

## BUSINESS CASE

### Self-sustain model for slaughter house waste management using biogas technology

Case name & location:	<b>Self-sustain model for slaughter house waste management using biogas technology</b>
Waste input type:	Slaughter house waste
Value offer:	<ul style="list-style-type: none"><li>• Improving local environment</li><li>• Production of Biogas</li><li>• Production of organic fertilizer</li></ul>
Organization type:	Local Government
Status of the project:	Construction expected to be finished on March 2017, revenue generation beginning in July 2017.
Scale of businesses:	Medium
Production capacity	Gas production 36 m <sup>3</sup>
Slaughter house capacity	30 to 40 cows
Major partners:	GIZ, LGED, Waste Concern, BBDF

#### Context and background

The supply of meat in Bangladesh in term of handling, slaughtering, and dressing of food animals take place in a very disorganized way. The animals are slaughtered traditionally, randomly and indiscriminately. There are many self-made field abattoirs in rural and urban areas, small towns and even in cities where slaughtering of cattle, sheep and goat by unauthorized butchers in fields, bushes, backyards or at some street corners.

Within a series of processes (such as receiving and keeping of livestock, slaughtering, removing skin, dressing of animal, removal and cleaning of stomach content and unwanted flesh and fats, transporting of processed materials etc), slaughterhouses produce large amounts of different solid wastes and wastewaters. Direct disposal of highly polluted wastewater and organic residues into the drains, low lands or sewerage system without prior treatment result in environmental and ecological problems and risk in clogging the wastewater drainage systems. There are no scientific slaughterhouses all over the country still now, except Bengal Meat Industries Private limited, Pabna. According to various authorities, there are a total of 1,415 pathogens known to infect humans and 61-75% of these are of animal origin. The zoonotic diseases are becoming a serious public health concern. Recently, Zika and Ebola are epidemic as well as the too numerous human deaths caused by rabies each year (55,000 die/year, 2000/years).

In this circumstance, slaughter house wastes can be managed through a sustainable way, where double benefits can be calculated i.e. energy-cum-treatment of wastes with locally available technologies through the community participation. However, the potential environment friendly way of waste management is to generate waste to bio-mass energy that encompass biogas production for cooking and power generation. There are potential sites for bio-gas production from wastes of slaughter house in urban centers of Bangladesh.

Slaughter house waste management using biogas technology is a relatively new idea in Bangladesh. In 2006, GIZ first introduced the concept. Later on in 2011, GIZ in collaboration with Local Government Engineering Department (LGED) had constructed another slaughter house waste based biogas plant in Gazipur. A Financial Agreement has been signed between LGED and GIZ to implement composite demonstration models for slaughterhouse with biogas plant at Tongi Area of Gazipur City Corporation (GCC).

A MoU has been signed between GCC and GIZ. Under this MoU GIZ is providing technical assistance for the implementation of composite demonstration models of slaughterhouse with biogas plant. Department of Animal Husbandry and Veterinary Science, Rajshahi University is the knowledge partner of this initiative.

### Market Environment

Only 6 per cent of all households in Bangladesh have access to gas-grids. While some others use modern fuels such as Liquefied Petroleum Gas; more than 90 per cent of all Bangladeshi households cook with traditional biomass energy, such as rice husks, jute sticks, cow dung or wood. In fact, 50 per cent of this country's total energy supply comes from biomass sources which are becoming increasingly scarce and costly, putting additional pressure on poor households. Biogas digesters fuelled with cow dung, slaughter house, poultry litter, night soil, crop wastes, water hyacinth leaves and so on represent a simple, inexpensive, yet highly effective way to use and conserve biomass.

As with energy, Bangladesh suffers from a severe deficit of fertilizer, organic fertilizer in particular. Based on a report by Kafiluddin and Islam, supply of fertilizer is about 1.7M tons against demand of 4.5M tons. Further, much of the supply available is chemical fertilizer which contributes to dire soil conditions in Bangladesh. Specifically chemical fertilizer contributes to organic matter depletion, nutrient deficiencies, drainage interference as well as other aspects of soil fertility decline (source: K and I).The increasing subsidy trend for chemical fertilizer has a significant negative impact on promotion of organic fertilizer and the subsidy of chemical fertilizer increased by 51% from 2002 to 2010.

