need to (i) ensure development of entrepreneurship, professionalism and profitability, (ii) build a practical and progressive business model, (iii) balance supply and demand side interventions keeping in mind the market size, (iii) ensure balance between standardization and innovation, (iv) build and communicate a clear plan for building up and phasing out, and (v) focus on leveraging with existing systems and capacities for training; to effectively mobilize the private sector in Nepal.

Mr. Mohan Raj Sharma described the evolution process of private sector in Nepal and the roles and responsibilities of biogas construction companies which are critical to the success of biogas programmes.

Describing the initiatives from NBP Cambodia to strength and mobilize the private sector and the achievement till date, Mr. Jan Lam stressed the need of capable private construction sector to ensure a sustainable biogas industry. He emphasized that there has to be a clear separation between the parties responsible for marketing, construction and after-sales service, and the quality enforcement units. According to him privatisation makes the masons more committed and professional.

The participants were then divided into two groups to further discuss the issue and come forward with practical recommendations related to the three key questions as mentioned above. The outcome of the discussions have been summarised below:

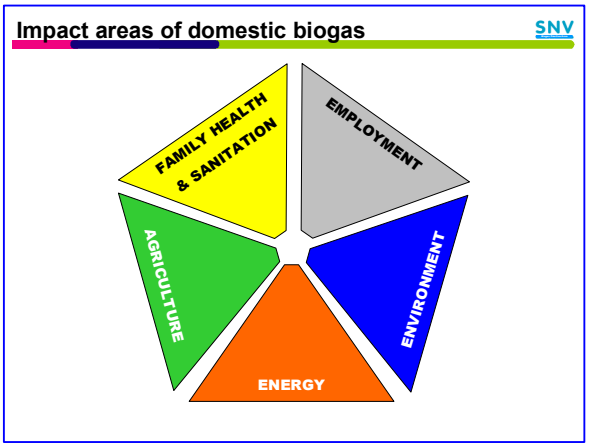
- There is lack of conceptual clarity among stakeholders on the definition and scope of private sector as well as about profit making. The roles of different players such as government, public and private actors are not clear.
- Institutional limitations are hindering effective promotion and regulation as well as creation of a levelled playing field and ability of self regulation and development.
- There is lack of business skills among rural entrepreneurs because of their limited technical knowledge.
- Because of poor economics of biogas and seasonal or irregular nature of work, staff retention has been one of the major problems for small biogas companies.
- As the end-users are not aware of the technology, there is lack of link between suppliers and prospective buyers.
- Private sector is not proactive in business development and promotion of the technology. There is lack of clarity on the responsibility of carrying out promotional activities.
- Working capital has been a problem for biogas entrepreneur especially the new and small companies. There is limited access to finance for private sector and users. Moreover, the present subsidy mechanism is not accessible to private sector.
- Over standardization, subsidy fixed to certain technologies and too much reliance on certain models is hindering the innovation. There is lack of research and development (R&D) initiatives by private sector.
- Privates sector's inability to think and act beyond biogas sector is limiting the diversification of business.

The outcome of the discussion revealed that the following support services and facilities are needed to strength the capacity of private sector to deliver effectively:

- Government should prioritise biogas sector development – strong policy support needed to safeguard the investment.
- Tax exemption for private companies to import biogas tools and appliances.
- Entrepreneurial capacity building supports.
- Providing seed capital to Biogas Construction Companies (BCC) as advance subsidy.
- Building network with banks, MFI and sanitation companies / institutions.
- Encourage qualified and capable masons to form a BCC.
- Make a strong association of BCC and strictly adhere to code of conduct.
- Ensure institutional supports to BCC from the program.
- Support to develop and implement practical business models.

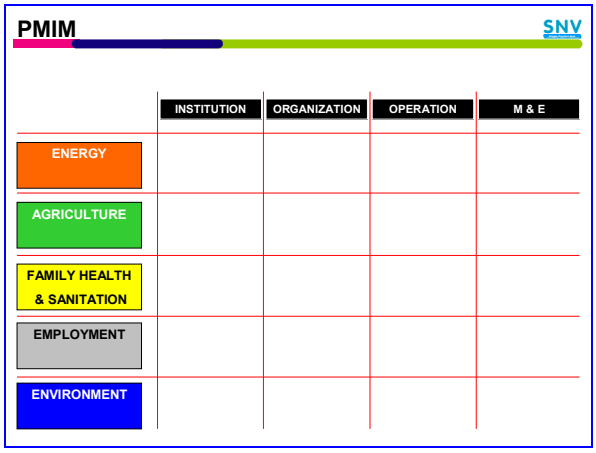
b. Session-2: Realisation of Multiple Benefits of Domestic Biogas Plant

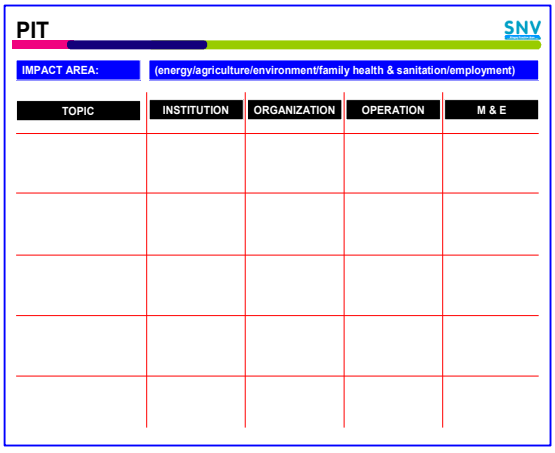
Facilitating the session on multiple benefits of domestic biogas plant, Mr. Felix ter Heegde of SNV delivered a presentation describing the objective of the session, anticipated outcomes, and introductory information related to the session topic. According to him, the objective of the session is to explore the managerial implications for biogas programmes pursuing the realization of multiple benefits of domestic biogas. The anticipated outcomes of the session include (i) introduction to tools that may assist programme managers with assessing the extent to which their programme is geared towards 'concretizing impact', and; (ii) a first overview on programmatic opportunities to this end. He then highlighted five main impacts areas of domestic biogas as shown in the diagram. He mentioned that the five impact areas provide a reasonable picture of the potential reach of a biogas programme; however, the precise nature of these benefits will depend on the situation, whereby they can be further distinguished into formal and informal benefits acting at micro and macro level.



Following the key presentation, four mini presentations entitled: (i) Initial steps towards achieving impacts; (ii) Quest for synergy in partnerships (iii) Gender mainstreaming in biogas programmes; and (iv) Integrating biogas technology into rural development policies and plans; respectively by Mr. Rajesh B. Shrestha from Pakistan Domestic Biogas Programme (PDBP) , Mr. Willem Boers from National Biogas Programme (NBP), Ethiopia; Mrs. Indira Shakya from BSP-Nepal; and Mr. Hongpeng Liu from UNESCAP. These mini presentations aimed at sharing (real) experience and/or clear ideas on/for biogas programmes – successfully or otherwise, attempting to "realize multiple benefits", focusing on the programmatic issues.

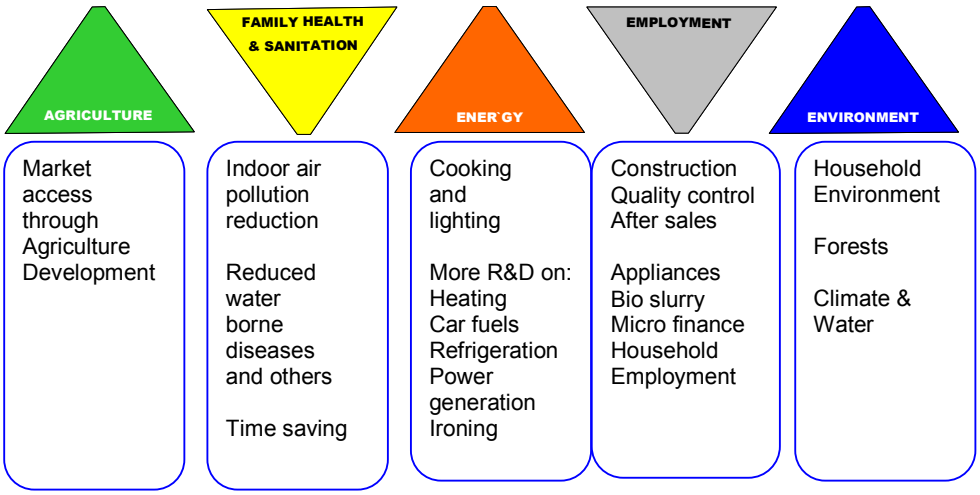
Questions were raised by the participants on utilization of bioslurry, diversification of end-use applications, direct benefits of gender mainstreaming. The question and answer session was followed by the explanation on programme dimensions, introduction of Programme Multiple Impact Matrix (PMIM) and Programme Impact Table (PIT) as given below.





The participants were then divided into five groups to work on specific impact areas and complete the PITs. The individual PIT form each group was then consolidated to prepare a draft PMIM.

The outcome of the group discussions revealed the following themes of the five major impact areas.



c. Session-3: Energy for All Partnership

In total of 38 participants including 20 participants from 11 countries with an existing or potential future biogas programme, 2 participants from knowledge institutes, 16 participants from partners and donors including ADB, Foundation for Development Cooperation (FDC), World Bank, KfW, Hivos, FAO, UNESCAP, Winrock, E&Co, Energy Sector Action Plan (ESAP), Groupe Energies Renouvelables, Environnement et Solidarités in Cambodia (GERES Cambodia) and SNV participated the session on Energy for All Partnership.

