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DEUTSCHE ZUSAMMENARBEIT

Implemented by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

In cooperation with:

Renewable Energy and Energy Efficiency Programme (REEP)

Background

The reliable and efficient delivery of modern energy services is crucial for reducing poverty and economic development. By 2021, Bangladesh is set to reach middle-income status and achieve its target of making electricity available for all. Renewable Energy (RE) and Energy Efficiency (EE) can play a significant role in achieving this target while ensuring energy security and sustainability.

For more than 40 years, the Federal Republic of Germany and the People's Republic of Bangladesh have maintained a cordial bilateral relationship. Soon after Bangladesh achieved independence in 1972, Germany started to provide technical and financial support to the nation. So far, this commitment has totalled more than EUR 2.5 billion. Renewable energies and energy efficiency is one of the priority areas where these two countries collaborate. On behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is implementing the Renewable Energy and Energy Efficiency Programme (REEP). The programme is working on:

- developing framework conditions for promotion of renewable energy and energy efficiency through policy advocacy and institutional development of the Sustainable and Renewable Energy Development Authority (SREDA);
- developing locally customised technological solutions on sustainable energy delivery and establishing business cases through successful piloting;
- facilitating market uptake of successful business models through capacity development of service providers, promoting access to finance and leveraging sustainable ownership.

GIZ has been working for the institutional capacity development of SREDA - the national nodal agency of Bangladesh's Ministry of Power, Energy and Mineral Resources (MPEMR). REEP, previously branded as the Sustainable Energy for Development (SED) project, in collaboration with SREDA, has made significant contributions and impacts on creating the enabling conditions required to disseminate renewable energy and increase energy efficiency in Bangladesh.

In collaboration with its government partners, GIZ is working in the following areas: improved rice parboiling system, retained heat cooker, solar water pumping system, waste heat recovery from power plants, efficient utilisation of natural lighting, energy efficient LED lighting, converting waste to energy, biogas technology and capacity development.

Programme name	Renewable Energy and Energy Efficiency Programme
Commisioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project region	Bangladesh
Line ministry	Power Division;Ministry of Power, Energy, and Mineral Resources (MPEMR)
Executing agency	Sustainable and Renewable Energy Development Authority (SREDA)

Improved Rice Parboiling System

Almost half of Bangladesh's energy comes from biomass. Rice husk constitutes about 23 percent of the total biomass fuel. Unfortunately, 80 percent of this rice husk (with bran-mix) is burnt up in traditional rice mill boilers during the parboiling process, where the overall energy efficiency is only 15-30 percent. These boilers also create huge environmental pollution (black carbon emission) and pose potential health risks for workers and surrounding neighbours, causing occasional explosions and resulting in casualties. To minimise environmental pollution, energy loss and health hazards associated with rice parboiling, GIZ has successfully developed the Improved Rice Parboiling System (IRPS) model. Interest in adopting the new system is growing among rice mill owners.

To date, 75 systems have been installed and 15 service providers have been developed who offer the commercial construction and maintenance of such systems.

Left: Efficient and pollution free IRPS in operation in a rice mill

Right: A local Retained Heat Cooker entrepreneur on her way to visit potential customers

Photo: © GIZ

Left: Rural women collecting drinking water from a solar water pump

Right: An ice cream factory illuminated by Solar Pipe Light

Retained Heat Cooker (RHC)

In Bangladesh, only six percent of the population has access to natural gas services, while the majority are still dependent on biomass stoves for household cooking. This inefficient practice causes widespread deforestation and has detrimental health hazards. It is estimated that this is causing 46,000 deaths every year, mostly among rural women and children. After reviewing the existing technology of traditional stoves, GIZ has developed an alternative cooking solution based on locally available materials: the Retained Heat Cooker (RHC). RHC is a non-electrical insulated bag designed to reduce the amount of fuel required to cook food. Instead of being placed on a stove for the entire duration, food is heated to a boiling temperature and then transferred to the RHC. It uses the principle of thermal insulation to continue the cooking process without requiring any additional heat or fuel. Laboratory tests have shown that 40-70 percent energy can be saved using an RHC, depending on the type of meal. So far, nine entrepreneurs and non-government organisations (NGOs) have started producing and marketing the product. The Office of the United Nations High Commissioner for Refugees (UNHCR) has distributed 15,000 RHCs in refugee camps and total 32000 units have been sold to date.

