2015

GHEL COMPANY PROFILE

Lightening for Better Future

Green Housing & Energy Limited

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Company Information

Company Name: Green Housing & Energy Limited (GHEL)

Web Address: www.ghel.org

Key Person: **Founder and Managing Director:** Dr. Mostaq Ahmmed, an expert in microfinance and Social Business, is the Deputy Chief Operating Officer of ASA International. He is also founder of the Paris based Social Business Think Tank ICMSE (International Center for Microfinance and Social Enterprise), which is creating and building linkage program with Corporate Businesses and Microfinance Institutions.

Date of Establishment: 2010

Registration Number: C 82133/10

Legal Status: Joint Stock Registered Company

Registered Capital: **7.942** Million US$

Business Scope: Alternative green energy, pure water supply which is addressing the scarcity of clean electricity and water supply, especially in remote areas including its Green housing and Agro-business Development activities.

Employees:

GHEL is presently working in 64 districts of the country. The total number of employees currently stands at around 200 and over 50% of them are engineers.

Number of Head Office Staff: 30

Number of Field Staff: 170

Number of Rural Women Trained: 4,050

Number of client service center (CSC): 122 including (37 Water Pumps and Irrigation Centers)

Banking and Investment Partners: IDCOL, Mercantile Bank Limited, Southeast Bank Limited.

International Business Partners: INES, AFTA, ICD, EDHEC and HEC

Other Partners: Rahimafrooz, Navana and Panna Battery.

Company Overview:

Green Housing & Energy Limited (GHEL), is a private company which is dedicated to Social Enterprises Development through linking corporate social capital venture funds with new technologies for achieving sustainable development.

Green Housing and Energy Ltd. are getting technical assistance from IDCOL and INES (a French National Solar Institution) and technological support from Taiwan and China based institute "AFTA Technology" and Government Institute name- CETC International. The company has several project and activities those are with Private Public Partnership (PPP) model, and addressing the decent housing, pure drinking water supply, irrigation and energy solutions for the low-income people.

The ultimate goal:

1. Overcome the dependency on fossil fuel by offering alternative green energy
2. Comes up with innovative solutions for Water Business in Rural Areas;
3. Offer the best and cleanest technology at an affordable prices.
4. To contribute to make of Bangladesh (one of the most vulnerable countries to climate change) a role model in Renewable Energies and Sustainable Development.
5. The initial and most meaningful goal of GHEL is to ultimately alleviate poverty by offering income-generating practical solutions to the low-income people of Bangladesh:
    - *By decreasing clean energy cast & ensure water supply network to the villages*
    - *By supplying a cheap energy source*
    - *By providing low-cost sustainable houses equipped with water supply, better sanitation and bio gas for improving living conditions of the low income people;*
6. Access to High Tech customized solutions for isolated low-income people
7. To invest in the area of agro business development by building a seed preservation center in which farmers could preserve their seeds for a low-price.
8. Technology integrated in a smart Business Model combining social strong preoccupation, gathered synergy from complementary partnerships and constant low-cost preoccupations lie at the core of GHEL's goal.

Mission: Why not use all of that beautiful sunlight and unutilized natural resources for something useful?

Vision for 2016:

- GHEL will launch a new product for the villagers to offer them mobile banking and unit banking facilities though partnering with commercial bank in 2016.
- Major technologies for providing power
- Low cost but better housing and agro business development product and services.

Vision for 2017:

Collective efforts for drastic carbon emission reduction and community people empowerment in Bangladesh.

Objective:

- Ensure pure water supply facilities available in the rural areas for drinking, households activities along with irrigation purposes through having buried pipe line networks;
- To promote, develop and extend renewable energy technologies such as solar power, biogas etc.
- To reduce poverty through the utilization of energy for productive purposes.
- To disseminate and develop awareness in renewable energy technology for rural people.
- Lower energy consumption with energy saving electrical appliances, lightning bulbs, home designs and locations - Green Housing
- To provide support to the farmers for preserving their seeds for a low price by building seed preservation center.

Human Resource and Development:

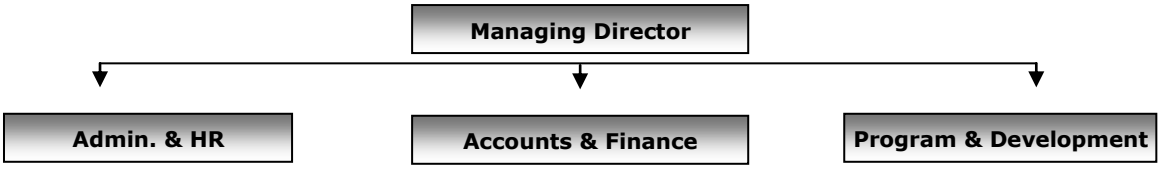
GHEL's Human Resource Management is the function that deals with issues related to the staff of the company such as compensation, hiring, performance management, organization development, safety, wellness, benefits, employee motivation, communication, administration, and training.

Services Provided:

The services of the Human Resources Department of the company provide:

- Recruitment and appointments
- Contracts of employment
- Payroll administration
- Staff development and training
- Employee relations
- Staff records and statistics
- Employment equality
- Promotions and grading
- Support and advice on all HR related matters to staff and management

Management Comprises:



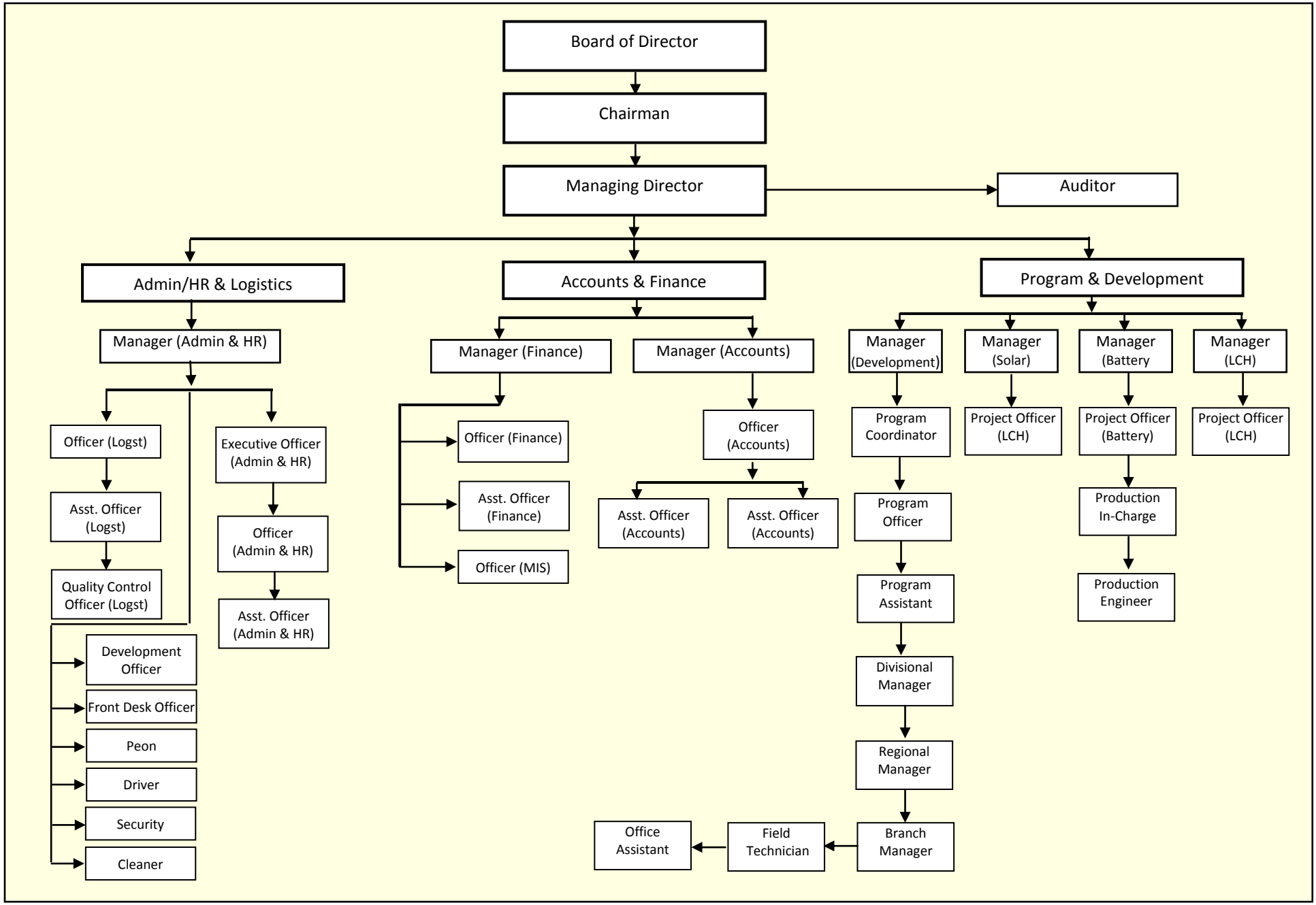
Admin. & HR covers the administrative department, human resources, communications, governance and sustainability.

Companies Accounts and Finance is responsible for internal and external accounting of the organization, financial management & controlling.

Program & Development is responsible for direct contact with the consumers, sells, distribution and production.

Green Housing & Energy Limited

Organogram



Competitive Landscape:

There is today a **huge market** to conquer with renewable energy since the vast majority of Bangladesh rural areas still have no access to pure drinking water facilities and clean energy supply. This ambitious project is undoubtedly realizable since more than **30% people they don't have access to those facilities whereas those are the key fundamental rights for the people.** Besides, entering in the market of renewable energy GHEL is positioning and focusing on water business, agro business and the low price of its rural housing products: they are planned to be 20% to 30% cheaper than conventional market prices. Implementing a comparable project, but at low-cost, and with the skills, knowledge and huge client network of microfinance promises to reach success. Moreover, to encourage private sector participation in the development of the power sector, water sector, the government of Bangladesh has showed its support by launching some fiscal incentive through "Private Sector Power Generation Policy" of Bangladesh in 1996. Investing in GHEL trusts a massive project supported by the government's guidelines while confronting our environmental and social focused responsibilities.

Featured Projects:

- Energy Solution - Solar Energy Product
- Water Business and Water Supply Network
- Agribusiness - Seed Preservation Center
- Housing Solution - Low-Cost Green Housing.
- Chilling Centre for Vegetables and Fruits.
- Biogas project
- Improved Cook Stove

Business Units:

- Solar Energy.
- Water Business
- Agro Business.
- Low-cost Green Housing.
- Biogas and Cook Stove
- Chilling Centre

Solar Energy:

Solar Panel:

Solar panels (arrays of photovoltaic cells) make use of renewable energy from the sun and are a clean and environmentally sound means of collecting solar energy. Solar panel is a packaged interconnected assembly of photovoltaic cells, also known as solar cells. Solar panels must withstand heat, cold, rain and hail for many years. The usual warranty is 15 years at 90% of rated power output and 25years at 80% of rated power output. The average cost for solar panel is from Tk. 5,500 to Tk. 85,000. An easy installation and portable technology which provides uninterrupted power supply unlike Fossil Fuel electricity.

Solar Lantern:

Solar lantern is a lighting system consisting of a lamp, battery and electronics, all placed in a suitable housing, made of metal, plastic or fiber glass, a photovoltaic solar panel and one or more rechargeable batteries. The battery is charged by electricity generated through the PV module. The lantern is basically a portable lighting device suitable for either indoor or outdoor lighting. Covering a full range of 360 degrees. A LED based solar lantern system aims at providing solar electricity for operating LED lights for specified hours of operation per day.

Solar Tri Cycle:

Solar Tri Cycle is a clean and renewable solar powered vehicle uses for short distances. It requires no additional fuel cost and is easy to drive and maintain.