With a brief overview on the session objectives and process by Dr. Govind Pokharel of SNV; Ms. Shaanti Kapila, ADB Consultant for Energy for All Partnership Programme, presented a paper entitled, 'Energy for All Partnership - a Regional Approach to Scaling up Access to Energy for the Poor'. She mentioned that ADB's 2009 Energy Policy aims to help ADB's Developing Member Countries (DMCs) provide reliable, adequate, and affordable energy for inclusive growth in a socially, economically, and environmentally sustainable way. According to her, three pillars of the policy are: renewable energy and energy efficiency, maximizing access to energy for all, and power sector reforms and governance. Emphasising the need to tackle persistent energy poverty, she highlighted two operational goals of Energy for All Partnership: (i) mainstream access to energy for the poor within ADB's operations, and (ii) increase ADB's investment in access to energy. She highlighted that Energy for All Partnership is a regional, multi-stakeholder platform for networking, cooperation, sharing lessons learned, developing 'scaling up' projects with an objective to provide access to reliable and affordable modern energy services to 100 million people in Asia and the Pacific by 2015/16 ensuring the involvement of key stakeholders from private sector, financial institutions, governments, NGOs. Describing the benefits to partners such as networking and mentoring; exchange of information and know-how; pipeline development; access to financial institutions and investors; partnerships to develop projects; newsletter, publications, invitations to partnership events; she emphasized on leveraging activities to achieve greater impact.

Ms. Shaanti Kapila's presentation was followed by a presentation from Mr. Wim van Nes of SNV on the 'Working Group on Domestic Biogas under the Energy for All Partnership'. He informed that SNV was requested by the ADB to lead this Working Group (WG) and has proposed the following objectives:

- Innovative dissemination of one million quality biogas plants by 2016 in about 15 Asian countries (including PR China and India) providing access to sustainable energy for about 5 million people.

- Important contribution to the development of sustainable market-based biogas sectors in these countries.

For 2009, the following activities are being undertaken:
- Biogas Market Studies in Lao PDR, Bhutan and the Philippines.
- Loan agreement between ADB and Ministry of Agriculture and Rural Development (MARD)-Vietnam on the 'Quality and Safety Enhancement of Agricultural Products and Biogas Development Project' (USD 22.25 million on biogas development)
- International Workshop on Domestic Biogas in Kathmandu, Nepal

Fur further discussion, he put forward the following three questions and asked the participants to provide their inputs:
- Do you see the relevance of this Working Group (WG)?
- Which strategies/partners are required to achieve the target of one million biogas plants by 2016?
- Which activities are to be executed in 2010?

A total of 29 participants, on behalf of their countries as well as organisations, took part in the discussion. Queries were raised by the participants on various issues such as allocation of target, operational modality of the working group etc. Mr. Wim van Nes provided following answers to those queries:
- Attribution of the one (1) million units will be discussed with ADB.
- There is no such like allocation of the one million target, as the countries are/will be in the driving seat and will decide themselves whether to implement and how to request support from the WG. The WG will be supporting, not leading the countries.
- Many issues are country/context specific and needs consideration at country level, but WG could take up a few country cross-cutting issues.
- As per the market-based approach, the households themselves will decide to invest in a biogas plant, not the countries and also not the WG. They may decide to invest in stead in other technologies.
- Partners are required at different levels, not only at country level, but also at WG level.

The following section summarises the outcome of statements from various participants.

Strategies & partners
- Installation target on 1 (one) million additional biogas plants is both ambitious as well as not ambitious. However, programmes in (parts of) China and India will be required to achieve the target.
- Implementing countries should be in the lead. WG will provide support, so no target will be allocated by WG, but will check the reality/feasibility.
- Market-based approach will be required, but to be attuned to the context of every (part of the) country.
- Various strategies were discussed to advance the activities on the WG.
- Composition of working group without formal membership as of yet:
    - Representatives from committed parties (government, private, civil society sector) in the implementing countries
    - Representatives from committed knowledge institutes
    - Representatives from committed partners & donors

Possible 2010 activities
- Networking activities (web site, mail, meetings)
- Support to (potential future) implementing countries to undertake feasibility and design studies
- Cross-country issues to be advanced by specialist groups
- Development of innovative financing mechanisms

Relevance of the WG
The participants agreed to formally launch the Working Group on Domestic Biogas under the Energy for All Partnership on 12 November 2009, in Kathmandu, Nepal.

2.2 Day-2: November 11, 2009

2.2.1 Field Visit

A field visit programme was organised to make the participants familiar with the rural setting of Nepal and to provide them opportunity to collect first hand information on various aspects of biogas programme in Nepal. The participants visited Bela Village in Baluwa Village Development Committee in Kavre Palanchok district which is located at a distance of about 45 km east of Kathmandu, the capital city of Nepal. The village of Bela, with about 150 households, has a record of having biogas plants in all the households. A vegetable growers' cooperative, established in 1996 and having member-strength of more than 700, was responsible for the coordination of activities including construction of biogas plants and credit management. The households have also started organic farming including the use of bioslurry – one of the main products of biogas plant. The participants were divided into 10 groups and each group visited 2 biogas households. The participants observed the physical status and functioning of operational biogas plants and collected related information from the users.

A brief meeting was organised in the village where the office bearers of the cooperative welcomed the participants and presented the activities being undertaken. The participants were provided with a picture of the functioning of the cooperative including its progress, roles and responsibilities as well as the problems and prospects. At the end, a ceremony was witnessed by the participants in which the community members declared their village a 'biogas village'.


The field visit has been instrumental in enhancing the knowledge of the participants on various aspects of biogas technology dissemination and in assessing the level of users' satisfaction. Observations of the biogas plants, as well as discussions with the cooperative members and users of the biogas plants; have been beneficial for the participants in getting acquainted with the technology dissemination practices being adopted in the village.

At the end of the field visit, participants were requested to provide written comments and feedback on the field findings. The following are the major observations of the participants:

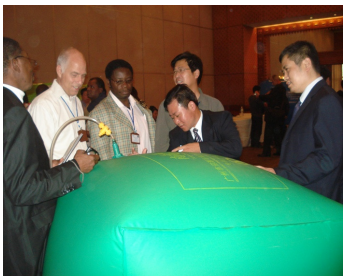
- There is good understanding of biogas and its benefit in the community.
- Biogas plants are well maintained.
- Users are happy with working of their plants.
- The integrated approach has been successful for scaling up.
- The initiative has added value on social side.
- In some plants, users are not using the water drain regularly.
- All the produced gas is not used; there is risk of methane escaping in the atmosphere.
- Users are happy with services being provided by the biogas company.

The participants suggested the following recommendations for improvements:

- Ensure sufficient biogas for all cooking needs of a family.
- Promote stove with two burners.
- Promote cattle rearing to feed up the plant sufficiently.
- Enhance the plumbing skills of masons.
- Train and promote convenient cooking methods for families during user's training.
- Mixer device seems too light and prone to wear and tear; carry out further research on it.

2.2.2 Market Place

A total of 21 organisations representing biogas county programmes, biogas related production and R&D companies, and organisations working in the filed of biogas technology displayed their products in the market place. A large Chinese business delegation comprising of 19 members from 15 different organisations participated in the market place to provide information on their products and services. The list of organisations and individuals who participated in the market place is given in Annex-2. The market has been instrumental in familiarising the product, disseminating information on product and services and getting acquainted with the recent product development in the sector. It is estimated that more than 200 people paid a visit to the market place.

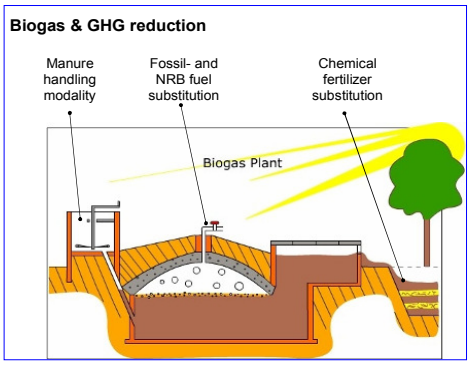


2.3 Day-3: November 12, 2009

2.3.1 Parallel Sessions

a. Session-4: Carbon Financing

Delivering an introductory presentation on 'Carbon Financing in Domestic Biogas', Mr. Jeroen van Bruggen of SNV urged the participants to take into consideration the key question of the session, 'how to ensure carbon finance for domestic biogas programmes?' He highlighted the process and topics for further discussions and shaded light on the expected output of the session.



Following the introductory presentation, Mr. Marco van der Linden of SNV presented a brief overview of mechanisms and methods related to carbon financing. His presentation included introduction of carbon markets for biogas projects: official compliance market under the Kyoto Protocol and the voluntary market; volumes of Clean Development Mechanism (CDM) and voluntary markets, and essential methodological issues related to CDM and Gold Standard (GS). He highlighted the potential carbon benefits of biogas plant as shown in the diagram and described in detail the essential methodological issues related to CDM and GS.

Mr. Prem Subedi of Winrock International presented a paper on 'Carbon Project Development and Stakeholders in Domestic Biogas Sector'. He highlighted CDM project development and approval methodology, CDM project cycle, steps of the validation process and indicative schedule, and some of the issues related with the carbon financing.

Mr. Ingo Puhl of South Pole Carbon Asset Management Ltd. presented a paper on 'Introduction to Carbon Revenues and Markets' which included a brief introduction to CDM and carbon markets, typical CDM risks (& how they apply to domestic biogas projects), and the future for domestic biogas: use of programmatic and sectoral approaches plus focus on new markets (non-CDM). According to him, the key opportunities/challenges for domestic biogas are:

- Very strong contribution to sustainable development
- High cost of project-specific Measurement, Reporting and Verification (MRV) requirements in CDM
- Suitable for premium, voluntary market

- Suitable for programmatic CDM, sector / benchmark crediting
- Not suitable for project CDM

Presenting a case of CDM project from Nepal, Mr. Samir Thapa of AEPC summed up his presentation highlighting the following issues:

- CDM is both an opportunity and a challenge. Doing CDM project has been like riding a roller coaster. It requires lot of resources, including knowledge and skills to develop and implement.
- CDM is a trade, not an aid. If acted in time, there is a huge potential in CDM that can help financing development activities.
- For long term perspective programmes, it is better to do Programme of Activities (PoA)/ additionality.
- Upfront cost for PoA is higher, but total cost is less than projects.
- There is some reluctance from Designated Operational Entity (DOE) to validate the PoA.
- PoA is still developing, bundle projects are more established.

