

IDCOL Solar Home System Program



S. M. Monirul Islam
Chief Financial Officer and Head of Operations



Infrastructure Development Company Limited

Pattaya, Thailand - 25 April 2014

Bangladesh: Key Energy Outlook



- Only 62% of the population has access to electricity and generation per capita is one of the lowest (321 kWh per annum).
- 70% of Bangladesh's total commercial energy is provided by natural gas and the remainder almost entirely provided by imported oil. Natural gas is in short supply.
- 62% of primary energy consumed comes from biomass and used mostly for cooking in rural areas;
- Current share of renewable energy (RE) in electricity production is very low with solar and conventional hydro producing about 0.5% and 4% of electricity, respectively;
- Government has a vision to make electricity available for all by 2021 and ensure 5% electricity generation from renewable sources by 2015 and 10% by 2030.

Policy Interventions of GoB



- A focal institution called Sustainable and Renewable Energy Development Authority (SREDA) has been established to coordinate activities for development and promotion of RE technologies and financing mechanisms
- Target is to generate 5% of electricity from RE sources by 2015 and 10% by 2030
- Fiscal incentives for investment in RE sector:
 - Tax holiday for 20 years
 - Exempt/reduce duties/levies on import of RE technologies
 - Exempt/reduce tax/levies on local manufacturing/assembling of RE equipments
- Financial and other incentives to attract foreign investments
- Feed-in-Tariff is under consideration for purchasing electricity from RE sources
- Private sector is allowed to generate electricity from RE sources and sell to utilities and/or their chosen customers at a preferential tariff
- Concessional financing and capital buy-down grants made available for promoting RE

Overview of IDCOL



- A fully Government owned public-private-partnership financial institution
- Started operation in 1997
- **Mission:** to catalyze private sector participation in infrastructure, renewable energy, and energy efficient projects in a sustainable manner
- Largest financier in private sector infrastructure projects
- Market leader in renewable energy sector
- Funded by the Government and multiple agencies i.e. the World Bank, ADB, IDB, DFID, JICA, KfW, GIZ, GEF, USAID, GPOBA

Product & Services

Infrastructure Sector

- Long-term local and foreign currency loans
- Debt and equity arrangement

Renewable Energy & Energy Efficiency Initiatives

- Concessionary financing and grant supports
- Technical assistance and quality assurance
- Capacity development of stakeholders
- Arranger of Carbon Credits

