

SNV Managing Board's response to the impact evaluation of Rwanda's National Domestic Biogas Programme (June 2013)

SNV's capacity development work focusses on three sectors (Agriculture, WASH and Renewable Energy), in 35 countries in Africa, Asia and Latin America. A sub-sector in Renewable Energy is Biogas. The evaluation of the Rwanda National Domestic Biogas Programme (NDBP) belongs to a series of impact evaluations of renewable energy programmes supported by the Netherlands, with a focus on the medium and long term effects of these programmes on end-users.

The overall objective of NDBP is 'to develop a commercially viable and environmentally sustainable market-oriented biogas sector, resulting in the reduction of biomass resource depletion while providing a significant improvement in the quality of life of the families concerned'.

The evaluation of NDBP is jointly implemented by the Policy and Operations Evaluation Department (IOB) and SNV. The evaluation has been subcontracted to Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI) and the International Institute of Social Studies (ISS). The main aim of the evaluation is to assess the NDBP through an analysis of the effects of access to biogas on various indicators of household welfare. These indicators include household energy expenditures, consumption of traditional fuels such as firewood and charcoal, time-use patterns, indoor air pollution and health effects, and the use of fertilisers and crop yields. The evaluation applied mixed methods, both quantitative and qualitative. The field work and data analysis of the evaluation took place during June-November 2012, and the evaluation report was finalized in April 2013.

SNV's Managing Board appreciates the overall quality of the evaluation as well as the methodology used, especially the cross-sectional household survey of 600 households of which half owns a digester and the other half has shown interest to purchase a digester - the so called potential applicants. To identify the impact of the NDBP on the various variables, a comparison of outcomes between digester owners and potential applicants was effectuated.

The evaluation addresses all evaluation questions as stipulated in the Terms of Reference.

SNV accepts the evaluation findings. The evaluation concludes that access to biogas offers considerable savings on energy costs and contributes to a reduction in the use of traditional fuels. The evaluation of the Rwanda programme, though, was not able to detect any effect of the increased use of bio-slurry on crop yields and did not find any statistically significant changes in time spent on obtaining fertiliser and firewood. The evaluation further concludes that uptake of digesters has been limited mainly due to the high initial costs of obtaining a digester given the socio-economic conditions of rural Rwandan households. The achievements at the institutional level compare favourably with the targets set. Amongst others the report points out that 80% of users having received training, that there are 42 active biogas companies, and that the Banque Populaire Rwanda is providing loans for those interested in purchasing a digester.

Overall, the findings in terms of the effects of the biogas programme on end-users challenges both experiences and other research findings, in particular where it concerns the usefulness of bio-slurry and the impact on time management. The Rwanda findings on the usefulness of bio slurry will be compared with the results of a forthcoming research in cooperation with Wageningen University and The Dutch Ministry of Economic Affairs. The time issue requires more investigation. Depending on the outcome of this analysis, additional measures in terms of adjusting policies and practice in all countries involved in biogas programmes may be required.

As for SNV's involvement in the Rwanda biogas programme in particular, SNV will continue providing support to NDBP. The SNV Rwanda team will draw thoughtful lessons from the evaluation and adjust their support if required. In addition to the measures that may come out of the above mentioned studies, adjustments may entail i) a renewed feasibility study to establish realistic targets for digester uptake for the coming years; ii) a revised awareness raising and training strategy focusing on expected benefits of biogas digesters as well as on measures to be taken to ensure the most optimal production of biogas; iii) a revision of the extension methodology on the use of bio-slurry. Based on internal analysis of the findings, an action plan will be made before end September 2013. This will include additional studies and quality improvement measures in the Rwanda biogas program as well as in other countries

where biogas programs are supported by SNV. The plan will be implemented in the last quarter of 2013 and in 2014.

Evaluation of Rwanda's National Domestic Biogas Programme

Summary and concluding remarks

This report has provided an assessment of Rwanda's National Domestic Biogas Programme (NDBP). To meet its objectives the report relied on a household survey which covered digester owning households and households who have shown an inclination to purchase a digester, so called, potential applicants; semi-structured interviews with a range of stakeholders and village-level data collected from a set of villages with a relatively high concentration of digesters. In order to identify the impact of the intervention on various outcomes the analysis relied on cross-section data and a comparison of outcomes between digester owners and potential applicants. The report commenced by providing a background of Rwanda's energy sector and then went on to describe and analyse the functioning of the NDBP. This was followed by examination of the effect of the program on various outcomes, including, patterns of energy expenditure and use of traditional fuels, time-use, smoke and health outcomes, crop yield and fertiliser use.

The NDBP programme has received international and domestic support and is an important element of the country's strategy to reduce dependence on wood as a source of energy. Despite a favourable policy environment and appropriate climatic conditions to support gas production, the programme has fallen short of its targets. By the end of November 2012 the programme had achieved about 15 percent of its originally intended target. The main reason for this shortfall appears to be the large gap between the actual price for a digester versus the price that was used in the feasibility studies. For instance, for the most popular digester (6m³) the ex ante price was pegged at 260,000 RwF but the actual price turned out to be 800,000 or almost three times the anticipated price. This figure amounts to about 2.6 times the annual per adult equivalent consumption in rural Rwanda. Based on the cost savings that are associated with the use of a digester the payback period, without discounting future benefits, for the most popular digester may be expected to be about 9 years with the current subsidy of 300,000 RwF and 14 years without the subsidy.

In addition to the less than expected uptake we found that about 10 percent of the completed digesters were not producing gas at all while 25 percent of digester owners were not satisfied with the volume of production. The two main reasons for no gas production are that digesters are still under construction and digesters/stoves/pipes are damaged. The less than satisfactory gas production is likely to be due to lack of cow dung as our analysis showed that about 21.5 percent of households had fewer cows than are needed to ensure proper functioning of their digesters. These figures, especially the lack of uptake tend to overshadow the success of the programme in other spheres. To reiterate, we found that 80 percent of users have received training, there are 42 active biogas construction companies and that eligible households interested in digesters are able to avail a loan from BPR. These achievements compare quite favourably with the targets laid out by NDBP (see Annex 3).

With regard to the impact of the programme, our sampling strategy appears to have delivered a credible control group. Differences between treatment and control are not pronounced and regardless of the empirical approach we found similar effects. The sharpest effect of the programme was found on reducing energy expenditure and helping households move away from a reliance on firewood and charcoal. Digester owning households spend about 30 percent less on energy as

compared to the control group, or at most an annual reduction in expenditure of about 58,000 RwF. The reduction in expenditure comes mainly from reduced use of firewood (5 kilograms less per day as compared to control households) and charcoal. Other effects include about half an hour less time needed for cooking, a less-smoky cooking environment (a marginal effect of 28 percentage points) and some evidence of positive health effects (a reduction in eye-related conditions for adult women). On the flip side we were not able to detect any effect of the increased use of bio-slurry on crop yields, despite the opinion expressed by some of the village chiefs. Households did mention the need for more knowledge on the appropriate use of bio-slurry which is an area that needs attention. We did not find any statistically significant changes in time spent on obtaining fertiliser and firewood.

Overall, it seems clear that access to biogas offers considerable savings and contributes to a reduction in the use of traditional fuels. However, based on the analysis here we conclude that uptake has been limited mainly due to the high initial costs of obtaining a digester given the socio-economic conditions of rural Rwandan households and the lower than expected benefits as compared to the projections made in the baseline study.