

# Sustainable Energy for Development (SED) Programme

## The challenge

Development needs energy. The reliable and efficient provision of modern energy services is a key to reducing poverty as well as boosting economic development. Bangladesh is targeting to achieve the status of middle income country by 2021 and to ensure electricity for all by 2021. Therefore country needs huge investment to fill up the infrastructure gaps, especially in the energy sector as more than 10% demand growth of energy per year, which if not accommodated for, will create a bottleneck for economic growth. In order to cope with this rapid industrialization process, it has become essential to generate energy from alternative sources, especially in off grid areas, to spread the impact of economic prosperity and on the other hand, to enable our industries and households become more energy efficient. The lack of supply of the much needed energy is one of the main factors hampering economic growth especially in the rural areas of Bangladesh.

## Our approach

Addressing Bangladesh's energy needs is, therefore, one of the priority areas of Bangladeshi-German development cooperation. The Sustainable Energy for Development (SED) programme, supported by the Ministry of Power, Energy, and Mineral Resources and the German Federal Ministry for Economic Cooperation and Development (BMZ) implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, is working to promote the use of renewable energy, as well as efficient use of energy. This is done by improving the framework conditions towards building markets for sustainable energy solutions through building capacities of relevant stakeholders, promoting the application of energy efficient (EE) technologies and technologies for the generation of renewable energy (RE).

## Objectives

- Developing the framework conditions for promotion of renewable energy and energy efficiency through policy advocacy and institutional development of SREDA (Sustainable and Renewable Energy Development Authority)

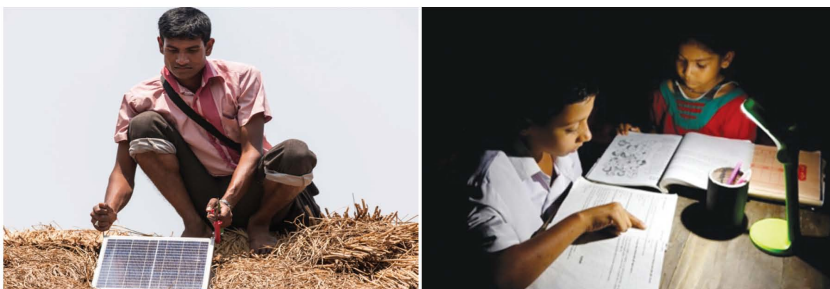
Project name	Renewable energy and energy efficiency programme
Commissioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project region	Bangladesh
Lead executing agency	Power Division, Ministry of Power, Energy, and Mineral Resources (MPEMR)
Duration	2007 to 2016

- Developing locally customized technological solutions on sustainable energy delivery and establishing business cases through successful piloting
- Facilitating market uptake of successful business models through capacity development of stakeholders, promoting access to finance and leveraging sustainable ownership

## GIZ Intervention Areas

### Building National Capacities

The Bangladesh Government is actively promoting renewable energy and energy efficiency in Bangladesh. The Renewable Energy Policy of Bangladesh, which was developed with the support from GIZ and other development organisations, states that "5% of the total power demand shall be met by supply of energy from renewable resources by 2015 and 10% by 2020". Approximately 32 per cent of the people in Bangladesh do not have the access to electricity from the national grid, thus promoting sustainable low-carbon and low-pollution technologies, improve living standards, ensure clean energy supplies through the use of renewable energy and thereby contribute to the reduction in the emission of greenhouse gas (GHG). In order to strengthen capacities within the government to steer and manage this development, SED has supported and facilitate the government to establish the national nodal agency SREDA. SED is working in developing the framework conditions for promotion of RE and EE through policy advocacy and institutional development of SREDA. SREDA is now addressing the challenges and barriers for RE and EE markets.



Left: Solar technology is an effective and environmentally sound way to provide electricity even in the remotest areas of Bangladesh.

Right: Studying after sunset using Pico PV



*Left: Solar powered pumping system supplying clean drinking water through water tanks mounted on hurricane-proof overhead concrete platforms.*

*Right: Producing Energy from Waste*

The agency will also set appropriate regulation and legislation in Bangladesh and coordinate and leverage investments to the sector. SED's Capacity and Organisation Development (COD) component is dedicated to facilitate and accelerate all the activities of SREDA. COD is facilitating strengthening of SREDA in association with the UK government's Department for International Development (DFID).

## Solar PV Applications in Rural Areas

### Rural Development Powered by Solar Home Systems

Bangladesh is globally applauded for the solar home systems programme initiated by the Infrastructure Development Company Ltd. (IDCOL), a Bangladesh Government owned financing company. More than 3.8 million solar home systems of 20-130Wp have been installed in the country's rural villages between 2003 and 2014, benefitting over fifteen million Bangladeshis. The German Government has been actively supporting IDCOL's solar home systems programme for several years now. SED, with co-financing from the multi-donor funded Energising Development (EnDev) Programme, provided funds as buy-down grants for more than 420,000 solar home systems.