Corporate Advisory

- Project Finance
- Financial Modeling
- Renewable Energy

** Trained about 2,000 professionals & arranged 7 experience sharing programs for delegates from African countries.*

Snapshot of IDCOL RE Initiatives



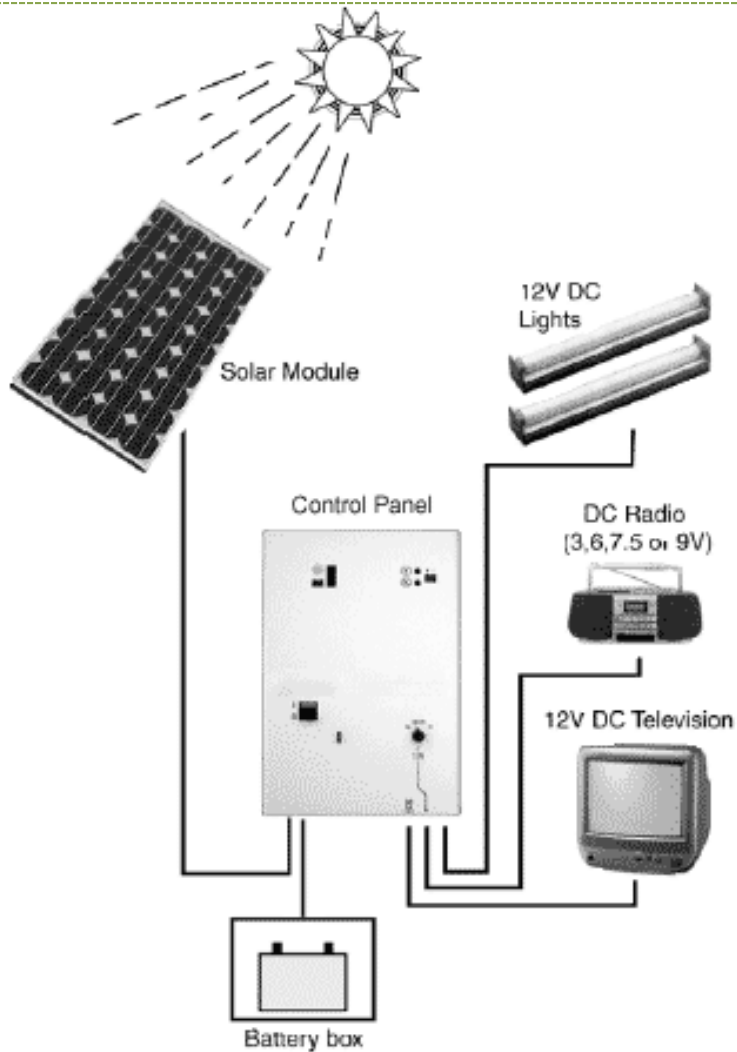
Project/Program	Target	Achievements as of Mar 2014
SHS Program	6 ml by 2016	2.9 ml
Domestic Biogas Program	100,000 by 2017	33,207
Solar Irrigation Program	1,550 by 2017	91
Solar Mini-grid	50 by 2017	4
Solar powered Telecom BTSs	As per demand	138
Biomass Gasification Project	10 by 2017	2
Biogas Based Electricity Project	130 by 2017	5
Improved Cook stove Program	1 ml by 2017	Recently launched

Why Solar Energy?



- Being located near the Equator, Bangladesh is recipient of sufficient sunshine round the year with daily average solar radiation ranging between 4~6.5 kWh / m²;
- Solar energy applications i.e. solar home system (SHS), solar powered irrigation pump, solar mini grid can be easily installed and maintained with little customer training;
- Although initial investment cost is high, the operating costs is lower than most other RE options and hence, a cost effective option;
- Solar energy is comparatively cleaner because unlike biogas and windmills, it does not produce smell or create sound pollution.'
- Solar energy based applications constitute more than 90% of current RE portfolio of Bangladesh.

Solar Home System (SHS)



Capacity	Appliances	Operation
20Wp	Lamp: 2 Mobile Charger: 1	4-5 hours
50Wp	Lamp: 4 B & W TV: 1 Mobile Charger: 1	4-5 hours
85Wp	Lamp: 9 B & W TV: 1 Mobile Charger: 1	4-5 hours

- CFL /LED Light
- Gel Battery
- DC-DC Converter to run color television, fan, refrigerator etc.