Solar Water Pumping System in Rural Areas

Bangladesh is one of the most climate change affected countries in the world, and might lose 17 percent of its land, and 30 percent of its food production by 2050 due to the effects of climate change. One of the observed impacts is severe salinity both in the surface and ground water bodies of the coastal belt; affecting crop production, water security and livelihood conditions in the coastal areas of Khulna, Bagerhat and Satkhira districts. As of now, GIZ has installed 122 units of climate resilient and low emitting solar Photovoltaic Pumping (PVP) systems which ensure sustainable safe drinking water supply to more than half a million people in six coastal districts of Bangladesh. This addresses internal migration, improves livelihood conditions and ensures environmental sustainability. Three other organisations have adopted GIZ's technical design for this intervention and installed another 17 plants. The plants are in the process of being handed over to the Department of Public Health Engineering (DPHE) through SREDA.

Waste Heat Recovery from Power Plants for Operating Cold Storages

Agriculture contributes around 20 percent to Bangladesh's GDP. Sustainable supply of energy is one of the major catalysts required to boost agricultural production and sustainable management of agricultural products. Limited access to cold storages, packaging and transportation is a major constraint in the production of larger quantities of potatoes, vegetables and fruits. Aiming to revamp the Bangladesh cold storage industry within a framework that involves new technologies, new sources of energy and new refrigeration techniques in a financially viable manner, GIZ is exploring the potential of using waste heat from power stations and invigorating it with an innovative technological solution to operate cold stores. Based on recommendations from a feasibility study and findings from preliminary analysis, two promising sites, Ashuganj Power Station Complex and Shahjibazar Power Station have been identified as most suited for establishing demonstration plants. It was recommended to construct a 5,000 MT capacity cold storage on pilot basis at Ashuganj Power Station Company Ltd (APSCL) vicinity using waste heat from 50 MW Reciprocating Engine Generating Set Power Station.

Efficient Utilisation of Natural Lighting in Industries

In Bangladesh, the industrial sector consumes around 50 percent of primary energy and around 35 percent electricity and emits about 15 percent of greenhouse gases (GHG). Depending on the type of industry, 20-30 percent of the consumed electricity is utilised for lighting. Most of the micro, small and medium industries (MSMIs) in Bangladesh are not efficient in lighting due to continuous usage of incandescent and beamer (tube) lights. To tackle this challenge, GIZ, in collaboration with a local youth based organisation, initiated the pilot project "R&D of the Industrial Solar Pipe Light," which provides a low tech inexpensive solution of harvesting natural day light through the Solar Pipe Light (SPL) system.

SPL is a tubular lighting device which can be installed at the roof level of a factory without any major structural changes and can transmit light to an interior area simply by reflecting sunlight. Keeping in mind the availability of local materials and rooftop conditions, a prototype light of 14" diameter has been developed for the cottage industries and a 22" diameter version for small and medium enterprises (SMEs).

The pilot project factory now receives 10-12 hours of free natural light during daytime instead of being dependent on electric bulbs. GIZ has conducted a market assessment to develop the business model of the product, and is continuously monitoring the performance of the existing design to identify possible areas of improvement.

Promotion of Energy Efficient LED Lighting in Garment Industry

In industries, lighting consumes 20-30 percent of the total electrical energy used. Improving lighting and energy efficiency in the ready made garment (RMG) sector of Bangladesh, which comprises of more than 5,000 small/big/medium sized garment factories, can be a significant step towards solving Bangladesh's energy problems. In this context, GIZ has undertaken a pilot project on "Energy Efficient LED Tube Lights in an RMG Industry under the Energy Services Company (ESCO) Model" to demonstrate the energy efficiency potential of LED tube lights and showcase the viability of the ESCO model. A baseline study has been conducted in a garment factory to assess the energy saving potential of LEDs compared to traditional tube lights and to fix a standard for LED that ensures the minimum lighting requirement for RMGs. The approach has been piloted in a textile factory and 4,400 luminaires have been replaced by LED lighting, saving 30-50 percent energy. If the entire industrial sector is retrofitted with LEDs, a remarkable amount of electricity could be saved nationally, while making it available to other energy starved sectors.