Solar Water Pump:

A solar water pump allows uninterrupted water supply for irrigation and pure drinking water supply through having underground pipe line for domestic uses of the safe water for the villagers. This consists of a solar panel, a deep cycle battery for continuous use, and a motor. As part of GHELs

pioneering sustainable village model, GHEL has already installed 37 Solar Water Pumps for Irrigation and pure drinking water supply to the different villagers. GHEL each Solar Water Pump Projects covered more than 40 to 50 Acre Irrigation land beside serving the local villagers with pure drinking water and water for daily household purposes. These water plants are designed to provide water supply to a group of farmers and households through collective distribution and centralized monitoring system. This systematic approach to water and energy supply is an efficient way of making water and electricity more available to the villages. This way, GHEL can offer a more affordable distribution pipe water channel and energy supply to regions and households those needed and improving better living condition due to the services.

Agro-business:

Seed Preservation Center:

Seed Preservation Center will ensure the facility of shortage for the remote people with minimum charge. The facility of the center will be techno oriented where the quality of the seed will be intact for long term but the cost will be very low.

Low-cost Green Housing:

Low cost (40% lower than a regular house) green housing is an ideal house with the integrated system of:

- Solar Energy (Solar Panel & other Solar utilities)
- Biogas plant or Modern Stove
- Pure water supply through reserved rain water or shallow tube well
- Environmental & Ecological Sanitation.

The longevity of the houses will be ensured for minimum 50 to 80 years and will be protected from Natural Disaster.

Biogas

As one of GHEL objectives is to reduce the dependence on fossil energy, GHEL wants to provide renewable solution to its customers.

Also only 3% of Bangladeshis have access to natural gas. Therefore GHEL will launch a program to install Biogas plants in the rural area of Bangladesh.

Improved Cook Stove

The main source of energy used for cook stove is currently wood and kerosene, which are sources of indoor air pollution and therefore many diseases.

By providing Improved Cook Stove, GHEL wants to improve the health conditions of its consumers and also to allow them to reduce their fuel costs by two.

GHEL Battery Plant

The backbone of most power storage system is battery. An electric Battery is “any machine that storage energy into electricity for transmission and distribution.”

GHEL battery plant will produce all kinds of solar batteries that will be suited to our solar lanterns, home systems, tricycles and water pumps as well as other solar products that require battery. The production capacity of the plant amounts 3300 pieces per month if run one shift (8 to 10 hours).

Plant Size

Plant will be built on a 5 Bigha land which cost has estimated amounts 3.30 Crores BDT and which will be located in the surroundings of Dhaka (in Gazipur). The plant requires 102 employees for production and 18 for corporate office.

Battery Produced:

The GHEL has made a clear technical plan to produce following categories of the batteries as per the Market Demands and it must have composed of three assembly lines:

- One small VRLA battery (55AH) assembly.
- One VRLA battery (80AH) assembly line.
- One 100AH battery assembly line.
- And one 130AH battery assembly line.

All the batteries are designed and destined to be used for solar panels.

Predicted Quantity of Production

The maximum capacity of production is of 3711 units per month and we intend to reach this point after two years of activity. First, we intend to produce 75% of our total capacity during the first year of activity, and then we will be able to produce 85% during the second year. And only during the third year of our performances, we will use our full capacity which will allow us to produce maximum 3711 units per month.

Projections of Yearly Production Plan:

	Year 1	Year 2	Year 3
Total capacity production	44,529	50,467	59,372
Effective production	75%	85%	100%
Quantity produced	33,397	42,897	59,372

Different Categories of the Yearly Batteries Production Plan

	product 1	product 2	product 3	product 4
Type	55AH	80AH	100AH	130AH
Quantity	11,132	11,132	11,132	11,132
Unit production cost(BDT)	4 760	5 950	7 843	8 400
Total production cost (BDT)	52,988,320	66,235,400	87,308,276	93,508,800
Selling price (BDT)	6 800	8 500	10 195	12 000
Total sales (BDT)	75,697,600	94,622,000	113,490,740	133,584,000
Unit margin (BDT)	2 040	2 550	2 352	3 600
Total margin (BDT)	22,709,280	28,386,600	26,182,464	40,075,200
Gross profit ratio	30%	30%	23%	30%

Working Area:

GHEL's activities divided into 07 cluster areas in Bangladesh.

1. Dhaka
2. Mymensingh
3. Bogra
4. Chittagong
5. Faridpur
6. Barisal and
7. Patuakhali

GHEL's offices divided into 03 categories: (1) Head Office (2) Regional Office and (3) Branch Office.

Office Location:

- Branch Offices: ★
- Regional Offices: ◈
- 07 Clusters: ●

Our Working Area in Bangladesh:

At present GHEL is working in seven cluster areas of Bangladesh. We have 122 Branches and 15 Regional Offices in the whole country. From the seven clusters, we cover the entire region of Bangladesh and provide support to our customers.

Seven Clusters are:

1. **Dhaka**
2. **Mymensingh**
3. **Bogra**
4. **Chittagong**
5. **Faridpur**
6. **Barisal**
7. **Paruakhali**

Training and Technical Support:

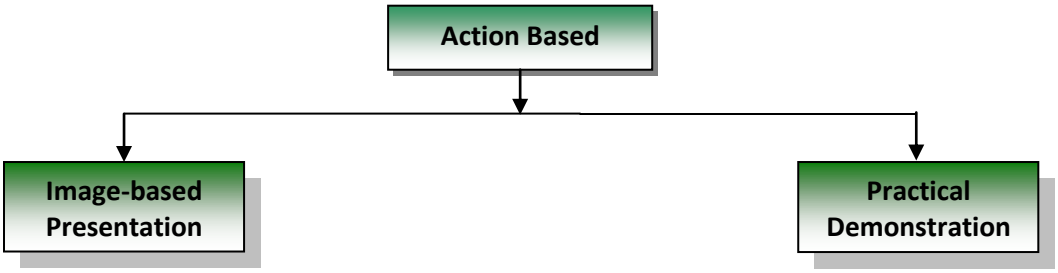
GHEL offers a variety of training programs designed to help everyone learn more about Solar Energy for household lighting, irrigation, pure drinking water supply and other component. Using a combination of Solar Power Field staff and industry experts GHEL cover everything from basic energy efficiency concepts to solar electric and solar applications. The Board has decided and authorized the Managing Director of GHEL Dr. Mostaq Ahmmed to take initiative for strengthening the GHEL's all Branch Offices which will work as a Client Service Center and these offices will work independently and simultaneously with microfinance Branch offices. It is also decided that for the smooth functioning and effective coordination of all the GHEL clients' service center, GHEL Management/Technical Team from the Business Office will coordinate with this purpose.