Mr. Eric Buysman from GERES Cambodia and Mr. Harrie Oppenoorth from Hivos presented a case form National Biodigester Programme, Cambodia. The programme has already entered into an agreement with Hivos Climate Fund to sell Verified Emission Reductions (VER). However, Hivos Climate Fund has decided to go for the Gold Standard for the NBP Cambodia anticipating the changed demand of the carbon market. The presentation highlighted some of the hurdles and possible solutions as well as preliminary results and lessons learnt in the process of getting GS certification as follows:

- Consider GS eligibility before the onset of the project activities.
- Incorporate GS rules and regulations in the stakeholder consultation rounds and project design.
- Communicate: ask for clarifications
- Use similar project documentation for inspiration.
- Consider Non Renewable Biomass (NRB) seriously and keep updated as rules change and will change often.
- GS certification is expensive, but yields premium credits which might bring a positive trade-off.
- Seriously consider bundling projects to create alliance to reduce costs and influence DOEs and GS.
- Certification is key, go for it.

The presentation session was followed by group discussions among the participants. The following tables illustrate the major outcomes of such discussions.

On Mechanisms and Methods

Barriers	Solutions / Actions / Approaches
Method problems: NRB	District level research Lobbying and R&D
Monitoring: current approach gets in the way of scaling up	Standardization in monitoring and installation design, monitoring program (but have to be specific to the local environment) Need mechanisms for aggregation: programmatic CDM (but what is a typical activity? And how do you aggregate them) Lobbying

On Project Development and Stakeholders

Barriers/Considerations	Solutions / Actions / Approaches
When to involve buyers	Share expertise & knowledge between developers to develop a project as far as possible before selling carbon credit
Delivery risks	Build an alliance, work though programmatic approach Sell into the voluntary market
Verifiers are not willing to validate programs	Resolve liability issues
National Authorities do not have capacity & understanding	Build capacity of regulators (UN role) Illustrate the sustainable development benefits of projects
Who owns the carbon right?	Communicate with owners Earmark the carbon revenues for specific purposes incl. payment to owners, monitoring & verification, training
Biogas is complex for verifiers	Build capacity, bundle validations

On Carbon Revenues and Markets

Barriers	Solutions / Actions / Approaches
High cost now – uncertain benefit much later	Move to programmatic approaches Decouple project financing from carbon revenues (i.e. by using future carbon credit revenue to collateralize loans from domestic banks into project financing) Reduce DOE verification thresholds/liabilities
Lack of scale is prohibitive to launch a national program	Launch regional programs or sector-wide international approaches
Lack of capacity, too much centralization of market operation (centralized at UN)	Accredit local verifiers Decentralize functions of Executive Board (EB) to Designated National Authority (DNA)
Local banks don't recognize carbon revenues	Involve them and let them learn Work with Financial Institutions (FI) to guarantee future revenues from carbon to local banks
Key stakeholders don't have sufficient information when they need it in project design	More networking and information sharing with stakeholders, introduce carbon in existing forums, use of best practice

b. Session-5: Cost Reduction and Technical Innovations

Mr. Jan Lam of SNV delivered an introductory presentation on 'Cost Reduction and Technical Innovations'. According to him, the key questions to be dealt in this session are:

- What are, at this moment, the most promising technical dome plant developments related to:
  - plant reliability (gas leakage, complexity level of construction)
  - plant life expectancy
  - plant cost
- What is the best method for innovation testing and large scale introduction?
- Is there a need for an internationally accepted protocol on the introduction of innovative designs?

Mr. Jan Lam stressed that the innovations have to be compared to a baseline; the traditional dome plant (The Nepalese GGC model, The Tanzanian CAMARTEC, The Indian Deenbandhu, The Kenyan AKUT and the concrete models used in China) ranging from 4 to 10 m3 capacity and used by single families primarily for cooking and at times also for lighting. He, therefore, told that the topics such as use of gas for electricity generation, gas storage technologies and institutional/ community plants will be excluded in this session. He mentioned, though the innovations on appliances like lamps and stoves are very relevant but given the time limitation and the fact that most of these issues were already dealt with at the market place, further discussion will not be done in this session.

Mr. Jan Lam then presented the features of a baseline 6 cum capacity fixed dome biogas plants as follows:

- Feeding varies between 35 and 60 kg dung per day (TS 20%) and an equal amount of water
- HRT varies between 40 to 75 days, depending on ambient temperature
- Gas production from 1200 to 2400 litres per day.
- Effective gas storage capacity 50 – 60% of the maximum daily gas production: 1200 – 1400 litres.

After describing the merits and demerits of fixed dome biogas plants, he requested the speakers of the session to deliver their presentations.

- Prof. Zhang Mi of CNCCC Sichuan Co. Limited, China, presented a paper on 'Introduction of Fibre-glass Household Biogas Digesters (FGBD)'. He started explaining the evolution process of FGBD in China. According to him, the research and development (R&D) strategy was formulated in early 1990's, however, the real work started only in early 2000's. Prof. Mi mentioned that the technology has matured these days and with the large scale development in 2007, China has started to export the

units to other Asian and African countries. He highlighted the basic features and chemical characteristics of FGBDs and emphasized that these units are easy to install and minimize the risk of gas leakages.

- Sharing the experience of Rwanda with the FGBD units, Mr. Guy Dekelver of SNV reported that there is not much difference in cost of installation between conventional brick and concrete plants and FGBD. He shared the outcome of a recent study carried out to assess the physical status, functioning and level of user's satisfaction that the conventional plants are performing better than the FGBD.
- Mr. Jianan Wang of Shengzhen Puxin Science and Technology Co. Limited delivered a presentation on key features of Chinese Puxin biogas plants. According to him, the main strength of Puxin plant is the added quantity of gas production because of leakage free digester and dome. He mentioned that the time needed for the installation of Puxin plant is much less and the structural durability of this plant is much higher. He also told that the cost of installation in also relatively cheaper than that of the conventional plants.
- Mr. Venkata Krishna Choppalli of Centre for Renewable Energy and Appropriate Technology, India, highlighted the added benefit of biogas plant with high density poly-ethylene (HDPE) gas holder over the conventional Deenbandhu design of biogas plants. Less time needed for construction, no need of curing of dome, minimized risk of gas leakage from dome, ease in construction as well as operation and maintenance were reported to be the advantages of the new innovation over the conventional design.

At the end of these four key presentations, question and answer session was organized in which participants raised various queries on: (i) the durability of the new innovations, (ii) the difference in costs of transportation and installation, (iii) amount of gas production and gas storage capacity of the dome, (iv) effect of temperature on composite plant and (v) methods of construction.

The second part of the session facilitated by Mr. Willem Boers of SNV was open for any 4-5 participants to present their innovations in the plenary. Participants were requested to register their names and theme of their presentations. In total, 6 participants expressed their interests to contribute.

- Mr. Surya Hada of Gobar Gas Company (GGC) in Nepal presented his innovation on the construction of low-cost biogas plant using bamboo sticks as the reinforcement. He shared his experience with such plant installed in actual field condition. He told that these plants would be instrumental in reaching the poorer section of the society who could not afford time and money to install conventional biogas plants.
- Mr. Li Linchun from Chongqing Wangliyuan Agricultural Development Co. Ltd. described the performance and salient features of soft biogas reactor. According to him, these biogas digesters are manufactured using sophisticated machines by means of welding with Poly Venial Chloride (PVC) that contains more than ten types of aging-resistant, corrosion-resistant, fire-resistant and special additive materials. Mr. Li told that the capacity of absorbing and storing the ambient heat by this plant is 30% higher than that of other materials.

- Mr. Prakash Lamichhane of BSP-Nepal presented the innovative design of modified GGC biogas plant to suit high altitude areas in Nepal. He described how simple modifications such as sloping manhole and curved bottom can help to increase the efficiency of biogas plant in high altitude areas. He also talked about the importance of heap composting on the top and covering of biogas plant with plastic shed to insulate it against the cold.
- Mr. Henry Spanjers of Lettinga Associates Foundation (LeAF), The Netherlands, talked about the suitability of decentralised waste-water treatment plants to generate biogas. He described the appropriateness of these systems in treating black and grey waters.
- Mr. Abdul Gofran, Chairman of Bangladesh Biogas Development Foundation and Consultant to Grameen Shakti, expressed his views that the innovation should lead us to less costly biogas plants and ensure increase in gas production. It should also minimise the problems due to high water table, earthquake and other adverse geological conditions.

- Mr. Anil Dhussa of MNRE, India, raised questions on some of the claims made by the presenters. He stressed the need to formulate standard protocols to test biogas plants and cautioned the participants not to compare carrots with onions.

During the questions and answers sessions, participants discussed various issued related to cost reduction and technical innovations. Mr. Hongpeng Liu of UNESCAP stressed the need to strengthen and mobilise private sector to play a lead role in technical innovation as the government's initiatives have their own limitations. He emphasized the need to strengthen public private partnership and technology transfer from one country to another and from one entrepreneur to another. Mr. Jeroen Kruisman of SNV advocated for the need to open doors for different designs as per the context and user's need.

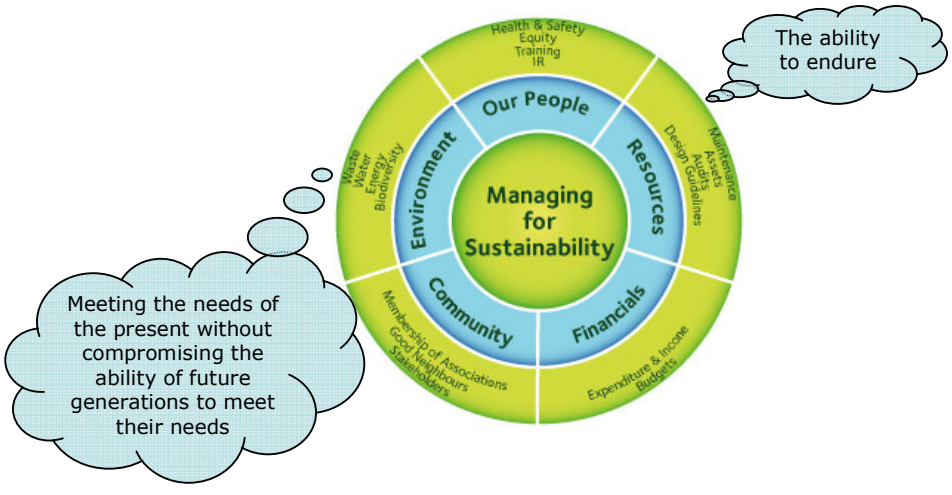
At the end of the session, Mr. Anaclet Ndahimana of SNV presented the summary of the presentations and outcome of the discussions. The main outcome of the session revealed the need to establish norms combined with a testing protocol so the performance of different type plants can be compared with each other. Probably, a technical commission is the best body to develop such norms and testing methods.

c. Session-6: Sustainability of Official Development Assistance (ODA) Funded Biogas Programmes

Mr. Andrew Williamson of SNV formally opened the session on 'Sustainability of ODA Funded Biogas Programmes'. Delivering an introductory presentation, he described the following three main objectives of the session:

- Consider and analyse the issue of sustainability of biogas programs,
- Focus on possible measures that will help to improve and upscale biogas programs,
- Produce a summary of conclusions + suggestions ready to present to the plenary after lunch.