Overview of IDCOL SHS Program

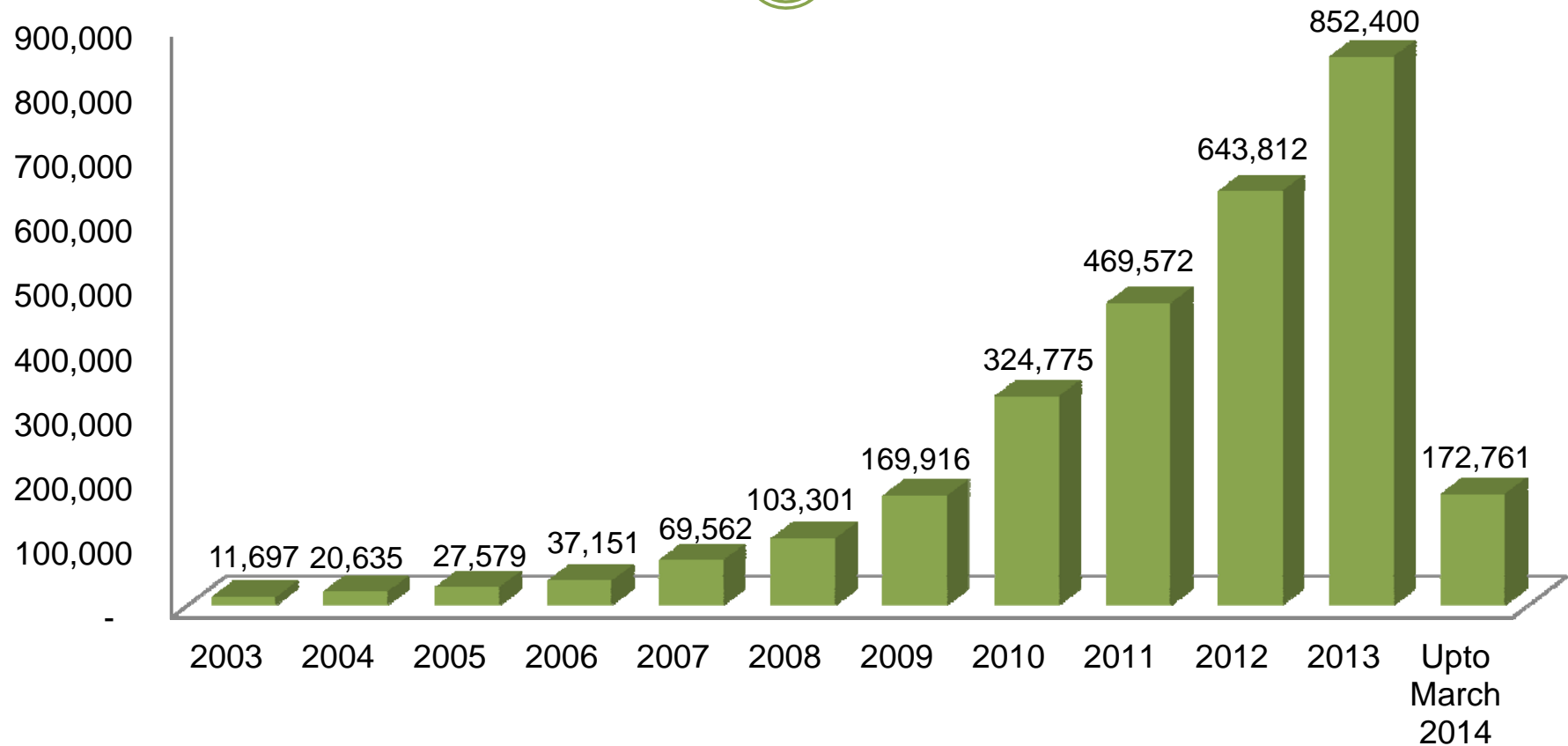


- With help of the World Bank, the Program started in 2003 as a key component of REREDP to improve standard of living of rural people by providing access to clean electricity;
- The GoB targeted NGOs, MFIs & Palli Biddut Samityas as the implementing agencies;
- Rural Electrification Board and IDCOL was selected as the coordinating agencies;
- While introducing the program as an off-grid electrification solution, the focus was to create a sustainable business model;

- Initial target of 50,000 SHSs was achieved 3 years ahead of time & USD 2 ml below estimated costs;
- The second target of 1 ml SHSs was achieved in July 2011;
- The next installation target is 6 ml within 2016;

- 47 POs are working as partner organizations under the program.