Need of Solar Training:

Solar training is critical because solar energy is such a broad, deep and often misunderstood topic. For this reason we are trying to provide actual data and proper technique for solar system.

Training Methodology:

The trainings are based on action base. Under the action based there are two wings one is (i) Image-based presentation which is based on image, this training especially for those people who are not literate. To make them understand we will use image. The other one is (ii) Practical demonstration; it focuses on flip chart.



Objectives:

- To ensure some technical training on solar system for rural women to develop their technical know how as well as economical condition in rural areas.
- To ensure sustainable operation of the energy utilities.
- To encourage public and private sector participation in the development and management of the energy sector.
- To provide better and effective service for customers.

Contents of Training

GHEL designed the training contents are into four types. We believe that if a person will have trained on these three grounds actually then definitely s/he can able to provide the best service in anywhere in Bangladesh. The other one is TOT which is Training of Trainers. The types of training we have designed are as follows:

Technical Training

This training will totally focus on technical issue specially maintain and setup polices. It will help stuffs to become technically sound.

Accounts Training

Accounts are the heart of any business. Accounts things are very sensitive and important and this training ground will make the stuffs sounds in accounts.

Monitoring and supervision Training

This ground will guide the stuffs how to use SHS and which way to take care of SHS. By these training stuffs will get to know clearly how to supervise the whole program

Training of Trainers (TOT)

GHEL will be also training peoples to give them enough knowledge to become trainers themselves. By having its own trainers, the branch offices will have more autonomy to grow faster.

Who Should Take Solar Training?

Our solar training classes are for absolute beginners and seasoned veterans. So, who should take a solar training course?

- Training for Customer/User
- Training for Electricians
- Training for Engineers
- Training Branch Manager and Technician.
- Solar Training for Beginners or Experienced staff and Professional

Our solar training is prepared for becoming a professional, successful solar installer. Whether he/she is a complete beginner, or an experienced solar installer, our solar training program is the perfect introduction, or refresher course to today's newest technologies and sizing/design/installation techniques.

Awareness & Campaigning Activities:

Through leaflet, brochure and poster GHEL is doing their campaigning activities in rural areas. By providing different training, people could know about GHEL's product like water supply network, solar home systems and its uses. People could aware about different impact of the product.

Partnership Agreement:

Partnership agreement was executed between the GHEL and IDCOL on January, 2011

About IDCOL:

Infrastructure Development Company Limited (IDCOL) was established on 14 May 1997 by the Government of Bangladesh (GOB). The Company was licensed by Bangladesh Bank as a non-bank financial institution (NBFI) on 5 January 1998. Since its inception, IDCOL is playing a major role in bridging the financing gap for developing medium and large-scale infrastructure and renewable energy projects in Bangladesh. The company now stands as the market leader in private sector energy and infrastructure financing in Bangladesh.

IDCOL is managed by a seven-member independent Board of Directors comprising four senior government officials, three prominent entrepreneurs from the private sector and a full time Executive Director and Chief Executive Officer. It has a small and multi-skilled work force comprising economists, financial and market analysts, engineers, lawyers, IT experts and accountants. IDCOL's stakeholders include the government, private sector, NGOs, multilateral institutions, academics and the people of Bangladesh at large.

IDCOL honored this partnership in April 2011, by awarding 150 million taka loan, for the its Solar Water Pumps and SHS Program.

Company Products:

Energy Solution - Solar Energy Product:

Solar Panel:

Solar panels (arrays of photovoltaic cells) make use of renewable energy from the sun and are a clean and environmentally sound means of collecting solar energy. Solar panel is a packaged interconnected assembly of photovoltaic cells, also known as solar cells. Solar panels must withstand heat, cold, rain and hail for many years. The usual warranty is 15 years at 90% of rated power output and 25years at 80% of rated power output. The average cost for solar panel is from Tk. 5,500 to Tk. 85,000. An easy installation and portable technology which provides uninterrupted power supply unlike Fossil Fuel electricity.

Solar panels are easy installations and portable technologies which provide clean, uninterruptible power supply unlike fossil fuel electricity. Their impact is thus inherently economic (they are less expensive in the long term), social (the living standard of low and mid income people will improve with the touch of modern technology in their daily activities), and environmental.

General Information	***Whistands:*** ***• heat*** ***• cold*** ***• rain***
Power supply capacity	***•10 watt Solar Home System*** ***• 20 watt Solar Home System*** ***• 40 watt Solar Home System*** ***• 50 watt Solar Home System*** ***• 75 watt Solar Home System*** ***• 85 watt Solar Home System*** ***• 120 watt Solar Home System***
Use of solar electricity	***• Lightening of the house*** ***• Operating televisions, radios and cassettes*** ***• Charging batteries of mobile phones***
Installation	***Placed on GHEL's houses roofs by GHEL's technicians.***
Lifespan	***20 to 25 years.***
Warranty	***15 to 25 years.***
Maintenance	***•Free of charge*** ***•Ensured by GHEL's local trained technicians***

Solar Lantern:

Solar lantern is a lighting system consisting of a lamp, battery and electronics, all placed in a suitable housing, made of metal, plastic or fiber glass, a photovoltaic solar panel and one or more rechargeable batteries. The battery is charged by electricity generated through the PV module. The lantern is basically a portable lighting device suitable for either indoor or outdoor lighting. Covering 360 degrees. A LED based solar lantern system aims at providing solar electricity for operating LED lights for specified hours of operation per day.

This solar lantern is a great alternative resource to fossil fuel lanterns; i.e. kerosene lantern, gas lantern, candle stick, torch light etc. Its environmental impact is extremely high: it reduces carbon emissions, guarantees daily energy supplies, hinders fire and environmental hazards caused by the use of kerosene, and is even less expensive than any other source of energy in the long run. Indeed, people in Bangladesh's rural areas spend an average of 12 to 15 BDT per day on kerosene while a solar lantern has a total cost of 2500 BDT. Considering an interest rate of 12%, it can be deduced that GHEL Solar Lantern is amortized in 207 days.

