

## Meeting Energy Needs with Biogas Technology

Addressing Bangladesh's energy needs is one of the priority areas of Bangladeshi-German development cooperation. The Sustainable Energy for Development (SED) Program, supported by the Bangladesh Ministry of Power, Energy, and Mineral Resources and the German Federal Ministry for Economic Cooperation and Development, through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, is deeply involved in Bangladesh's effort to provide more and reliable energy to its people through the dissemination of renewable energy technologies and the more efficient use of energy from all sources.

More than 90% of all Bangladeshi households cook with traditional biomass, such as rice husks, jute sticks, cow dung, or wood. In fact, 50% of Bangladesh's total energy supply comes from biomass sources. However, biomass is becoming increasingly scarce and costly, putting additional pressure on already stretched poor households and resulting in unsustainably low levels of organic matter and nutrients in the soil.

Biogas digesters, fed with cow dung, poultry litter, night soil, urine, crop wastes, water hyacinth, leaves, etc., represent a simple, comparatively inexpensive, but highly effective way to more efficiently use and thus conserve biomass. They produce biogas, a mixture of mainly methane and carbon dioxide, which can be used as a clean fuel for cooking and lighting or to power an electric generator. Biogas digesters also constantly release high-quality, germ-free organic fertilizer in the form of bio-slurry.

Around 45,000 biogas plants are already in operation in Bangladesh; most of them small domestic systems fueled by cow dung, for example, and used for cooking. The Dhaka City Zoo has also installed one large and three smaller biogas plants that use the animal dung and slaughterhouse waste produced in the zoo. However, the SED Program, working with several partner organizations, has been working to promote the use of larger (gas production of more than 4.8 cubic meters per day) biogas plants by dairy and layer poultry farms. As a



Biogas digesters, fed with waste such as poultry litter produce biogas which can be used as a clean fuel.

result, about 1500 biogas plants in Bangladesh today use cow dung or poultry litter to produce biogas on a commercial scale.

### Large potential market for commercial biogas digesters

There is a large potential market for commercial biogas digesters in the dairy and poultry sectors: over 25,000 dairy farms and 100,000 poultry farms in the country could benefit from the technology through savings of traditional cooking fuels and diesel for power generation (the cost of construction is recovered in two to three years), as well as the prevention of disease and the production of pathogen-free fertilizer.

However, a number of technical problems had to be addressed before the technology could be widely disseminated: The gas produced in a biogas generator

fed by poultry litter contains small amounts of hydrogen sulfide and moisture, which are corrosive and therefore cause engine problems. This sulfur, as well as the water vapor, must be removed. Special biogas carburetors are also necessary to start and operate internal combustion engines operating with biogas.

In 2008, SED engineers installed a pilot biogas power generation system at Raj Poultry in Faridpur and successfully developed a process to remove the moisture and hydrogen sulfide using “plug and play” filters and were also able to modify local gasoline and diesel engines to produce electricity (in 100% biogas and also in dual fuel modes).

Interest in this new technology has spread rapidly. Over 60 private sector commercial establishments have already invested their own money in this power generation technology; GIZ provided technical support, but no financing. Other biogas units in poultry and dairy farms were constructed by contractors with the direct and indirect support of GIZ. All of these commercial plants are producing electricity using small to medium-sized engine generators (5 kW - 50 kW). In total, over 1200 kW of electricity is being generated from these commercial biogas plants today.

Although private sector investors have realized that the investment in biogas technology pays off – for both captive and emergency power generation – there is a financial barrier, as the idea is new to banks and financial institutions. To help overcome this barrier, GIZ has signed a memorandum of understanding with Infrastructure Development Company Limited (IDCOL) and the International Finance Corporation, which will provide financing for commercial biogas plants. The first commercial biogas plants that obtained a loan from



The biogas produced in large commercial biogas plants in poultry and dairy farms is used to generate electricity.

IDCOL are already producing electricity. To accelerate the roll-out further, GIZ is also coordinating advisory services for appropriate banks, such as Bangladesh Krishi (agricultural) Bank and other banks/financial institutions in the public and private sectors.

It has been estimated that 10% of the larger dairy and poultry farms alone could produce about 50 MW of electric power with biogas technology, not a small matter in a country where 75% of rural households have no access to electricity from the grid. There are also many potential applications of biogas technology in other industries. SED is currently working with a tea garden in the Tetulia area of Panchagar District, for example, to explore the possibility of using biogas-powered heaters to dry harvested tea leaves, thus replacing/saving the diesel fuel the garden presently uses for this purpose. Other possibilities include biogas-powered heaters in textile dyeing operations and production of biogas from the “brown liquor” effluent of Bangladeshi sugar mills.

February 2012