Year-wise SHS Installation Status

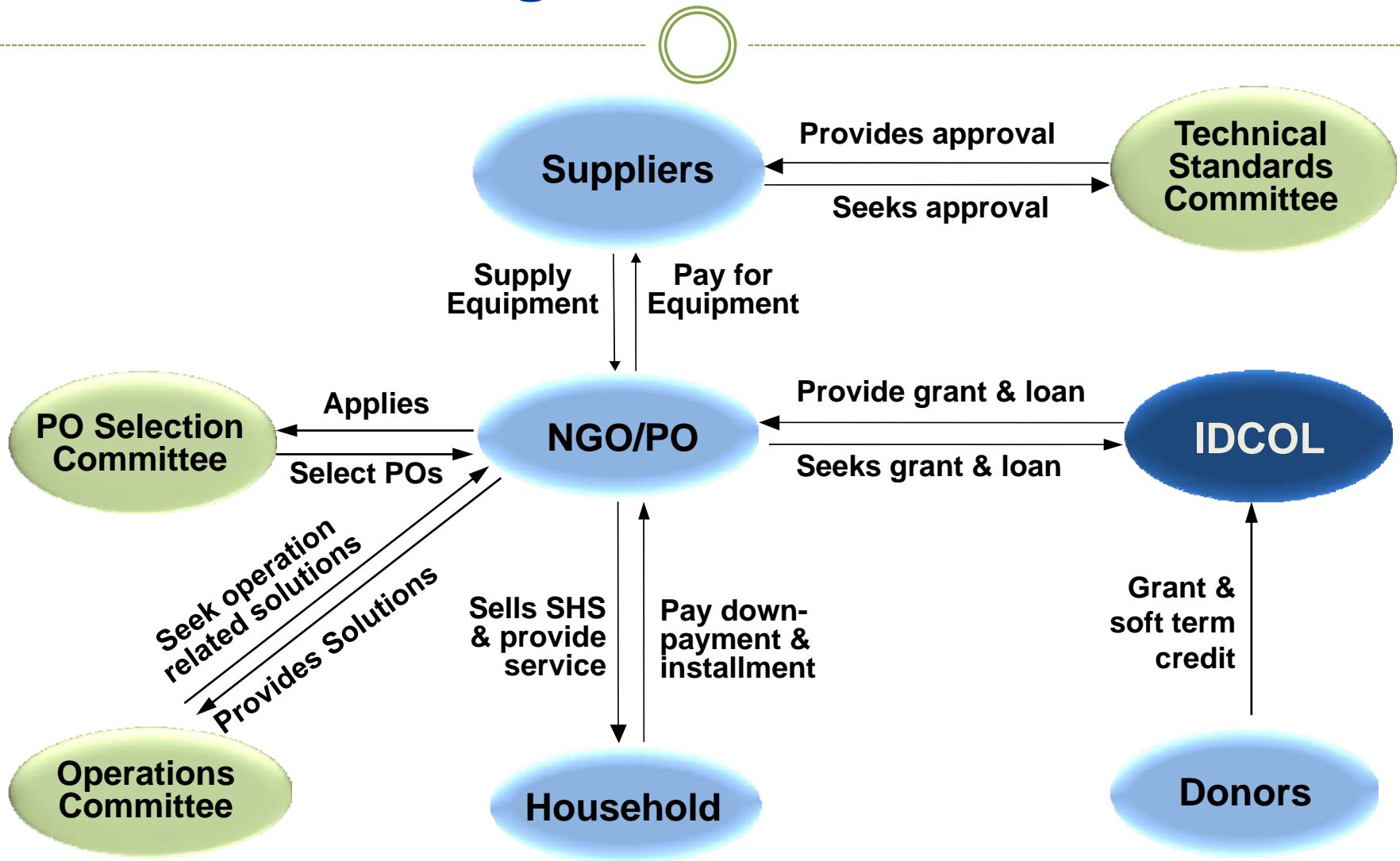


● **Total installation: 2.9 ml**

● **Monthly average installation : 60,000**

❖ **Largest & fastest growing off-grid rural electrification program in the world**

Program Structure



Mode of Financing: an Example



(a) Market Price of 20Wp SHS	USD 193
(b) Buy-down grant	USD 20
(c) System Price for Household [(a)-(b)]	USD 173
(d) Down payment from household to PO [10% of (c)]	USD 17
(e) PO loan to household [(c)-(d)]	USD 156
Loan Tenor	3 years
Interest Rate	16% p.a.
Monthly Installment Amount	USD 5.40
(f) IDCOL Refinance [70%~80% of (e)]	USD 109 ~ 125
Loan Tenor	5~7 years
Interest Rate	6~9% p.a.