General Information	***• Portable lighting device • Indoor or outdoor lighting • Includes LED technology lighting & phone charging application • Covers a range of 360° • 2 different models of 5 watt each.***
Charging Time	***6 hours***
Duty Cycle	***Provides 5 hours minimum operating daily uses.***
Lifespan	***5 hours***
Warranty	***3 years(battery under 1 year warranty)***
General Information	***• 2 different models***
Charging Time	***8 hours***
Duty Cycle	***5 hours (with additional battery: 3 days backup)***
Maintenance	***• Free of charge • Ensured by GHEL's local trained technicians.***

Solar Water Pump:

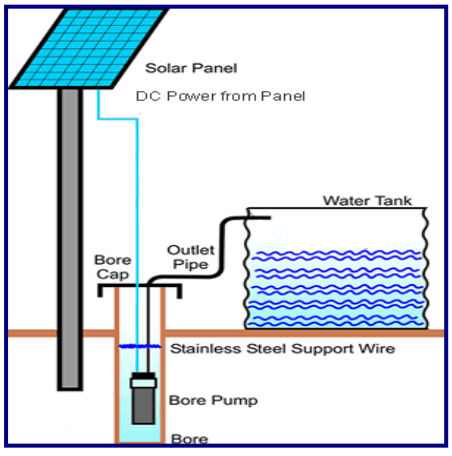
A typical solar powered pumping system consists of a solar panel array that powers an electric motor, which in turn powers a bore or surface pump. The water is often pumped from the ground or stream into a storage tank that provides a gravity feed, so energy storage is not needed for these systems. PV powered pumping systems are a cost-effective alternative to agricultural wind turbines for remote area water supply.

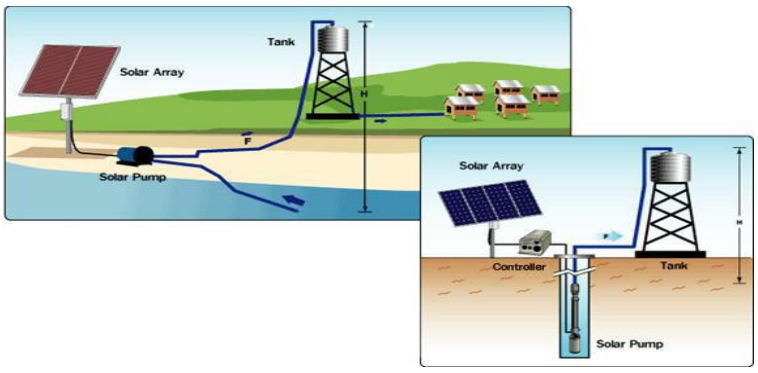
A solar water pump allows uninterrupted water supply for irrigation and pure drinking water supply. This consists of a solar panel, a deep cycle battery for continuous use, and a motor. A solar powered pump is a pump running on the power of the sun. A solar powered pump can be more environmentally friendly and economical in its operation compared to pumps powered by an ICE or internal combustion engine.

The GHEL Irrigation Projects is suitable for the landscape and weather conditions in most of Bangladesh since it relies on sunlight to produce electricity and pumping waters for cultivation, proper sanitation and drinking water supply. GHEL has already installed 50 Solar Irrigation Pumps in northern part of Bangladesh. The GHEL Irrigation Projects are providing water supply to more than 2500 farmers for irrigation purposes and 50 villagers are getting water supply for drinking and households purposes and benefits of GHEL Water Business are as follows:

- It is a sustainable project and could generate revenues from the water business and have long-term health benefits from the source of pure water in the villages;
- Low cost supply of water which affordable by the community people;
- Decrease several diseases and create healthy atmospheres in the villages;

PV pumping systems have, as a minimum, a PV array, a motor, and a bore pump. Solar water pumping arrays are fixed mounted or sometimes placed on passive trackers (which use no motors) to increase pumping time and volume. AC and DC motors with centrifugal or displacement pumps are used.





Solar Tri Cycle:

Solar Tri Cycle is a clean and renewable solar powered vehicle uses for short distances. It requires no additional fuel cost and is easy to drive and maintain.

Solar Tri Cycle is a clean and renewable solar-powered vehicle used for short distances and very easy to drive. It consists of an attached photovoltaic panel module and a rechargeable solar battery with a tri cycle.

The commercialization of such a product would have a crucial impact on Bangladesh's environment since motorized rickshaws are ubiquitous in the country, and especially in Dhaka where more than 400 000 of them circulate every day. This number is even more dramatic considering that motorized rickshaws emit 30 times more pollution than a normal car. There is thus a huge market to conquer and an environmental plight to address since 47% of Dhaka's CO2 emissions are due to transportation.

General Information	***• Requires no fuel cost*** ***• Minimum speed: 40 to 60 miles per hour***
Charging Time	***8 hours***
Duty Cycle	***6 hours***
Lifespan	***20 - 25 years***
Warranty	***3 years(battery under 1 year warranty)***
Maintenance	***• Free of charge*** ***• Ensured by GHEL's local trained technicians.***

Solar products for corporate clients:

Outdoor lightening System

- Easy to set up. No wiring or protection cables in the ground.
- Reduce dependency on national power grid line.
- Very low maintenance, reliable & very safe.
- Durability of solar panel is 20-25 years.
- Lighting hours: 4-6h/day or can be set according the customers requirement.

- In cloudy days, 2-3 days can be assured by the battery.

Solar LED Sign:

Solar LED motion sensor light is perfect for driveways, sheds, cabins and garage. At night it lights automatically whenever motion is detected. Adjustable sensor & light direction. Weatherproof for outside installation. Easy to mount to virtually any surface.

Green Housing:

GHEL designs and builds adapted low cost houses to the exact specifications of the Bangladeshi people's demand. GHEL is offer Green Houses for people living in rural area first, and have low or middle income. As more and more of the population live in hut or precarious houses, the demand for low cost but safe and clean houses has also increased. Many individuals, particularly those who have low income but own some land, have found that there is a tremendous interest in taking a micro credit to finance their housing, which also often constitutes their work place.