Mr. Williamson defined sustainability in terms of biogas programmes as 'the likelihood of a programme to continue effectively after ODA support has been withdrawn, particularly with respect to construction, household biogas finance and training'. According to him, a sustainable biogas programme is institutionally and financially sustainable in the sense that all the needed market players are willing and able to continue to play their role in the market as well as the program can adapt and find alternatives in the event that ODA is reduced. He told that as the need for biogas is huge and growing; funding is scarce; biogas markets are fragile; re-starting programs is an expensive and difficult undertaking; and ODA is not constant; it is important that the sustainability of the biogas programmes is ensured. The following illustration was presented to describe sustainability issue.



The introduction was followed by presentations from Dr. Narayan P. Chaulagain of AEPC, Nepal and Dr. Kailash Khandelwal, Consultant for Bio energy from India.

Presenting the perspectives from a host government in Nepal, Dr. Chaulagain mentioned that the depletion of ODA will have the following negative impacts on the dissemination of technology:

- More remote areas, poorer and marginalized people will never be able to get subsidy unless other alternatives to ODA is worked out.
- Private sector capacity cannot be fully developed.
- Difficulties in carrying out R&D activities.
- Better-off areas and richer people too should pay a higher price for the technology.
- Difficulties in making biogas as an inclusive social project.

According to him, ensuring sustainability of biogas programme without ODA would be difficult but the adverse impacts of its depletion could be minimized by means of the following:

- Trying to get revenue from Certified Emission Reductions (CER)/VER.
- Looking for other grant funding sources outside ODA funding.
- Developing proper credit mechanism.
- Capacity strengthening of concerned organizations.
- Proper operational guarantees of installed biogas plants.
- Proper institutional set-up for installation, quality control and fund flow.
- Integration with income generating activities and overall development planning.
- Considering a right-based approach of programme implementation.

Presenting an independent perspective, Dr. Khandelwal shared the experience from the implementation of the National Biogas and Manure Management Programme in India and highlighted challenges faced by the programme. He told that the programme is not self-propelling. According to him, the following are some perspectives for a sustainable programme:

- Minimizing plant cost by competitive bidding
- Control on management cost by employing Government staff and institutions
- Confidence building by enforcing provisions of guarantee fee (and repair charges)
- Carbon financing: Rules for sharing among stakeholders

According to him, though sustainability of biogas programme without ODA is difficult, however, there are some opportunities which could be tapped to move towards sustainability. These include:

- Phasing out of government subsidy on Liquefied Petroleum Gas (LPG) and fertilizers
- Agriculture prosperity
- Women empowerment
- Use of biogas for electricity generation: 3 -10 kW
- Use of biogas as tractor fuel
- Growing popularity of organic farming

The participants then discussed in teams. The outcome of the group discussions on the sustainability matrix has been presented in the following table:

Program Component	Possible Solutions
Program Management	○ Carbon revenue (VER, CDM) ○ Government policy, funding, commitments ○ Capacity development for management and resource mobilisation ○ Private sector (NGO) takes over ○ Diverse donors, multilateral and bilateral, from different areas ○ Commercialize the services, sell services to (local) governments
Construction	○ Increase farmers contribution ○ Enterprise development ○ Cheaper design, market increase, poorer segments ○ Awareness among households ○ Diverse services by companies

Household Plant Financing	○ Micro finance ○ Household finance ○ Reduce subsidy ○ Mobilise private investors
Training	○ Strengthen capacity and mobilise constructors ○ Privatize training ○ Mainstream training in vocation education institutes ○ Mobilise Associations
Quality Control (QC)	○ Strengthen Government's role ○ Mobilise associations and private sector ○ Encourage users to do QC themselves ○ Think of independent third party QC ○ Ensure internal quality control within companies/ formulate code of conduct ○ CDM monitoring ○ Certification of products
General	○ R&D for technical and program innovation

2.3.2 Reporting Session

Mr. Kailash Khandelwal, consultant from India, chaired this session and called upon the representatives from different parallel sessions to present summary of the outcome of discussions. Mr. Jeremy Stone, Mr. Ngosi Mwihava, Mr. Wim van Nes, Mr. Ingo Puhl, Mr. Jan Lam and Mrs. Indira Shakya presented outcomes of Session 1, 2, 3, 4, 5, and 6 respectively. The outcomes have already been included under each session description in chapter -2 above.



Dr. Khandelwal expressed his views that the scaling-up provisions should clearly be spelt out in the national policies. He also emphasised the need to strengthen public private partnership and creating an international forum on biogas. In closing, he expressed hope that African Development Bank may come out with a similar effort in Africa as Energy for All partnership in Asia initiated by ADB.

2.3.3 Signing of Memorandum of Understanding

A Memorandum of Understanding (MoU) was signed between the visiting Chinese Business Delegation, the Nepal Biogas Promotion Association and the Biogas Sector Partnership - Nepal on mutual plan of action especially on product development and marketing of biogas products and appliances. The leader of Chinese delegation expressed the willingness and interest of the Chinese entrepreneurs to associate with Nepalese counterparts. He announced that all the products that were transported from China to display in the market place will be handed over to Nepalese partners as a token of appreciation.

2.3.4 Results and Way Forward

Ms. Shaanti Kapila, Consultant of ADB chaired this closing session. She mentioned the saying, 'all good things come to an end' and thanked the organisers for excellent workshop.

Mr. Wim van Nes presented the summary of results of the workshop and the potential way forward as follows:

Related to process

- Result: Overall, a high level of engagement, interaction, interest and networking.
- Way forward:
  - ADB is committed to continue its support to the Working Group (WG) on Domestic Biogas under the Energy for All Partnership.
  - SNV is committed to continue its support to the biogas sectors in selected countries and networking to all engaged countries.

Related to Private Sector Development

- Result: Acknowledgement of the important role of the private sector to be played on marketing, construction & after sales, as well as on credit provision.
- Way forward: Countries to develop and implement policies that will support the private sector to fully play these roles.

Related to Realisation of Multiple Benefits

- Result: Acknowledgement of the importance of establishing and maintaining quality in biogas programmes in order to ensure the realisation of multiple benefits at all levels (micro, meso, macro).
- Way forward:
  - Increase of effective efforts to maximise the proper use of bio-slurry.
  - As biogas may not fulfil fully the cooking requirement, linkage to be established with Improved Cook Stove (ICS) programmes.

Related to the Working Group on Domestic Biogas under the Energy for All Partnership

- Result: Working Group has been launched on 12 November 2009, in Kathmandu, Nepal.
- Way forward: SNV to lead the Working Group and in cooperation with the ADB to proceed with activities required to achieve the objective of 1 (one) million biogas plants installed by 2015/2016.

Related to Carbon Financing

- Result: Realisation of the need of international coordinated approach to maximise the chance of success on carbon financing.
- Way forward:
  - Mobilisation of parties willing and able to participate in this approach.
  - Formulation of regional or country-based approaches.

Related to Cost price reduction & technical innovation

- Result: Protocol required on the introduction of innovative designs.
- Way forward:
  - Specialist group to be involved for the development of a protocol.
  - Selection of appropriate and uniform test methodologies.

Related to the Sustainability of ODA supported programmes

- Result: No consensus on the role of ODA, also because the issue is very country specific.
- Way forward: Sustainability matrix to be used for planning new programmes and monitoring & evaluation of existing programmes.

Recommendations by selected participants on "How to improve and scale up practices?"

From the audience, a number of participants were invited to reflect on the core theme of the workshop. Their views are summarised in the following sections:

Mr. Ngosi Mwihava, Tanzania

- Biogas, in many rural areas in Tanzania, is a 'least cost' option among different alternative sources of energy.
- Higher cost of installation is a challenge for Tanzania as well as all other African countries.
- To scale up the practices it is important to have:
  - proper design and implementation approach keeping in view the experience from similar programmes.
  - effective subsidy and credit mechanisms in place.
  - sustainable financing in the local context to promote rural-based sustainable energy.
  - initiatives to mainstream existing infrastructure to promote and extend biogas technology.
  - mechanisms for ensuring productive use of biogas plant and reduce indoor air pollution in line with effective R&D initiatives.

Mr. Saeed Ahmad, Pakistan

- 5 million biogas plants are feasible in the country.
- Private sector has poor track record. They are not mobilised properly.
- There is limited access to affordable credit.
- Use of bioslurry is not practiced effectively.
- To scale up the practice it is important to:
  - use SNV platform for similar MoU with Chinese biogas entrepreneurs.
  - ensure technology transfer from Nepal.
  - create database at district level. Technical and financial assistance will be needed from SNV for this activity.
  - support is needed to ensure affordable credit, enforce quality control, strengthen capacity of private sector, capacity building of stakeholders and awareness raising.
- SNV may come up with similar international workshop in Pakistan. The government is ready to support.

Dr. May Sengendo, Uganda

- There is need to look not only at technological matters but also on other aspects of programme implementation.
- There is need for innovation not only for cooking and lighting but also for other strategic and practical gender needs.
- Diversification of end use application of biogas is important.
- Capacity building needs to look not only at technical training but also on strengthening capacity of private sector and users. Training and wider capacity building should be used as a major sustainability strategy in ways that build capacity of private sector and users to enable a market oriented programme.
- Include biogas programme in national development process in ways that enable biogas to be a priority of central and local governments. If biogas is considered as government's priority sector, financing will come from different sources.
- Create a multi-stakeholder platform and focus on what different stakeholders can provide in terms of skills and services. Ensure that all the stakeholders are linked with the value chain of biogas products.
- There is need to have an effective communication in place.