A Sustainable Financing Structure



Phased-out Subsidy :

	2003	2004~5	2006~7	2008~9	2010~11	2012	2013~14
Capital Buy down Grant	\$70	\$55	\$40	\$40	\$25	\$25	\$20*
Institutional Development Grant	\$20	\$15	\$10	\$5	\$3	-	-

**for small SHS (below 30 wp) only*

Concessionary to Semi-Commercial Credit:

	2003~8	2009	2010	2011	2012	2013~15
Loan Tenor	10 yrs	6-10 yrs	6-8 yrs	6-8 yrs	5-7 yrs	5-7 yrs
Interest Rate	6%	6%-8%	6%-8%	6%-8%	6%-9%	6%-9%
% of Loan Refinanced	80%	80%	80%	80%	70%-80%	60%-80%

Quality Control Mechanisms

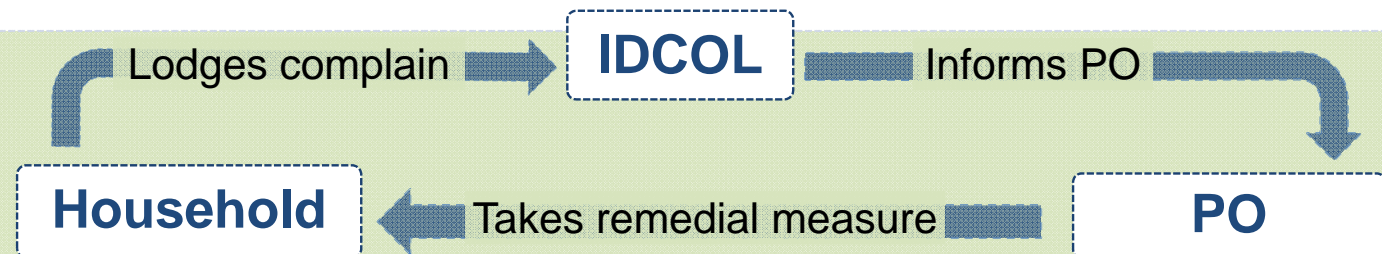
Physical Inspection

- Physical inspection by technical inspectors
- Verification of collection efficiency by collection efficiency inspectors
- Independent technical and financial audit

Training Programs

- Training for trainers
- PO Staff / customer training
- Supplier consultation

Call Centre



Program Benefits



- **Program Achievement** : 2.9 million SHS
- **Number of Beneficiaries** : 13 million people
- **Power Generation** : 130 MW (approx.)
- **Fossil Fuel Saving** : 172,000 ton/yr
- **CO₂ reduction** : 503,000 ton/yr
- **Job Creation** : 60,000 people
- **IDCOL Investment** : USD 560 million

Key Success Factors



- **Innovative financing structure**
 - **Ownership model**
- **Financial contribution of all parties**
 - **Facilitated timely installment collection and after sales service**
- **Sustainable business model**
 - **Commercialization objective and focus on institutional development**
- **Cost-efficient standardized technical design**
 - **Extended warranty and suppliers' accountability**
- **Price determination by the market**
 - **Healthy competition**
- **Superior quality control and after sales service**
 - **Multi-level inspection mechanism and dedicated call center**
- **Development of local support industries**
 - **Timely supply of necessary SHS components at lower price**
- **Bangladesh's micro-finance experience**
 - **Facilitated credit based sale**
- **Support from GoB, the World Bank and other develop partners**

Challenges & Mitigations



Challenges	Mitigation
Lack of awareness	<ul style="list-style-type: none">▪ Promotional campaigns▪ Training programs
Untested business model	<ul style="list-style-type: none">▪ Social enterprise model with an ultimate goal of commercialization▪ Presence of multiple POs ensures healthy competition▪ Phased reduction nature of grant
Lack of institutional capacity	<ul style="list-style-type: none">▪ Institutional development grant / Long-term concessionary credit▪ Staff training program
High cost of SHS equipment	<ul style="list-style-type: none">▪ Capital buy-down grant / Concessionary credit facility▪ Local support industry development
Lack of quality assurance	<ul style="list-style-type: none">▪ Technical standard committee▪ Quality control mechanisms by IDCOL
Lack of fiscal support	<ul style="list-style-type: none">▪ Tax holiday▪ Duty free import
Demand for higher load	<ul style="list-style-type: none">▪ Solar mini-grid