### Rural Development Powered by Solar Lantern/Pico-PV

SED and the International Finance Corporation (IFC) have launched the Lighting Bangladesh initiative to jointly improve the market conditions for smaller solar systems. To build up the lantern market, GIZ Bangladesh's Energising Development (EnDev) programme with co-financing from DFID solar lanterns commercial enterprises will be subsidised through buy down grant. These Lithium-Ion and NIMH based small system will ensure a smaller environmental footprint and are within the financial reach of the poor. These systems will be able to light the huts of the poor people living off-grid and underserved communities cleaner, who are now dependent on traditional kerosene lanterns.

### Solar PV Drinking Water Supply in Rural Areas

Bangladesh is one of the most climate change affected country and the adversity will continue to be more severe in coming days. Saline intrusion in the coastal belt areas of Khulna, Bagerhat and Satkhira districts is causing a huge crisis of safe drinking water. The situation becomes worse, as shrimp farming practices add to the salinisation of inland areas. Even in the non-coastal areas the quality of underground water sources is questionable, as in some areas these are arsenic contamination. People of Coastal areas often rely on unsafe pond water which cause high incidence of water borne diseases. Rural women and girls are usually burdened with the responsibility of collecting water for their families.

To address this crucial problem, SED programme of GIZ Bangladesh started installing Solar Photovoltaic Pumping (PVP) Systems for drinking water supply since 2010. As of now, SED has supported the construction of more than 139 solar-powered waterpumping facilities to ensure safe drinking water access in south-west region of the country. These facilities have a nominal capacity to supply approximately 2.18 million litres of drinking water on a daily basis. Different types of water sources, including surface and ground water have been explored.

SED has also provided technical assistance to CDMP (Comprehensive Disaster Management Program), one the largest disaster management program based on this experience. At this stage, SED is working with SREDA to initiate a coordinated institutional process where the Government of Bangladesh can take up the whole process and continue.

Beyond the above mentioned technology intervention, SED is planning to intervene in Solar Water Heating System, Solar Nano-Grid and Institutional Solar Systems in the area of Solar Energy sector.

## Energy from Waste

The conventional fuels required for the production of electricity is depleting day by day. It is imperative to explore alternative sources which can be used as the fuel for electricity generation. Bangladesh Government has already started the initiative to produce electricity with alternative sources like waste. At the same time, huge volume of waste disposal and management is a growing concern in Bangladesh. Addressing the above issues, the SED programme of GIZ, has jointly taken several initiatives to produce fuel and electricity from industry as well as municipal wastes.

### Commercial and Institutional Biogas

The SED programme has been working with several partner organizations to promote the institutional and commercial use of biogas technology throughout Bangladesh. Biogas digester is a simple, comparatively inexpensive, but highly effective way to managing waste.

Over 1500 commercial biogas plants have already been installed in small to large scale businesses like dairy farms, and layer poultry farms in Bangladesh with technical support of GIZ. The market potential is much bigger. Over 25000 dairy and 150,000 poultry farms in the country could benefit from the technology by reducing the use of traditional cooking fuels and diesel for power generation as well as preventing diseases and producing organic fertilizer.

The commercial biogas plants have the capacity of producing electricity (of 5kW-50kW ). In addition, GIZ has started working on management of waste produced in slaughter houses and use it as raw material for biogas digesters. The SED project also intends to use agricultural residues like corn plants and water hyacinth as raw materials for biogas digesters.

## Feasibility Study on Waste to Energy Conversion at Keraniganj

Renewable energy is one of the important fuel diversification strategy identified by Bangladesh Government. Waste to energy is one of the key renewable energy options to the context of Bangladesh. It is also instrumental towards sustainable waste management for a densely populated country like Bangladesh. In response to request from Government of Bangladesh, SED program conducted a feasibility study at Keraniganj Upazilla (sub-district) of Dhaka on exploring possibility of waste to energy conversion. The objective of the study is to support Bangladesh Government in assess waste to energy potential in that area, recommend suitable technology, tech-economic analysis of the pilot project with the recommended technology. GIZ's study had been handed over to the Government Power Division. Government of Bangladesh is now developing pilot project based on GIZ recommendation through its own funding. GIZ is committed to Bangladesh Government in providing technical support in this regard.

## Improved Cooking Solutions

The World Health Organization has estimated that 46,000 women and children die each year in Bangladesh as a direct result of exposure to indoor air pollution, while millions more suffer from respiratory diseases, tuberculosis, asthma, cardiovascular disease, eye problems, and lung cancer. Considering this as urgent problem GIZ has turned its attention to the inefficient and poorly ventilated clay stoves that the vast majority of Bangladeshis use for cooking. In Bangladesh, only 6 percent of the population has access to natural gas from grid supplies. The overdependence on biomass is causing deforestation. The traditional inefficient cooking practice has detrimental health hazards. SED programme of GIZ, has reviewed the existing technology of traditional stoves and cooking practices and developed simple, affordable solutions based on locally available materials as an alternative cooking solutions.

## Improved Cooking Stoves

The “Bondhu Chula”, an improved stove, reduces the biomass required to cook a meal by up to 50%. The addition of a chimney significantly reduces household member's exposure to harmful smoke and gas emissions.

The originally design was developed by scientists of the Institute of Fuel Research and Development (IFRD) of Bangladesh Council of Scientific and Industrial Research (BCSIR).