Mr. Anil Dhussa, India

- As most of the benefits of a biogas plant are non-tangible, subsidy should be a prime factor for dissemination of the technology. Biogas programme in China is successful because of the higher share of subsidy; in contrary, Indian programme is suffering because of the lower subsidy rates.
- Quality should be in the centre of biogas programme implementation. Best practices should be shared between programmes and contextualised to adopt in a local situation.
- There is need to make genuine efforts to reduce the cost of installation.
- Skilled and motivated manpower is a key for the success of a biogas programme. It is good to learn from China where quite a lot of people are trained.
- IEC strategy and tools need to be strengthened.
- Develop larger entrepreneurs to increase absorptive capacity. Small entrepreneurs will not lead to a 'great success'.
- Energy for All Partnership should be strengthened and implemented effectively.

Other participants also expressed their views on how to improve and scale up practices related to biogas programme implementation. Participants pointed out need to distinguish between 'poverty alleviation' objective and 'commercial sector development' objective. In other words, there is need to deal differently with the 'social' versus 'commercial' approaches of biogas programme implementation.

2.3.5 Evaluation and Closing of the Workshop

Mr. Jean de Matha Ouédraogo, SNV Corporate RE Sponsor Director, thanked all the participants for their active participation and congratulated them for the successful completion of the workshop. He thanked the Government of Nepal, SNV Nepal, and ADB officials for their unfailing supports to make this event a great success. He also thanked all the paper presenters, facilitators and session chairpersons for their contributions. Extending special thanks to Mr. Wim van Nes and Mr. Fred Marree, he told that this event would not have been possible without their hard works. He also thanked SNV Nepal and BSP-N team for excellent arrangement and management of the field visit programme. In closing, Mr. Ouédraogo reiterated that biogas is a renewable energy source that is friendly to the environment and to the livestock owning households, and rightly, will open a new page of ambitions to maximise our efforts to develop renewable energy just a few weeks away from the important climate change conference in Copenhagen. At the end, Mr. Wim van Nes felicitated the presenters and some other contributors for their contributions.

Evaluation forms were distributed to the participants at the end to evaluate the overall workshop event and provide constructive comments and suggestions. The outcome of the evaluation indicates that 66% (76 out of 116) of the total participants feel that the international workshop has been 'very useful' to them and other 34% reported that it was 'useful'. Only one participant (1%) expressed the workshop to be 'moderately useful' while none of the participants mentioned it to be 'not useful'. The details of evaluation outcome have been given in Annex-4.

3. Celebration of 200,000th Biogas Plant in Nepal

The participants, after the completion of the formal workshop programme, attended a special ceremony organised to celebrate the success of the Biogas Support Programme (BSP) in Nepal to install more than

200,000 biogas plants. The owner of 200,000th biogas plant, the mason who constructed this plant, the supervisor as well biogas companies who contributed to the success of biogas programme in Nepal were provided with special awards from the President of Republic of Nepal, Dr. Ram Baran Yadav. The celebration ceremony was addressed by Dr. Prakash Sharan Mahat, Minister for Energy, Mr. Taker Sharma, Minister for Environment, Secretaries in the Ministry of Energy and Ministry of Environment, SNV Nepal Country Director, Mr. Hans Heijdra, and Chief Executive Officer of SNV, Mr. Dirk Elsen.

4. Conclusion

The international workshop has been instrumental in providing an organised platform for experts working in domestic biogas sector in different countries across the world to share problems, prospects, innovations and best practices related to dissemination of biogas technology. The evaluation results clearly indicated that the workshop has been successful in achieving its objectives.

Annexes

Annex-1: List of Participants

Name	Organisation	Function	E-mail address
From Afghanistan:			
Mr. Michael Yon	New York Times	Biogas research for Afghanistan	michael.yon@gmail.com
Mr. Stash Guam	UNDP, National Area Based Development Program	Energy Advisor	satish.gautam@mrrd.gov.af
Mr. Ram P. Dhital	UNDP, National Area Based Development Program	Renewable Energy Expert	ram.dhital@mrrd.gov.af
From Bangladesh:			
Mr. Md. Abdul Gofran	Bangladesh Biogas Development Foundation (BBDF)	Chairman	gofran@dhaka.net
Mr. Md. Fazlul Haque	Grameen Shakti (GS)	Deputy General Manager	G_shakti@grameen.net
Mr. Md. N. Haque Faisal	Infrastructure Development Company Ltd (IDCOL)	Programme Manager	faisal@ns1.idcol.org
Mr. S.M. Formanul Islam	Infrastructure Development Company Ltd (IDCOL)	Director and Company Secretary	fislam@idcol.org
Mr. Mustak Hassan Md. Iftekhar	NGO Affairs Bureau (NGO-AB)	Director General	dcheu@agni.com
Mr. Md. Monir Ullah	Bangladesh Biogas Development Foundation (BBDF)	Member	nirapad.biogas@gmail.com
Mr. Rajeev Munankami	SNV	Advisor Biogas	rmunankami@snvworld.org
From Benin:			
Mr. Sakariyou Mahman	Ministry of Energy and Water	Director	youmahman2@yahoo.fr
From Bhutan:			
Mr. Chhimi Dorji	Department of Energy, Renewable Energy Division	Deputy Executive Engineer	chhimi08@gmail.com
Mr. Phurpa Dorji	Ministry of Agriculture, Department of Livestock	Officer	p_dorji@moa.gov.bt
From Burkina Faso:			
Mr. Johnson Bien-Aime	SNV	Country Director	bjohnson@snvworld.org
From Cambodia:			
Mr. Phal Kao	MAFF, Dep. of Animal Production & Health (DAPH)	Director	saoleng@nbp.org.kh
Mr. Chetra Sar	MAFF, Dep. of Animal Production & Health (DAPH)	Chief Animal Production Office	chetrass@yahoo.com
Mr. Eric Buijsman	GERES	Carbon and Technology Analyst	e.buysman@geres.eu
Ms. Saoleng Lam	National Bio-digester Programme (NBP)	Programme Coordinator	lamsaoleng@gmail.com
Mr. Jan Lam	SNV	Biogas Advisor	jlam@snvworld.org
Mr. Prakash Ghimire	SNV	Regional Advisor Biogas	pghimire@snvworld.org
From China:			
Mr. Li Qian	Biogas Institute of Ministry of Agriculture (BIOMA)	Director General	biogaskyc@caas.net.cn
Mr. Zhang Mi	CEEIC	Managing Director	zhangmij1@126.com
Mr. Jianan Wang	Shengzhen Puxin Science & Technology Co., Ltd.	Proprietor	topsaving@yahoo.com
From Ethiopia:			
Mr. Mesfin Batisso	EREDPC, National Biogas Programme	Regional Manager	mbatiso@yahoo.com
Mr. Wossenu Areda	EREDPC	Process Owner	wossenuareda@yahoo.com
Mr. Misganaw Asnakew	EREDPC, National Biogas Programme	Manager	misgan_asnakew@yahoo.com
Ms. Worknesh Ketema	SNV	Finance Advisor	wassefa@snvworld.org
Mr. Willem Boers	SNV	Biogas Advisor	wboers@snvworld.org
Ms. Banchayehu Getahun	SNV	Biogas/RE Advisor	byitayal@snvworld.org
From Germany:			
Ms. Mariela Pino	Cologne University of Applied Sciences	Student, M. Sc.	mariela.pino@smail.fh-koeln.de
Mr. Otmar Werner	German Development Bank (KfW)	Project Manager	otmar.werner@kfw.de
Mr. Marc Lüers	GTZ	Consultant	marclueer@gmx.de
From Honduras:			
Mr. Willem Bron	SNV	Advisor Renewable Energy	wbron@snvworld.org
From India:			
Mr. Venkata Krishna Choppalli	CREAT	Executive Director	krishnacreat1@rediffmail.com
Dr. Kailash Khandelwal	Consultant		advkck@yahoo.com
Mr. Gopal L. Meena	Ministry of New and Renewable Energy (MNRE)	Director (Biogas)	gl.meena@nic.in
Mr. Anil K. Dhussa	Ministry of New and Renewable Energy (MNRE)	Director	anildhussa@yahoo.com
Mr. D. Vidya Sagar	SKG Sangha	President	skgsangha@gmail.com
Mr. Jagannath Raju	Society for the Welfare of Weaker Sections (SWWS)	President	jagannathraju7@rediffmail.com
Mr. Ram Chandra Pal	The Energy and Resources Institute(TERI)	Field Manager	rcpal@teri.res.in