GHEL Low cost green housing is an ideal house that will be sold at a retailing price that is 40% cheaper than any other regular house, and will integrate the following devices:

1. Solar Panel & other solar utilities

2. Biogas plant or Modern Stove

3. Pure water supply through reserved rain water or shallow tube well

4. Environmental & Ecological Sanitation

Besides, the house can be used not only to live, but also to host a home-grown business. Low-cost green housing has numerous positive impacts that are not only environmental, but also economic and social. Such a house not only improves the quality of its inhabitants' every-day life by providing them with a decent place to live, but also fosters their productivity by allowing them to have a work place where they can set-up their own SME.

Moreover, this house ensures less emission of Greenhouse gases and a smaller dependency on fossil fuel thanks to the numerous solar products it includes, thus helping in reducing the global warming. Its solid waste management, safety water and sanitation will also disallow diseases transmissions in the environment. At the same time, the concept and an approach of recycling the nutrients from human and animal wastes in biogas plant will meet the demand of Natural Gas.

The strength of this project is that it offers low & mid-income people an affordable, robust and energetically-self-sufficient housing equipped with hybrid and eco-friendly technology. The microfinance support program eradicates the weight of down payment. Eventually, education may be encouraged in the long run due to the acquisition of a better standard of living.

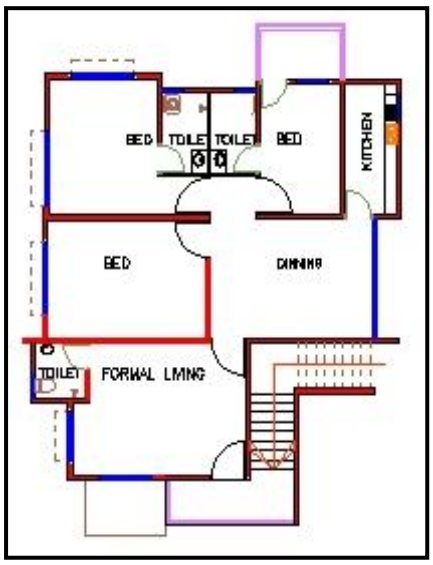
According to clients' cash flow, four different house models will be available: model A, B, C and D. Every House contains a drawing room, a dining room, 3 bedrooms (mater; child and guest), a kitchen, toilet and a veranda. The difference lies on the surface of the house and environmentally friendly facilities.

A (without land)	200 sqf	6 weeks	Water, Sanitation, Cook, Solar hurricane	2,00,000 BDT
B (without land)	400 sqf	6 weeks		4,00,000 BDT
C (without land)	800 sqf	6 weeks	Solar Home system, Cooking stove, Sanitation, Water	6,00,000 BDT
D(with land)	2*1000 sqf (cluster)	6 weeks		10,00,000 BDT

SINGLE HOUSE:

- 3 Bed rooms ,
- Living room ,
- Dinning room,
- 1 Toilet & Kitchen
- Open veranda.
- **M Bed room** 11’-8”X13’-6”
- **C Bed room** 10’-8”X8’-9”
- **G. Bed** 13’-0”X9’-4”-1
- **Toilet & Kitchen** 8’-4”X4’-5”
- **Front Verandah** 18’-0”x8’-0”
- **Back -veranda** .5’-0”x5’-0”

DUPLEX HOUSE:



- 3 Bed room
- Living room ,
- Dinning room ,
- 3 Toilets &
- 1 Kitchen ,
- 1 veranda.

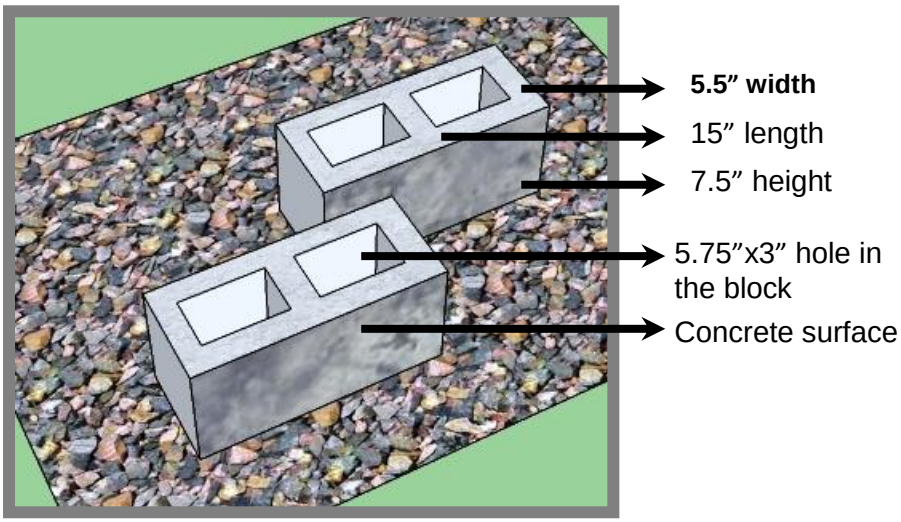
Hollow Blocks:

In the low cost housing used the hollow blocks which is totally hand made & sun burned. The blocks are most hygienic, environment friendly, easy usable to construction & very efficient.

Materials: Cement, stone, thick sand & water.

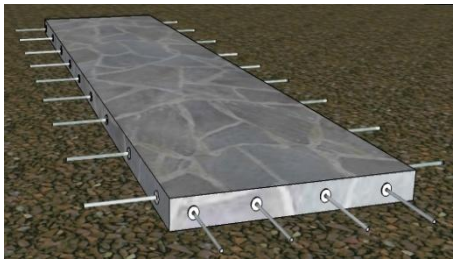
Size: 15”x5.5”x7.5”

Efficiency: it’s very much time saving to make & assembling to construction.



Roof Slabs:

Used prefabricate concrete slabs for roofing



Efficiency:

Easy usable, sufficient size to carry & movement.

It could be easy to maintain as construction elements for any where of the country.

