

Mendis, M.S. and van Nes. **The Nepal Biogas Support Program: Elements for Success in Rural Household Energy Supply. Policy and Best Practice Document 4.** Ministry of Foreign Affairs, The Hague. Netherlands. July 1999. BSP Lib Temp No. 100<sup>1</sup>

The Nepal Biogas Support Programme (BSP) is a successful model of development cooperation; technological innovation; financial engineering and market development that have helped address some of the social, economic, energy and environmental needs of the rural areas of Nepal. The BSP also represents a working partnership between His Majesty's Government of Nepal (HMG/N), the Dutch Development Cooperation, the German Financial Cooperation through the German Development Bank (KfW), the Agricultural Development Bank of Nepal (ADB/N), the Netherlands Development Organization (SNV), the Gobar Gas Company (GGC), the private sector of Nepal and the rural farmers of Nepal. As a result, there are a number of lessons to be learnt from the BSP that can be applied to other development assistance programs targeted at the dissemination of small-scale rural and renewable energy technologies.

Depleting forest resources coupled with increasing population presents the Government of Nepal with an important challenge to outline appropriate policies with regard to energy supply, especially in the rural areas of Nepal. The Alternative Energy Promotion Centre (AEPCC) was created in 1996 to accord higher priority to the renewable energy resources among which biogas is one of them.

The principal objective of the BSP is to promote the wide-scale use of biogas as a substitute for wood, agricultural residues, animal dung and kerosene that is presently used for the cooking and lighting needs of most rural households. The rising demand for fuelwood, agricultural residues and dung, by the rapidly increasing population of Nepal, has helped accelerate the rates of deforestation, soil degradation and environmental decline in the densely inhabited areas of Nepal. In addition, use of biomass fuels and kerosene has significantly impacted the health and welfare of especially women and children who are most often subjected to the smoke and fumes associated with the use of these fuels.

The BSP, in its first and second phase, has successfully constructed more than 20,000 biogas units. This compares to only 6,000 units that were installed at the initiation of the preparations of the Program in July 1990. The third phase of the BSP envisions the construction of an additional 100,000 biogas plants by the end of fiscal year 2002/2003. A total of 37,000 units have been installed by July 1998 under BSP benefiting more than 200,000 members of rural households. This substantial increase in the deployment of biogas plants has been accomplished while simultaneously reducing the costs and increasing the reliability and efficiency of biogas plants.

The BSP has helped open the market for the production of biogas plants in Nepal. At the initiation of the Program there was essentially only one state-owned company, the Gobar Gas Company (GGC), producing biogas plants. At the end of 1998, as a direct result of the approach of market development, 38 private companies besides GGC had entered into this business. All participating companies must meet strict production quality and service standards for their biogas plants to be eligible to receive the subsidy that is provided to farmers. As a result of the growing competition, technical design modifications and quality control measures initiated, the overall cost of biogas plants in Nepal has declined by over 30 percent in real terms since the inception of the BSP.

One of the important features of the BSP has been its innovative financial engineering and judicious application of consumer subsidies to help develop the market for biogas plants. Working with the ADB/N and more recently the Nepal Bank Limited (NBL) and the Rastriya Banijya Bank

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<sup>1</sup> It is worth mentioning here that this work has received World Climate Technology Award 1999. This award was distributed by the Climate Technology Initiative with congratulations to the SNV Netherlands Development Organization for its achievements in initiating the Nepal Biogas Support Program to promote the wide-scale use of biogas as a substitute for traditional fuels used in most households for cooking and lighting purposes.

(RBB), a loan and subsidy program was structured that is targeted at supporting the small and medium-scale rural farmers. This loan and subsidy program has been a very critical element in developing the commercial market for the biogas plants in Nepal. The subsidy, fixed at three levels (for the Terai, Hill and Remote Hill District), at present represents approximately 35 percent of the total cost of the biogas plant. At the amount of subsidy is fixed, its relative contribution to the total price of the biogas plant is expected to decline with rising inflation in the economy of Nepal. The objective of the third phase is to eventually decrease the dependency of the biogas program on subsidy.

The program has also strengthened the institutional support for the development of the biogas market. Specifically, it has helped HMG/N establish an apex body, the Alternative Energy Promotion Centre (AEPC), to support biogas and other alternative energy application in Nepal. Additionally, the establishment and activities of the Nepal Biogas Promotion Group (NBPG), an association of companies that produce biogas plants, were supported. The BSP has also assisted in the formation of an NGO Coalition for Biogas and Alternative Energy Promotion. This Coalition could be instrumental from their grass-roots access to rural farmers to help disseminate biogas plants to eligible farmers.

Biogas plants provide multiple benefits at the household, local, national, and global level. The key benefits are related to gender, environment, health and institutional strengthening. The momentary values of most of these benefits are not quantifiable. However, the financial and economic analysis of the costs and benefits that are quantifiable clearly demonstrate the value of biogas plants and the BSP. The financial internal rate of return (FIRR) for an average size (8-m<sup>3</sup>) biogas plant is estimated at 14 percent. The FIRR is very sensitive to the price of fuelwood which is estimated to be NRP 1.0/kg in the base case. The FIRR is negative when the price of fuelwood is below NRP 0.6/kg and nearly 100 percent when the price of fuelwood is NRP 1.6/kg. The economic internal rate of return (EIRR) for the biogas plant is 15 percent in the base case.

An economic analysis of the entire BSP I & II results in an estimated EIRR of 11 percent when only the benefits of fuelwood and kerosene savings are accounted for. If the benefits of saved labor are added, the EIRR rises to 15 percent. Adding the total value of the nutrients saved by the BSP increases the EIRR to 32 percent. Including the conservative estimates for the health benefits of smoke reduction (US\$ 6.67/household/yr) increases the EIRR to 36 percent. Finally, adding the value of the reduced carbon provides an EIRR of 50 percent. It is clear that there is a strong justification for the limited subsidy provided for the biogas plants and the grant support provided for the BSP. Without the subsidy support for the biogas plants, it is unlikely that the Nepalese farmers would have sufficient financial incentives to adopt the biogas plants. Without the grant support for the BSP, it is certain that the standards, quality and dissemination rates for biogas plants in Nepal would not have risen.

The acceleration of biogas dissemination in Nepal will face a number of challenges in the future. These include the need to further stimulate market demand for biogas plants, strengthen Nepalese biogas institutions, bolster the private sector biogas firms, maintain high plant quality standards and reduce the relative input of the financial subsidy given to farmers.