Name	Organisation	Function	E-mail address
From Indonesia:			
Mr. Bambang Boedi Cahyono	CV Khazanah Bahari	Manager	yonobbc@gmail.com
Mr. Awang Riyadi	MEMR, New Renewable Energy & Energy Conservation	Staff	awangriyadi@yahoo.com
Mr. Robert de Groot	Hivos, Indonesia Domestic Biogas Programme	Programme Manager	r.degroot@hivos.or.id
Mr. Sundar P. Bajgain	SNV	Biogas Advisor	sbajgain@snvworld.org
From Kenya:			
Mr. Josphat Kariuki	Equator Fuelwood Energy Saving Project (EFWES)	Founder Director	equaterfuelstove@yahoo.com
Mr. Paul Gamba	KENFAB	Coordinator Biogas Programme	pgamba2002@yahoo.com
Mr. Moses Wanga	SNV	Biogas Advisor	mwanga@snvworld.org
From Lao PDR:			
Mr. Khampaye Thammavong	MAF, Department of Livestock and Fisheries	Programme Director	lao_dlfmaf@yahoo.com
Mr. Souphavanh Keovilay	MAF, Department of Livestock and Fisheries	Programme Manager	souphavanh@biogaslao.org
Mr. Andrew Williamson	SNV	Biogas Advisor	awilliamson@snvworld.org
Mr. Jeroen van Bruggen	SNV	Carbon Finance Advisor	jvanbruggen@snvworld.org
Mr. Bounthavy Sengtakoun	SNV	Biogas Advisor	bsengtakoun@snvworld.org
Mr. Vinoth Vansy	MAF, Department of Planning	National Project Director	vinus_lao02@yahoo.com
From Nepal:			
Mr. Dilip Jung Shah	Agricultural Development Bank Ltd (ADBL)	Chief Loan Division	dilip.shah_jajarkot@yahoo.com
Mr. Sylvain Koch-Mathian	AGIS Environment	SAESUp project leader	sylvain.koch-mathian@saesup.org
Mr. Rudra Prasad Khanal	Alternative Energy Promotion Center (AEPC)	Sr. Administrative Officer	rudra.khanal@aepc.gov.np
Mr. Sushil Acharya	Alternative Energy Promotion Center (AEPC)	Credit Officer	sacharya@aepc.gov.np
Mr. Samir Thapa	Alternative Energy Promotion Center (AEPC)	RESS Coordinator	samir.thapa@aepc.gov.np
Dr. Narayan Prasad Chaulagain	Alternative Energy Promotion Center (AEPC)	Executive Director	narayan.chaulagain@aepc.gov.np
Mr. Niels Juhl Thomsen	AEPC, Energy Sector Assistance Programme	Chief Adviser	niels.thomsen@aepc.gov.np
Mr. Upendra Man Malla	Biogas Sector Partnership-Nepal (BSP-N)	EC Vice Chairman	umalla.east@gmail.com
Mr. Khagendra Nath Khanal	Biogas Sector Partnership-Nepal (BSP-N)	Assistant-Director	knkhanal@bspnepal.wlink.com.np
Dr. Indira Sthapit Shakya	Biogas Sector Partnership-Nepal (BSP-N)	Board Member	indira_bspnepal@wlink.com.np
Mr. Prakash Lamichhane	Biogas Sector Partnership-Nepal (BSP-N)	Manager	prakash@bspnepal.wlink.com.np
Mr. Saroj Rai	Biogas Sector Partnership-Nepal (BSP-N)	Executive Director	srai@bspnepal.wlink.com.np
Ms. Bindu Manandhar	Biogas Sector Partnership-Nepal (BSP-N)	Department Chief	bindu_bspnepal@wlink.com.np
Dr. Tri Ratna Bajracharya	Center for Energy Studies (CES)	Director	triratna@ioe.edu.np
Mr. Lumin Kumar Shrestha	Centre for Rural Technology(CRT), Nepal	Director	lumink@crtnepal.org
Mr. Ganesh Ram Shrestha	Centre for Rural Technology(CRT), Nepal	Executive Director	ganeshramshrestha@gmail.com
Mr. Kalidas Neupane	Consultant		kalidasneupane@yahoo.com
Mr. Shanker Raj Pandey	German Development Bank (KfW)	Local Expert	kfwnepal@wlink.com.np
Mr. Frank Boemer	German Development Service (DED)	Coordinator	frank.boemer@ded.de
Mr. Dharma Raj Pandey	Pashchimanchal Grameen Bikas Bank	Chief Executive Officer	pgbb_btw@wlink.com.np
Mr. Yogendra Mandal	MFI/ Jiban Bikas Samaj	Executive Director	Jbs_amahi@yahoo.com
Mr. Yagya Raj Sharma	NABIL Bank	Sr. Relationship Manager	yagya.sharma@nabilbank.com
Mr. Krishna Subedi	Nepal Biogas Promotion Association (NBPA)	Chairperson	kc_subedi@yahoo.com
Mr. Mohan Raj Sharma	NBPA	Executive Director	moraj_sharma@yahoo.com;
Mr. Bikash Adhikari	NBPA	Engineer and Technical Officer	info@nbp-association.org.
Mr. Shekhar Aryal	NBPA	Ex-Chairperson	nbpg@nbpg.wlink.com.np
Mr. Surya Hada	Gobar Gas Company	General Manager	hada_surya@hotmail.com
Ms. Shaunna Barnhart	Pennsylvania State University	PhD candidate	himalayan.butterfly@gmail.com
Mr. Sandip Kumar Kantha	REWSSPC	Managing Director	sandip_kanth@yahoo.com
Dr. Krishna Raj Shrestha	RECAST	Biomass Energy Expert/Professor	shresthakr@hotmail.com
Mr. Shuva Sharma	Scott Wilson Nepal Pvt Ltd	Infrastructure and Institutions	shuva401@gmail.com
Mr. Ramesh K. Gautam	SNV	Micro Finance Advisor	rgautam@snvworld.org
Mr. Uttam Jha	SNV	OSID Advisor	ujha@snvworld.org
Mr. Tom Thorsch Krader	SNV	Sector Leader RE	tkrader@snvworld.org
Dr. Govind Pokharel	SNV	Sponsor Manager RE Asia	gpokharel@snvworld.org
Ms. Suchana Pandey	SNV	RE Advisor	spandey@snvworld.org

Name	Organisation	Function	E-mail address
Mr. Siddhi Shrestha	SNV	RE advisor	sshrestha@snvworld.org
Mr. Jeremy Stone	SNV	Renewable Energy Advisor	jstone@snvworld.org
Mr. Marco van der Linden	SNV	Carbon Finance Advisor	marcovanderlinden@snvworld.org
Ms. Subarna Newar	SNV	Portfolio Coordinator RE	srai@snvworld.org
Mr. Rajendra Shakya	SNV	Regional Head of Administration	rshakya@snvworld.org
Mr. Dinesh Dulal	Clean Energy Development Bank Ltd (CEDB)	Sr. Relationship Officer	dinesh.dulal@cedbl.com
Mr. Prashun R. Bajracharya	Universal Consultancy Service Pvt Ltd.	Programme Director	prashun_bajracharya@yahoo.com
Mr. Govinda Devkota	Universal Consultancy Service Pvt Ltd.	Executive Chairman	govindadevkota@yahoo.com
Mr. Kedar Chandra Sharma	Ministry of Environment	Environment Advisor	ncpu@wlink.com.np
Mr. Thomas Pedroletti	Planet Finance	Head of Mission	tpedroletti@planetfinance.org
Mr. Loknath Ghimire	Nepal Biogas Promotion Association (NBPA)	Vice President	info@nbp-association
Mr. Surya Sapkota	Alternative Energy Promotion Center (AEPC)	Planning Officer	surya.sapkota@aepc.gov.np
Mr. Frans Neuman	ICIMOD, Mountain Forum Secretariat	Executive Secretary	f.neuman@mtnforum.org
Mr. Ram Bhajan Shah	National Cooperative Federation of Nepal (NCF/N)	General Manager	ncf@wlink.com.np
Mr. Mangal Das Maharjan	AEPC, Renewable Energy Project (REP)	National Project Director	mangal.maharjan@aepc.gov.np
Mr. Thakur Devkota	AEPC,Rural Energy Development Programme (REDP)	Senior Energy Advisor	thakur.devkota@redp.org.np
Mr. Vidya Deo Joshi	Alternative Energy Promotion Center (AEPC)	Biofuel Programme Coordinator	vidya.joshi@aepc.gov.np
Ms. Anisha Shakya	Centre for Rural Technology (CRT), Nepal		faithless_annie@hotmail.com
Mr. Tapendra Chand	Nepal Biogas Promotion Association (NBPA)		tapendrachand@hotmail.com
From the Netherlands:			
Mr. Harrie Oppenoorth	Hivos	Advisor Energy & Climate Change	hoppenoorth@hivos.nl
Mr. Wim J. van Nes	SNV	Knowledge Network Leader	wvannes@snvworld.org
Mr. Fred Marree	SNV	Knowledge Network Facilitator	fmarree@snvworld.org
Dr. Henri Spanjers	Lettinga Associates Foundation (LeAF)	Group Leader	henri.spanjers@wur.nl
Ms. Sheila Oparaocha	ETC Foundation	Senior Consultant	s.oparaocha@etcnl.nl
From Pakistan:			
Mr. Saeed Ahmad	Ministry of Environment	Deputy Secretary	saeed.ahmad52@yahoo.com
Mr. Khaleel Ahmed Tetlay	Rural Support Programmes Network (RSPN)	Chief Operating Officer	khaleel.tetlay@rspn.org.pk
Mr. Md. Sajjad Haider	Rural Support Programmes Network (RSPN)	Programme Manager	sajjad.haider@rspn.org.pk
Mr. Rajesh Shrestha	SNV	Biogas Advisor	rshrestha@snvworld.org
Mr. Prem Sagar Subedi	Winrock International	Technical Advisor	premsubedi@gmail.com
Mr. Javaid Afzal	World Bank	Environment Specialist	jafzal@worldbank.org
From the Philippines:			
Ms. Shaanti Kapila	Asian Development Bank (ADB)	Energy for All Initiative Coordinator	skapila.consultant@adb.org
Mr. Joselito Calip	Department of Energy	Science Research Specialist	joselito_calip@yahoo.com
From Rwanda:			
Mr. Gerard Mutimura Sakufi	Banque Populaire du Rwanda (BPR)	Programme Lending Manager	sakufigerard@yahoo.fr
Mr. Augustin Hategeka	MinInfra, National Domestic Biogas Programme	Coordinator	ahategeka@yahoo.fr
Mr. Jean de Matha Ouédraogo	SNV	Country Director	jouedraogo@snvworld.org
Mr. Anaclet Ndahimana	SNV	Biogas Advisor	andahimana@snvworld.org
Mr. Guy Dekelver	SNV	Biogas Advisor	gdekelver@snvworld.org
From Singapore:			
Mr. Zuzhang Xia	The Foundation for Development Cooperation (FDC)	Access to Energy Coordinator	zuzhangxia@fdc.org.au
From Tanzania:			
Mr. Ngosi Mwihava	Ministry of Energy & Minerals (MEM)	Asst. Commissioner-RE	mwihava@mem.go.tz
Mr. Jones Olotu	Rural Energy Agency (REA)	Energy Project Officer	olotujf@hotmail.com
Mr. Felix ter Heegde	SNV	Advisor Biogas	fterheegde@snvworld.org
Mr. Peter Bos	SNV	Biogas Advisor	pbos@snvworld.org
Mr. Alexander Mwalyoyo	TaTEDO		mwalyoyo@yahoo.com
Mr. Lehada Shila	CAMARTEC, Tanzania Domestic Biogas Programme	Programme Coordinator	clshila@yahoo.com