### Findings

**Local slum:** The potential site is located near the Tongi slum houses over 2,000 residents (Reference: Urban Socio-Economic and Vulnerability Study of Gazipur City Corporation (GCC), Care Bangladesh). The primary profile is given below

#### Livelihood profile

Occupation	Mostly, RMG workers Remaining in Drug factory and local services
Family member each household	Average 4 members
Female family member's occupation	Majority, in RMG factory

### Kitchen habit

Type of stove	Traditional stoves
Type of fuel	Wood fuel, Cotton fibre
Fuel price	Wood fuel: 400-500 Tk/mon Cotton fibre: 80-150 Tk/1-1.5 mon
Number of meals cooked each day	2 to 3 times (depending on occupation)
Cooking hours each day	Average 4 hours in a day

**Slaughter house:** Welfare of animals, sanitary slaughtering and public health safety are essential requirement in slaughterhouse for ensuring safe and quality meat for the consumers. In Bangladesh, three categories ranging from small, medium to large slaughterhouses are found. The small or medium slaughter houses are built by municipalities.

Currently 15 to 20 cows are slaughtered at Tongi Slaughter House. Around 30 to 35 more cows are slaughtered outside the slaughter house near the road, on bank of river, near to hat as a result the environment is polluted every day as well as human health are threaten. However efforts are being taken by City Corporation authority to streamline the system. GCC plans to enforce law to ensure for slaughtering animal at Tongi Slaughter house.

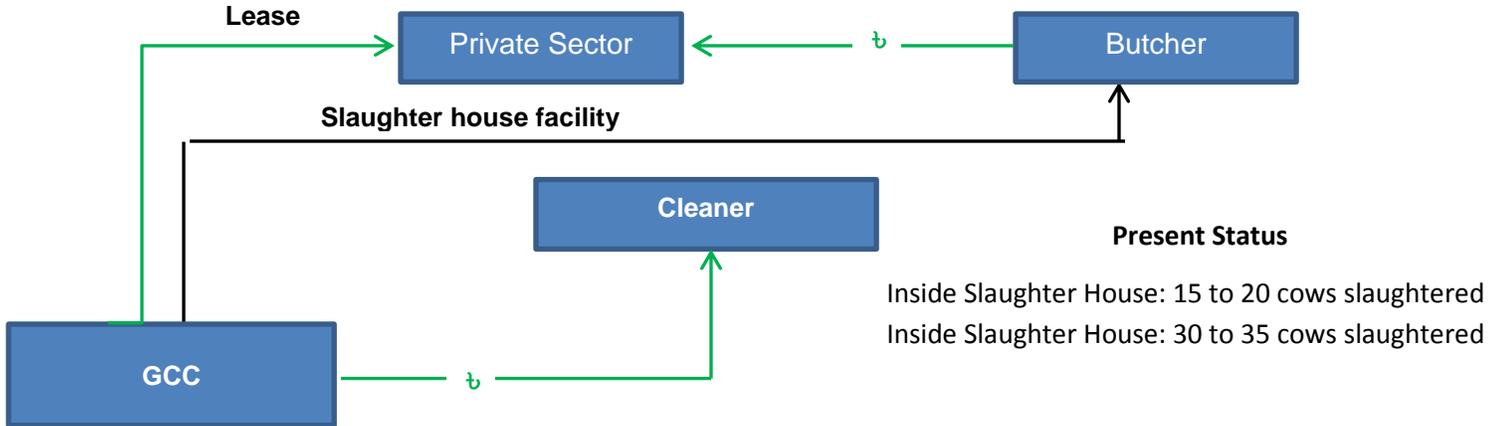


Fig2: Value chain of present Slaughter house

**Bio slurry as Organic Fertilizer:** Rural Development Academy (RDA), Bogra is well known for producing organic manure from bio slurry produced from biogas plant. The processed slurry is made available to market through private company ACI as organic fertilizer. Research findings confirmed that bioslurry as an organic fertilizer has affected crops by increasing the yields. Furthermore, bio-slurry has vital role on restoring soil organic matters which are at alarmingly low levels (less than 1% to some regions) in Bangladesh.

ACI Fertilizer has come up with a wide range of organic fertilizer, macro & micronutrient and foliar fertilizers while incorporating modern methods and technology in the soil management practices in Bangladesh to ensure high yields of crops. ACI Fertilizer collaborates with the government, as well as agro-research institutions to find out the best agricultural practices that can promote better yields. It trains retailers and farmers partnering with government and non-government organizations about the benefits and nutrient contents of different fertilizers, helps farmers to select a balanced mixture of fertilizers for their land and encourages farmers to use organic and bio fertilizers in order to restore soil health and enhance sustainability of natural resource.