Size: 10'-0"X2'-0"

Contains: (ease Roof slab):

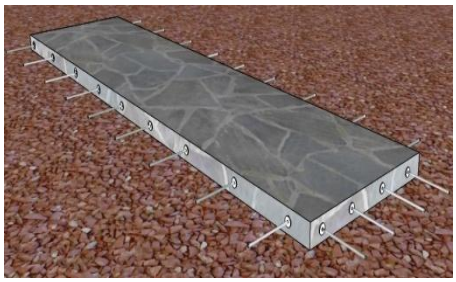
Rod 10 ml –(90 ft)

Cement, –(1 bag)

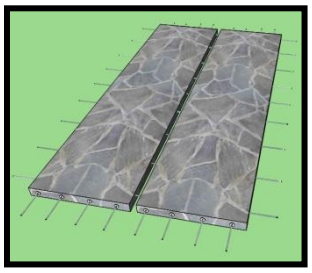
Thick sand –(21/2 bag)

Brick chips –(4 bag)

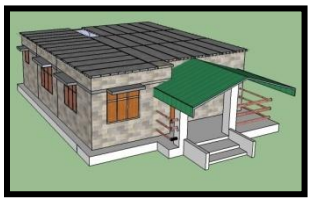
Water–(20L).



Detail of the Roof slab:



Step:1



Step:2

Step:3

Step:4

Step:5

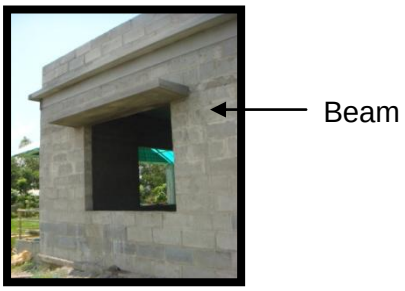
Final:

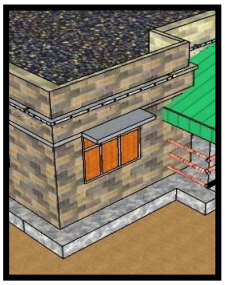
Roof & Beam:

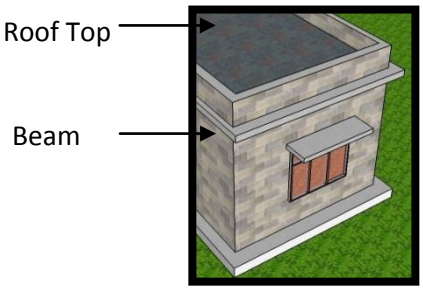
In the low cost housing on the roof there is cement plastering that's why temperature is cool in the house environment. In 7' height all around building there is continuous beam surrounded for it the building got heavy strength.

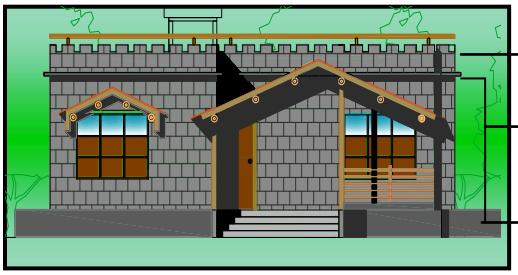
Height of internal space:

10'-11" height between floor & ceiling of the room.









Parapet wall & sun shade:

In the low cost housing used the door & window which is totally made by aluminum sheet.

Parapet wall: Size: 2'-6" height

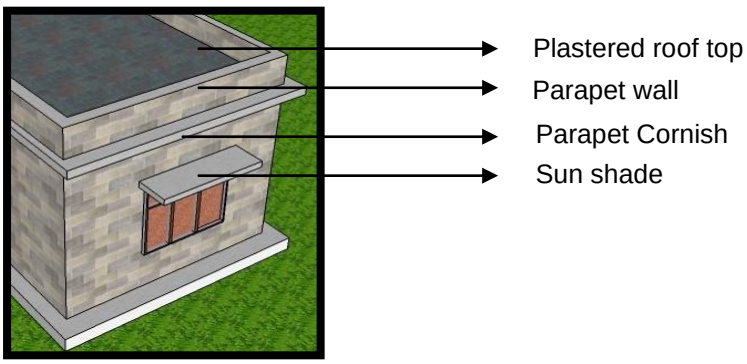
Materials: Hollow block with cement plaster.

Parapet Cornish: Size: 0'-6" extended.

Materials: Concrete with cement plaster.

Sun shade: Size: 1'-6"x4'-0"

Materials: Concrete foundation with cement plaster.



Water system:

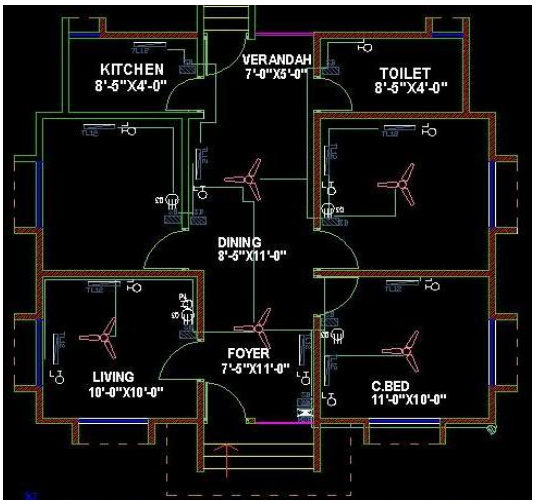
In the low cost housing solar water system is used in the building. In bathroom there is water preserver

The project provided the high power water system which can be used in house keeping & the other cultivation works.

Electrical drawing :

In the low cost housing provided all the provision of electrical options what is necessity for a house ,it can be provided the solar home system if any one wants .

There will be provided 1 light and 1 fan in option for a room, so there will be the necessary outlet in every rooms. The total options are 4 fans and 4 energy savings light options.



Temperature:

Internal wall & external wall are well cement plastered, used the hollow blocks which converted the warm & hot wind to cool .Roof are cement plastered & the over think layer of cement that's why the roof hold the cool environment inside of the house.

Constrain & Limitations

The project of low cost housing is a promising project which will provide cheap housing solutions to the peoples of rural areas. But there are some difficulties for the construction.

Such as:

- The hollow blocks which are made manually, were not as strong as what we wanted .So we decided to make it with a machine which will compress the blocks. Then it will be stronger and will fulfill our expectation of strength.
- The roof slabs are also made manually. It was difficult to maintain for setting and fixing up.