Name	Organisation	Function	E-mail address
From Thailand:			
Mr. Sivanappan Kumar	Asian Institute of Technology (AIT)	Professor	kumar@ait.ac.th
Ms. Sweta Pokharel	E+Co Asia	Investment Officer	sweta.pokharel@eandco.net
Mr. Sverre Tvinnereim	FAO	Bioenergy Officer	Sverre.Tvinnereim@fao.org
Mr. Ingo Puhl	South Pole Carbon Asset Management Ltd.	Head of Thailand office	i.puhl@southpolecarbon.com
Mr. Hongpeng Liu	UNESCAP	Economic Affairs Officer	liu4@un.org
Mr. Jeffrey Dickinson	E+Co Asia	Regional Manager	jeff.dickinson@eandco.net
From Uganda:			
Mr. Patrick Nalere	Heifer Uganda	Country Director	patrick.nalere@heiferuganda.org
Mr. Medard Muganzi	Private Sector Foundation Uganda	Project Officer, Programmes	mmuganzi@psfuganda.org.ug
Ms. Patience Turyareeba	SNV	Biogas Advisor	pturyareeba@snvworld.org
Dr. May Sengendo	Consultant		sengendo@infocom.co.ug
From the USA:			
Mr. Jacob Winiecki	Arc Finance	Senior Program Specialist	jacob@arcfinance.org
Mr. Jeremy Levin	WB, South Asia Sustainable Development Network	Senior Technical Specialist	jlevin@worldbank.org
From Vietnam:			
Ms. Nguyen Thi Minh Nguyet	MARD, Biogas Program Division	Program Coordinator	nguyetntm@biogas.org.vn
Mr. Jeroen Kruisman	SNV	Chief Technical Advisor	jkruisman@snvworld.org
Mr. Bastiaan Teune	SNV	Biogas Advisor	bteune@snvworld.org
Mr. Tran Kim Long	MARD, International Cooperation Department	Deputy Director General	longtk.htqt@mard.gov.vn
Mr. Pham Quang Toan	MARD, Agricultural Projects Management Board	Deputy Director General	toanpham@mard.gov.vn

Additional international participants of the Market Place only:

Name	Organisation	Function	E-mail address
From China:			
Mr. Zhang Tianrui	Beijing Lunen New Energy Co., Ltd.	Director General	chunyu77777@126.com
Ms. Li Xu	Chengdu Energy-Environment International Corporation	Manager Assistant	lixu87@126.com
Mr. Zhang Tieyao	Chengdu Hongqi Industry Co.Ltd	Director General	chinacdhqsy@163.com
Mr. Tu Yunzhang	China Association of Rural Energy Industry	Director	tuyunzhang@163.com
Ms. Zhou Zhimin	China Association of Rural Energy Industry	Deputy Director	zhouzhimin2380@sina.com
Mr. Zhu Jiang	Chongqing Wangliyuan Agriculture Development Co.,Ltd.	Director General	atom1125@sina.com
Mr. Wu Zhaoliu	Feiye Science and Technology Co.,Ltd. Beijing	Director General	bjfne@163.com
Mr. Li Rujun	Guangzhou Zhaoyuan Renewable Energy Developing Co.,Ltd	Director General	616609268@QQ.com
Ms. Shi Peiru	Institute of Planning and Designing, Ministry of Agriculture	Senior Engineer	tuyunzhang@163.com
Ms. Peng Aihua	Jiangxi Gongchuang Eco-Scientific Co.Ltd	Director General	nyzx88@cn-jxzhaoqi.com
Mr. Wang Jianhua	Jiangxi Gongchuang Eco-Scientific Co.,Ltd	Managing Director	nyzx88@cn-jxzhaoqi.com
Mr. Mei Zili	MoA, Monitoring and Testing Center of Biogas Appliances	Standing Deputy Director	m13618016610@163.com
Mr. Meng Fanchen	Shandong Dezhou Beichen Complex Material Co., Ltd	Director General	smc-beichen@263.com
Mr. Yang Rui	Shanghai Chengchang Power Co.,Ltd.	Sales Manager	rickandiris@foxmail.com
Ms. Mei Lijuan	Shanxi Yanglin Qingguang, Biogas Sealing Material Plant	Director	cangiong186@sohu.com
Ms. Wei Qionghua	Shanxi Yanglin Qingguang, Biogas Sealing Material Plant	Deputy Manager	canglong186@sohu.com
Mr. Zhang Ping	Shanxi Yanglin Qingguang, Biogas Sealing Material Plant	Manager	canglong186@sohu.com
Mr. Wang Yiming	Xinye Eco-Energy Co,Ltd Chizhou, Anhui	Senior Agronomist	waishiwaijing@hotmail.com
Mr Li Linchun	Chongqing Wangliyuan Agriculture Development Co.,Ltd.	English interpreter	
From Nepal:			
Ms. Gisela McGuinness	International Committee of the Red Cross (ICRC)	Water & Habitat Coordinator	assist.kat@icrc.org

Annex-2: Participants in Market Place

Representative	Organisation
Mr. Guna Bahadur Lama	Nepal Biogas Promotion Association (NBPA)
Mr. Paul Marek	
Mr. Som Prasad Newar	
Mr. Guru Prasad Shrestha	Biogas Sector Partnership Nepal (BSP-N)
Mr. Mahaboob Siddhiki	
Mr. Mahesh Devkota	
Mr. Narhari Lama	
Ms. Gisella McGuinness	International Committee of Red Cross
Mr. Robert de Groot	Hivos, Indonesia Domestic Biogas Programme
Mr. Jan Lam	SNV, Cambodia Domestic Biogas Programme
Mr. Zhang Tianrui	Beijing Lunen New Energy Co., Ltd.
Ms. Li Xu	Chengdu Energy-Environment International Corporation
Mr. Zhang Tieyao	Chengdu Hongqi Industry Co.Ltd
Mr. Tu Yunzhang	China Association of Rural Energy Industry
Ms. Zhou Zhimin	
Mr. Zhu Jiang	Chongqing Wangliyuan Agriculture Development Co.,Ltd.
Mr. Wu Zhaoliu	Feiye Science and Technology Co.,Ltd. Beijing
Mr. Li Rujun	Guangzhou Zhaoyuan Renewable Energy Developing Co.,Ltd
Ms. Shi Peiru	Institute of Planning and Designing, Ministry of Agriculture
Ms. Peng Aihua	Jiangxi Gongchuang Eco-Scientific Co.,Ltd
Mr. Wang Jianhua	
Mr. Mei Zili	MoA, Monitoring and Testing Centre of Biogas Appliances
Mr. Meng Fanchen	Shandong Dezhou Beichen Complex Material Co., Ltd
Mr. Yang Rui	Shanghai Chengchang Power Co.,Ltd.
Ms. Mei Lijuan	
Ms. Wei Qionghua	Shanxi Yanglin Qingguang, Biogas Sealing Material Plant
Mr. Zhang Ping	
Mr. Wang Yiming	Xinye Eco-Energy Co,Ltd Chizhou, Anhui
Mr Li Linchun	Chongqing Wangliyuan Agriculture Development Co.,Ltd.
Mr. Sajjad Haider	Pakistan Domestic Biogas Programme

Annex-3: Programme Schedule

Monday, 9 November 2009:

20.00-21.30	Welcome reception at Hyatt, Rox Bar	Mr. Jean de Matha Quédraogo

Programme Tuesday, 10 November 2009:

08.00-08.30	Registration at Hyatt, near Ballroom (AB)	Mr. Fred Marree; Mr. Dhana Khadgi; Ms. Bindu Manandhar Mr. Mr. Zuzhang Xia
Plenary Inauguration Session (in Ballroom AB) chaired by Mr. Hans Heijdra		
08.30-09.30	-Statement from Mr. Barry Hitchcock, Country Director for Nepal, ADB, delivered by Ms. Shaanti Kapila, Consultant, ADB; -Opening remarks by Jean de Matha Quédraogo, Corporate Knowledge Network Sponsor on Renewable Energy, SNV -Opening remarks by Mr. Dirk Elsen, Director, SNV -Group picture	Mr. Govind Pokharel
Plenary Presentation Session (in Ballroom AB) chaired by Mr. Hongpeng Liu		
09.30-09.55	Biogas Support Programme in Nepal	Mr. Saroj Rai
09.55-10.20	Biogas experience in China	Mr. Li Qian
10.20-10.50	Tea/coffee Break	
10.50-11.15	Domestic biogas development in India	Mr. Gopal L. Meena
11.15-11.40	SNV supported biogas programmes in Asia and Africa	Mr. Felix ter Heegde
11.40-12.00	Introduction to the parallel sessions of the Workshop	Mr. Wim J. van Nes
12.00-13.00	Lunch	
Parallel Sessions including tea/coffee break:		
13.00-17.00	Session 1 (*in Ballroom AB*): Private sector development	Mr. Sundar Bajgain
	Session 2 (*in Ballroom C*): Realisation of multiple benefits; programme success: concretising impact	Mr. Felix ter Heegde
	Session 3 (*in Kirtipur*): Energy for All Partnership (on invitation)	Mr. Govind Pokharel
17.00-19.00	Drinks & snacks at Hyatt, Pool Side	Mr. Tom Thorsch Krader

Wednesday, 11 November 2009:

07.30-11.30	Field visit (10 groups)	Mr. Uttam P. Jha
11.30-12.30	Lunch at Himalayan Horizon, Dhulikhel	
12.30-14.00	Return from Dhulikhel to Hyatt, Kathmandu	
15.00-18.00	Market Place at Hyatt, Ballroom AB	Mr. Cagri Hurmuzlu
18.30-21.00	Dinner/buffet at Garden of Dreams, Thamel	Mr. Dhan Khadgi

Thursday, 12 November 2009:

Parallel Sessions including tea/coffee break:		
08.00-12.00	Session 4 (*in Kirtipur)*: Carbon financing	Mr. Jeroen van Bruggen
	Session 5 (*in Ballroom AB)*: Cost price reduction and technical innovation	Mr. Jan Lam
	Session 6 (*in Ballroom C)*: Sustainability of ODA supported programmes	Mr. Andrew Williamson
12.00-13.00	Lunch	
Plenary Reporting Session (in Ballroom AB) chaired by Dr. Kailash Khandelwal		
13.00-14.00	Reports on the conclusions and recommendations of Parallel Sessions 1 up to 6	Session Reporters
Plenary Closing Session (in Ballroom AB) chaired by Ms. Shaanti Kapila		
14.00-15.20	Workshop results and the way forward	Dr. Govind Pokharel Mr. Wim J. van Nes
15.20-15.30	Closing remarks	Mr. Jean de Matha Ouédraogo
15.30-16.30	Tea/coffee break plus evaluation	All
Plenary Celebration Session (in Ballroom AB)		
16.30-18.00	Celebration of 200,000 biogas plants installation under the Biogas Support Programme in Nepal	Mr. Basu Sharma
18.00-20.30	Reception with Nepali biogas stakeholders over drinks & buffet on invitation of AEPC, BSP-N, KfW and SNV/Nepal at Hyatt, Banquet Garden	Ms. Subarna Newar

Annex-4: Evaluation of Workshop

Issues	Poor	Fair	Good	Very good	Remarks
Workshop Programme	0.0	0.0	38.0	62.0	○ Well organised. ○ It was well managed. ○ I was yet to come out through a full-fledged educative workshop covering all aspects of biogas technology. ○ The topics in parallel sessions were very good to be included in plenary. ○ Such a well planned, perfect timing and relevant topics including field visit. ○ The workshop exposed us to a lot of things regarding biogas which perhaps we were not aware of. ○ Very well organised, coordinated – ran very smoothly and stayed on target. ○ Successful on networking the biogas families. ○ It was taken up very well and time was managed properly. ○ Identify the key issue to discuss is better than separate two groups: such as barriers and solutions. ○ More group work plus break time is required.
Inaugural Session	0.0	8.0	52.0	40.0	○ It was sharp and sweet. ○ Missed the session due to flight problems. ○ I guess it was excellent as it was not in the session day. ○ Some formal type, not much time consuming – short and sweet! ○ Explanation of cultural significance of the lighting of the lamp to inaugurate the workshop would have been good as most of the people were not from Nepal. ○ No representative from the Government of Nepal. ○ Would have been more memorable if the ceremony of 200,000 biogas plant was observed together with the inauguration. ○ Individual introduction of participants was missed – why? ○ Well done.
Plenary Presentations					○ We expected process of BSP-N that would help new initiatives.
Mr. Saroj Rai (Nepal)	0.0	28.0	52.00	20.0	○ Presentations from China and India were not clear enough.
Mr. Li Qian (China)	4.0	56.0	33.0	7.0	○ Missed the sessions due to flight problems.
Mr. G.L.Meena (India)	8.0	60.0	19.0	13.0	○ Mr. Qian's and Mr. Meena's presentations were confusing. For such plenary presentations it may be useful to provide presenters with tips on effective power point.
Mr. Felix ter Heegde (SNV)	0	2.0	39.0	59.0	○ Presentation from Nepal was nice in comparison to that from India and China. Presentation from India was not good. ○ Felix should have used updated + verified data for such an important presentation (not easy!) ○ The presentations for China and India were little bit unclear. The presenters read the slides and I felt sleepy! ○ I am not sure if it was due to language or other reasons that the plenary presentations from China and India were not to the standard of the workshop. ○ Competency to present information was very bad in India and China presentations. ○ Some data in Felix's presentation were confusing such as proportion of subsidy compare to farmer's investment.
Parallel Sessions					
Private Sector Development	7.0	13.0	60.0	20.0	○ More time needed for open floor sessions/discussions to clarify issues.
Realisation of Multiple Benefits	0.0	15.0	40.0	45.0	○ Was not aware about the objective of the session on 'Energy for all partnership' in advance.
Energy for All Partnership	0.0	16.0	50.0	34.0	○ The parallel sessions were very fruitful due to uncovered facts that we too learned a lot from them.
Carbon Financing	0.0	18.0	56.0	26.0	
Cost price reduction and technical Innovation	4.0	11.0	50.0	36.0	○ Group works rarely bring new things. ○ The break-out discussion format was well-run and constructive.
Sustainability of ODA supported programmes	6.0	13.0	59.0	22.0	○ No real innovations discovered. No real cost reduction found. ○ More time needed for question and answer sessions. ○ Some of the answers given by the presenters were not satisfactory.

Programme on 11/11					
Field Visit Programme	0.0	0.0	38.0	62.0	○ We expected more stalls from Nepal to demonstrate goods and services.
Market Place	0.0	14.0	55.0	31.0	○ Market place could have been more balanced – it was very much 'China-dominated'. ○ Good time management during field visit. ○ Language constraint made a bit difficult, but was not bad. ○ Only digesters under construction were visited. For people who do not know it would have been nice to see a blue flame. ○ Field visit was good but it would have been nice to have more time with the biogas users. ○ I support the concept of market place but did not find it actually very useful.

					○ Would have been better to visit more biogas users. Our group was able to visit with only one user. ○ Showing benefits of biogas on users is required. ○ Seeing in believing.
Plenary sessions on 12/11					○ More decisions and actions expected.
Reports from Parallel sessions	0.0	10.0	66.0	24.0	○ Results and way forward were somehow clear. ○ Well planned and perfectly managed.
Workshop results and way forward	0.0	7.0	37.0	56.0	○ Reporting session was useful as it was good to have an idea of what went on in the other parallel sessions. ○ I was expecting more.
Preparations and Facilitation of workshop	0.0	8.0	40.0	53.0	○ It was perfect and would like to specially thank Wim. ○ Thanks to Wim and Fred for clear guidelines and support through information provision. ○ Unfortunately, some related people happened to be missed out and some not involved in the sector got chance to attend. ○ I never received an update communication on the workshop times so I just showed up at 8 am on day 1 and luckily I guessed right. ○ Not well informed before. No consultations with national institutes in Nepal.
Hotel arrangements	3.0	5.0	43.0	49.0	○ It was nice and well organised. ○ Almost all the foods that have been provided by the hotel are locally receipt. Better to have more neutral menu/international menu. ○ Very well arranged and professional. ○ Beautiful hotel – I just find it ironic that such meetings on work with the poor are always in such plush surroundings. ○ Wonderful, though bit far from the city centre. ○ Internet too expensive! ○ Even after paying such a high hotel bill, the internet is so inaccessible! ○ Good hotel but INTERNET? ○ Food was not very good/less tasty. No internet access was provided as a service to client. Even the cost was too high. ○ Internet service is vital during the workshop.
Overall Usefulness of workshop	0.0	1.0	34.0	66.0	○ Excellent event – congratulations! ○ It has enabled me to realise where improvement and scaling up can be done. ○ Such a great opportunity to learn through sharing experiences. ○ Gained diversified country experiences.
Comments, suggestions, and complaints	○ Hope it will be continued and evaluation will be done after one year. ○ Workshop is well organised, presentations and parallel sessions were really wonderful. Good learning opportunity for a new comer and it will be useful for my country. Looking forward for more fruitful collaboration with ADB and SNV for the adoption of similar programme in my country. We want to learn more from Nepal's experience on the dissemination and implementation of domestic biogas programme. Also willing for technology and know-how transfer from India and China. ○ How to ensure sustainability of the programme after SNV pulls out. ○ The participation of private sector was poor; please consider more involvement in the future. ○ During sessions, use cards to organise ideas/comments etc. ○ Excellent, keep it up! ○ The quality of after-lunch session on 12/11 was not as high as the rest of the programme. Time management got sloppy and input not so sharp! ○ More focus should have been given to answer questions such as how to make pro-poor? How to make cost effective? How to exchange ideas among the participants/countries? ○ All are fine and request to organise similar events in a need basis in future for better learning and good networking. ○ May SNV-ADB collaboration grow! ○ This should be an annual event of SNV. ○ More technical discussion in future programme. ○ I have all my best wishes from the heart that such efforts would continue on sustainable manner to facilitate the sustainability of Biogas for all needy people. ○ Similar workshop should be organised to create a platform to share experiences and knowledge transfer. ○ In future, the flight route and connections should be decided in consultation with the participants. ○ Cooperative organisations should be involved compulsorily because of their networks with villagers and farmers. ○ Great Workshop. ○ Please consider having such a workshop in Africa. ○ Very good, well organised and quite useful outcomes. Thanks. ○ Though it is costly, I believe that in the long run such event pays more than the costs by contributing to meet the theme of the workshop 'how to improve and scale up practices'. ○ It was very useful workshop for private sector to promote domestic biogas.				

	○ Keep it up SNV. SNV staff are humble and very accommodative. All Africa energy for all WG. ○ I expect more active participation from the participants. ○ Before organising such international workshop, national institutes/host country agency should be consulted and involved. For example, in this case BSP/N and AEPC/GON. ○ Would have appreciated hearing about challenges and constraints, especially the new programmes would have discussions on how to deal with these problems. ○ Good, keep it up! ○ Please bring in more governmental and non-governmental actors next time. ○ Should be held annually rotating hosts between SNV countries. ○ Made so many new friends and contacts. Also gained confidence about way ahead. ○ No comments, thanks! ○ The size of the workshop (>150 participants) was rather overwhelming. ○ Chinese participants do have less communication with other participants. ○ Biogas users to be focused while improving or developing biogas technology. It would have been good if one or two biogas users were invited in the workshop to know their views regarding improvement and scale up practices. Thank you. ○ Thanks to SNV Corp + SNV Nepal for a wonderful job! ○ Avoid non-serious air-companies and long travel routes if there are easy options. Consult participant before deciding the flight route. ○ Internet connection should be provided in the rooms. Varieties of food, breakfast, lunch should be available. LCD should be provided on time. ○ One technical session including uses of biogas should be considered. ○ One piece of paper for each person in every session is required to note down queries as the time was not enough for discussion. ○ Do not know why the air tickets were bought from the Netherlands. It would have been far more easy and cheaper to purchase it from respective country. ○ Simply excellent.