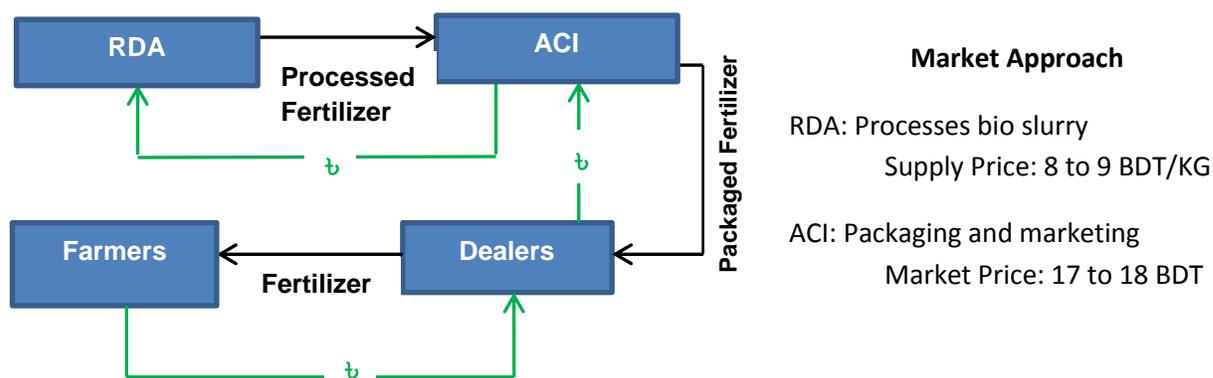


Fig2: Value chain of Organic Fertilizer

**Business Model**

Slaughter house waste management business offers three value propositions (figure 1) – Supply of biogas, provide quality compost and provide waste management service for improved local environment. Biogas will be sold to households for cooking by mini gas grid. The organic fertilizer will be sold to companies that sell compost to dealers and farmers.

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
<ul style="list-style-type: none"> <li>GIZ</li> <li>BBDF</li> <li>Waste Concern</li> <li>Rajshahi University</li> </ul>	<ul style="list-style-type: none"> <li>Slaughter House Waste collection</li> <li>Producing biogas and compost</li> <li>Sale of biogas and compost</li> </ul>	<ul style="list-style-type: none"> <li><u>Supply of biogas to household.</u></li> <li>Provide quality organic fertilizer with higher nutrient provision to crops.</li> <li>Provide improved waste management services for residents of GCC.</li> </ul>	<ul style="list-style-type: none"> <li><u>Direct sales of biogas to households</u></li> <li><i>Sales of organic fertilizer to Waste Concern</i></li> <li>Indirect sanitation service for residents of GCC</li> </ul>	<ul style="list-style-type: none"> <li><u>Biogas supply to nearby households</u></li> <li><i>Compost to Waste concern</i></li> <li>Improved environment for residents of GCC</li> </ul>

	<b>Key Resources</b> <ul style="list-style-type: none"> <li>• Capital for the investment and operation</li> <li>• Labor</li> <li>• Partnership</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate City dwellers to get safe and hygienic meat</li> </ul>	<b>Channels</b> Self and dependent upon BBDF, RU and Waste Concern	
<b>Cost Structure</b> <ul style="list-style-type: none"> <li>• Investment cost(Land, Biogas plants, Machines)</li> <li>• Operational cost (Manpower, utilities, maintenance cost)</li> <li>• Marketing &amp; packaging cost</li> <li>• Depreciation</li> </ul>		<b>Revenue Streams</b> <ul style="list-style-type: none"> <li>• Sale of biogas</li> <li>• Sale of organic fertilizer</li> </ul>		
<b>Social &amp; environmental costs</b> <ul style="list-style-type: none"> <li>• Risks from leakage of pipeline.</li> </ul>		<b>Social &amp; environmental benefits</b> <ul style="list-style-type: none"> <li>• Jobs created</li> <li>• access to clean energy for household cooking and Improved crop productivity</li> <li>• Reduced pollution from improved sanitation</li> <li>• Environmental benefits through reduction in GHG emissions</li> <li>• Safe and hygienic meat for city dwellers.</li> </ul>		

Figure1. Business model canvas

**Value chain and position**

According to GCC’s possible law enforcement, it is estimated that at least 40 cows will be slaughtered at Tongi slaughter house every day.

Gazipur City Corporation will lease out the Slaughter house cum biogas plant yearly basis. The lessee will be responsible for operation and maintenance of slaughter house. GGC will assign a caretaker who will be responsible for

- Ensuring slaughter house waste into biogas digester during test run and regular operation.
- Managing the biogas supply system to households and maintenance of the gas supply system.
- Collecting monthly fee from households connected to the biogas supply system.