To face some difficulties we are going to mix up the conventional methods & the traditional methods for material and construction.

Features and Advantages of the Green Housing

Short Construction Time:

As many parts of the house as possible are prefabricated or precast. The house can thus be built very quickly and the pieces easily bought and replaced. The technical team can build the house in a minimum time, GHEL's goal being 6 weeks of construction.

Security and Sustainability:

The most important issue is that the houses last longer. All the parts (prefabricated, precast, cast-in-situ or make-in-situ) are structurally strong and sustainable. That's why the concrete floor will be elevated against monsoons, threat against floods and erosion. Brick wall and RCC pillar make the house more durable and solid than bamboo. It will also prevent from termite attack. The C1 sheets which cover the roof will protect from leaks during monsoons.

Besides, the houses are solid enough to support earthquake& cyclone by absorbing general earth-shock. The plinth level is counted according to the earth level for the different areas. These safety standards respond to the Bangladesh weather but may not respond to climatic changes. Longevity of the house will be ensured for minimum 50 to 80 years.

Affordability:

Those minimum costs houses are designed for the people who have very little income. Thanks to its low price, they can afford it with a program of micro credit and reimburse it more easily. In theory the client interest rate would be 15% and the loan can be bi-weekly or monthly repaid on a period of 5 or 6 year.

Impact:

Social Impact:

GHEL Low Cost Housing Program will contribute to global improvement of social welfare of the rural population of Bangladesh with an input in various crucial fields.

Health: Thanks to clean sanitation, anaerobic or composting toilets, the risk of disease is dramatically reduced. Moreover renewable energies, like solar energy, and specific facilities, like improved stoves, enable to keep clean air in the house, especially when compared to the common use of smoky and unhealthy kerosene lamps in rural areas.

Education: Survey carried out by the World Bank has shown that a better access to electricity in households contributes to a higher level of education. Indeed, the average time spent by a child to read or study increases by 6% when electric light is available (compared with

kerosene lamp or lamp with batteries) and the non-attendance at school is reduced by 20%.

Access to information: Electricity also offer a better access to information because it gives people more time every day to listen to radio (18% more than in the households where there is no electricity).

Employment opportunity: Among women and low income community.

Economical Impact:

Reduced living costs: Most of the facilities included in the house enable to reduce the daily living costs burdening its inhabitant. Renewable energies generate major savings by reducing expenses in kerosene, batteries or wood. Better environment for health reduces the expenses in medicines and medical care. Sustainability of accessories and materials deletes the cost of maintenance and replacement.

Home Grown Business: GHEL houses enable the inhabitants to set up a home grown business. Added to a good access to electricity, this business is more productive and increases the income of the family.

Assistance through Microfinance program: To avoid the burden of down payment for clients who could not afford these products otherwise.

Low cost affordable system Will make the life easy and safe.

Relevant warranty: For each product and utility system.

Environmental Impact:

Reduction of greenhouse gases: GHEL houses use solar energy system, biogas and improved stoves which contribute to the reduction of greenhouse gases emissions and of the overall reliance on fossil fuel.

Water consumption reduction: Ecological sanitations such as composting toilets enable to reduce water consumption.

Access to the modest low cost housing will improve the quality of life and people will be much more productive and such a customize house could be used not only for living but also for homegrown businesses.

Solid waste management, safety water and sanitation will disallow the disease transmission in the environment. At the same time, the concept and an approach of

recycling to nature the nutrients from human and animal wastes in biogas plant will meet the demand of Natural gas.

Living comfort: The structure of the house, its architecture and the accommodations are designed to provide comfort to its inhabitants. That is the reason why there is a gossiping place, high sanitation, safe drinking water, sun light etc.

Ventilation: It has top ventilator of 10”x12” size, mosquito protected for every room so that CO2 and hot air can pass away. Doors and windows setting allow air to move in and move away.

Exceptionality: Some special features are used in this house which are not founded in general houses such as wall made of block, roof made of wire mesh concrete or tally, nominal brick or block foundation, economical slender column or pillar section, anti-theft security system etc.

Impact on Health:

Reduces diseases caused by polluted environment; i.e. Asthma, Lung Cancer, Skin Cancer etc.

Improves the living condition and ensures a safe environment.

Cluster Housing: GHEL plans to build clusters of model D houses. Each cluster will include eight houses and each house, which has two floors of 1,000 sqf each, can accommodate two families. In the frame of the GHEL cluster housing program, the selling price is 10,00,000 BDT per apartment. The land, a biogas plant, a community center and a security fence are included in the price.

Green Housing and Energy Ltd.

Consolidated Balance Sheet

As on 31.12.15

Assets	BDT	$ in Million
Non Current Asset	**456980423**	**5.859**
Property, Plant and Equipment	178607583	2.290
Loan to Beneficiaries	175349402	2.248
Service Charge receivables	46704438	0.599
Security Receivable from IDCOL	56319000	0.722
Current Assets	**162457414**	**2.083**
Inventories	75317529	0.966
Debt Service Reserve Account	3263684	0.042
Advance, Deposits & Prepayments	12563890	0.161
Preliminery expenditure	1646594	0.021
C/A Current Account Inter Project	66749646	0.856
Cash and Cash Equivalent	2916071	0.037
Total Asset	**619437837**	**7.942**
Equity & Liabilities		
Equity	**175467174**	**2.250**
Equity	19000000	0.244
Share money deposit	9186072	0.118
Retained Earnings	147281102	1.888
Non-Current Liabilities	**318763275**	**4.087**
Loan from IDCOL	310690853	3.983
Loan from other project	8072422	0.103
Current Liabilities	**125207388**	**1.605**
Short term (Time) loan	35564583	0.456
Accounts Payable	53692715	0.688
Others liabilities	233503	0.003
Security Deposit	30070	0.000
Current Account Inter Project	23443202	0.301
Provision for expense	0	0.000
Accruals	231901	0.003
Loan From MD	23990464	0.308
Provision on security receivables form IDCOL	20950	0.000
Total Equity and Liabilities	**619437837**	**7.942**

More Information on:

www.ghel.org

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