Feasibility Study on Waste to Energy Conversion at Keraniganj

With rapid economic growth and urbanisation and industrialisation, the major cities of Bangladesh are facing the complexity of municipal solid waste (MSW) management. MSW can contribute significantly towards generation of renewable energy, especially in major cities and municipalities which have an organised waste collection system in place.

Recognising this, the Government of Bangladesh, through SREDA, requested GIZ to conduct a feasibility study on exploring the possibility of Waste to Energy (WTE) conversion at Keraniganj Upazila. The objective of the study was to support the government in developing a model project that can be replicated in similar upazillas or municipalities throughout the country by converting waste to energy. After validation of the study's findings, experts have recommended a dry fermentation biogas solution for Keraniganj. GIZ has also supported two study visits of policy makers and engineers to Germany to familiarise them with the technology. The Bangladesh Power Development Board (BPDB) has already started the tender process for the pilot phase, the success of which may lead to the replication of similar efforts in other areas or municipalities and can improve the environment while saving a huge volume of primary energy resources.

Meeting Energy Needs with Biogas Technology

The disposal and management of huge volumes of waste is a growing concern for Bangladesh. Converting this waste to an energy source can open new doors of possibility. Biogas digesters, fed with organic waste such as cow dung, poultry litter, night soil, crop waste, water hyacinth or leaves, represent a simple and comparatively inexpensive but highly effective energy solution. They produce biogas, a mixture of mainly methane and carbon dioxide, which can be used as a clean fuel for cooking, lighting or generating power. Biogas digesters also produce bio-slurry as a by-product, which is a high-quality, pathogen-free organic fertiliser. Since 2006, GIZ has worked with several partner organisations to promote the institutional and commercial use of biogas technology throughout Bangladesh. With GIZ's support, over 1,500 commercial biogas plants have been installed in small to large scale businesses such as dairy and poultry farms. In 2011, together with the Local Government Engineering Department (LGED), a slaughterhouse based biogas plant was constructed in Gazipur. GIZ is now implementing composite demonstration models for slaughterhouses with biogas plants at Shaheb Bazar of Rajshahi City Corporation (RCC) and Tongi under Gazipur City Corporation (GCC). The construction of the plant at Gazipur has been completed, and 8 households are receiving biogas generated from it.

Buffer storage (balloons) to enhance biogas storage capacity in a large commercial poultry farm

Photo: © GIZ

Capacity Development

By conducting capacity needs assessment of key stakeholders, identifying necessary policy support areas, and promoting a broader level of engagement among different stakeholders and supporting the institutional development of SREDA, GIZ has madesignificant contributions towardscapacity development in Bangladesh's energy sector. Capacity building and development is based on the interaction of three dimensions: people, organisation and framework conditions. The following steps were followed to ensure the incorporation of these three dimensions:

- Alignment with SREDA
- Sector assessment
- Technology development and customisation
- Piloting
- Developing business cases
- Capacity development of stakeholders
- Market devlopment initiatives

The proposed activities were aligned with SREDA to achieve national RE and EE targets. People, organisation and framework conditions for development were assessed through sector assessment and in subsequent stages the capacity gaps were filled up. A multi tier implementation approach was followed for capacity development of all stakeholders.

At macro level, capacity development support was extended through policy advocacy and policy dialogue to improve the framework conditions and ensure the development of the RE and EE sectors. The meso level activities for capacity development focused on enhancing human resource development, organisational development and the development of networks, especially for SREDA, to support them in developing enabling framework conditions for achieving national RE and EE targets. At the micro level, emphasis was given on effective and efficient instrument development for relevant stakeholders. These instruments incorporated the development of suitable RE and EE technologies, business models, and dissemination approaches for rolling out selected RE and EE technology and network development. The capacity of the relevant stakeholders was improved to enable them to use the instruments properly and contribute towards achieving the national RE and EE targets.

Published by

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As at June 2017