The slaughter house wastes will be fed into anaerobic biogas digester to produce biogas. The bio slurry will be dehydrated to produce organic fertilizer. The produced biogas will be supply to selected households through gas pipeline and the liquid and organic fertilizer will be sold to companies who have the licensee to sell organic fertilizer to farmers.

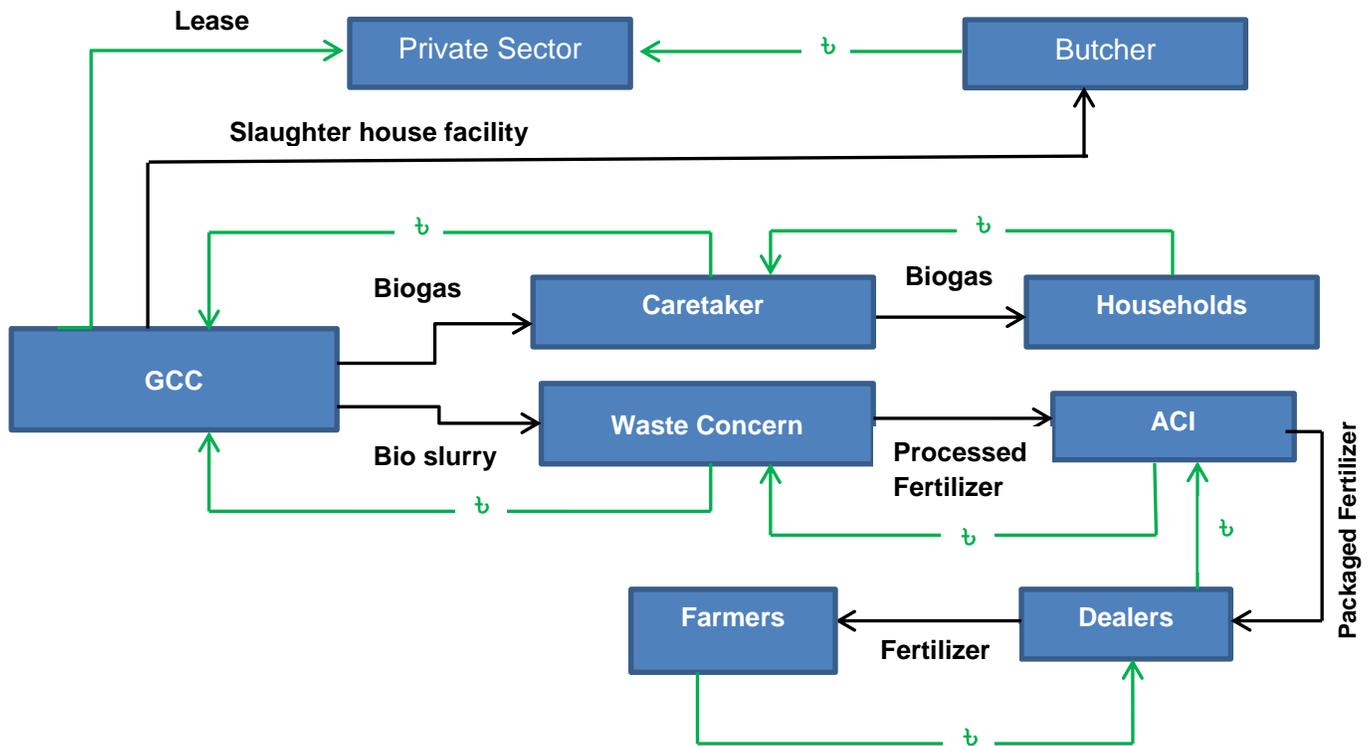


Fig2: Value chain of Slaughter house cum biogas plant

Waste Concern Consultants is a leading consultancy firm based in Bangladesh, providing consulting services and project assistance. The services provided by Waste Concern Consultants include: Waste Management & Resource Recovery, Composting of organic waste, Municipal Services Planning. Waste concern consultant is responsible to dehydrate liquid bio slurry.

Considering ACI's market development capacity in fertilizer, they are responsible for packaging and marketing of dehydrated bio slurry as balanced organic fertilizer.

**Biogas test phase:** The technical test will be conducted primarily to adjust the approach and finalize,

- Test Period: 6 months
- Household: 10
- Gas supply: 2 hours/Day
- Monthly payment collection: 500 BDT/Household

**Government fund:**

- Biogas Plant construction: 650,000 BDT
- Fertilizer unit and monitoring: 300,000 BDT



\*\*Government fund will not be covered to generate profit. The net income will be covered for Operation & Maintenance cost.