In 2012 to 2013 GIZ has disseminated more than 2 lacs 50 thousand improved stoves. The initiative was jointly implemented by a project ‘Market Development Initiative for Bondhu Chula’ with financial support from the Bangladesh Climate Change Trust Fund (BCCT) and EnDev Bangladesh. Under the project over 5800 sanitary shops owners receive training on stove production, more than 1200 women volunteers and 500 promoters was encouraged for the wider uptake of the energy efficiency, improved stoves. Since 2010 more than 1.8 million improved stoves have been installed in Bangladeshi households. Each of these stoves saves about one ton of CO2 emissions and around 500kg of wood per year. The programme Bondhu Chula envisages replacing all traditional stoves in Bangladesh with improved stoves by 2021, thereby saving thousands of lives, reducing consumption of biomass and protecting the environment.

## Retained Heat Cooker (RHC)

GIZ is promoting a type of retained heat cooker in the form of an insulated bag designed to reduce the amount of fuel required to cook food. The insulation allows the food to continue cooking inside the bag with no further energy input. With the technical support of Islamic University of Technology (IUT) University different options of locally available materials were identified. The bag has shown up to 70% of energy saving performance compared to gas and electric cooking. All sorts of food items with large amount of liquid can be cooked in this cooker, including rice, potato, chicken, vegetables, and beef etc. RHC can also be used as an ice box and yogurt maker. The pilot was initiated in 2014. Along with other partner organizations the SED programme has developed the product and started marketing. As a new product, which can be locally manufactured, and can create employment opportunities and thus reduce poverty.

## Promotion of Technologies to Improve Energy Efficiency

### Improved Rice Parboiling Systems

Bangladesh is the world's sixth largest rice-producer. Parboiled rice is deeply rooted in Bangladeshi culture and way of life. It is the staple food of about 160 million people in Bangladesh. Most of the Parboiled Rice (about 80%) is produced at 50,000 small and medium-sized rice mills in the country. The traditional boilers used in rice parboiling are quite unsafe, cause occasional explosions leaving casualties of operators and on lookers.



Left: Biogas based Electricity Generators at Gazipur (4 X 100 kW capacity).

Right: Improved cooking stove reduces the biomass required to cook a meal by up to 50%.



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*Left: Improved rice parboiling system developed by GIZ*

*Right: Efficient Natural Lighting through Solar Pipe Light*

In addition, traditional boilers emit smoke, poisonous carbon monoxide and other particles that not only pollute the environment, but also create health hazards for those who are exposed.

Considering the above factors, GIZ's SED program successfully developed the Improved Rice Parboiling System (IRPS) model at the request of Bangladesh Government. Using GIZ energy efficient parboiling system, about 50% of the rice husk, that is used for firing the boilers can be saved. The surplus husk is used to make briquette for cook stoves. It is also widely used as bed-spread in poultry industries. The saved husk has other markets too. Saved rice bran can be made available for use in edible oil industry. The improved parboiling systems also have longer working life compared to the traditional ones. Not only the overall efficiency is increased, but huge pollution is also mitigated. By reducing smoke emissions and introducing other safety measures, the facilities provide a far more convenient, safer and healthier working environment.

As of now, SED programme of GIZ has installed 68 demo units in 9 rice mill clusters out of 50 rice mill clusters available in the country. More than 50 technicians have been trained and 12 local service providers are available as a result of GIZ's technical assistance and capacity development initiatives. SED along with its counterpart SREDA has now taken a joint initiative integrated parboiling and milling across rice mill clusters to promote energy efficiency and productivity improvement in rice mill clusters.

## Efficient Natural Lighting through Solar Pipe Light

Customised innovative simple technological solution can have the capacity to reduce the growing demand of energy as well as can ensure efficient use of energy.

Keeping that in mind, SED programme of GIZ has taken an initiative on harvesting day light using solar pipe light in industries.

SED programme has piloted solar pipe light in two settings, one is in small cottage factory and another is in ice cream factory. The study reveals that the pilot is helping the industry to use free natural lighting during daytime for 10-12 hours covering around 750-800 sqft. factory area illuminating equivalent light of 500 watt CFL bulb. At the same time it saves monthly energy cost of around 1800 BDT. and reduces almost 77 kgs of carbon dioxide. Solar pipe light has a huge prospect in factories of Bangladesh to avoid electricity usage for day lighting.

## Waste Heat Recovery from Power Station to run Cold Storages

Innovative technological intervention can reduce the energy demand as well as can ensure efficient use of energy. Considering this issue, the SED program of GIZ Bangladesh has been conducting a study on power station waste heat recovery to run the Cold Storages. The study has been undertaken in line with vision of the Ministry of Power, Energy and Mineral Resources of Bangladesh Government. The study will recommend the potential suitable technologies and submit a techno-economic analysis of a pilot project. Based on study government is expected to implement one pilot project in future. The study will also explore other possible use of waste.

Apart from the above interventions SED is planning to intervene in providing technical assistance in smart metering with power utilities, promotion of efficient lighting in garments sector from the demand side management.

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