Solar Mini Grid



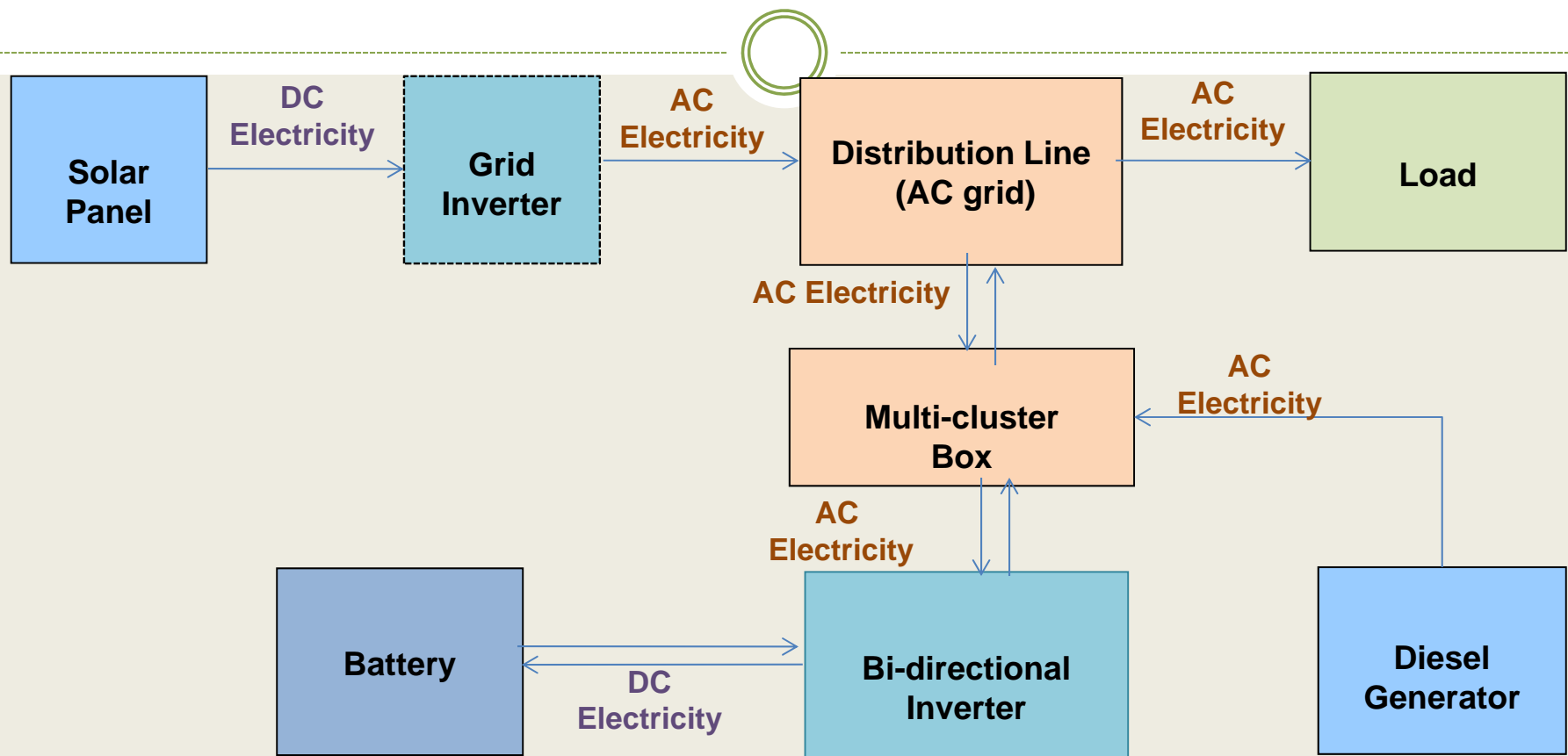
- SHS operates lamp, mobile charger, black & white TV etc for only 4~5 hrs at night;
- Solar mini-grid can operate higher loads i.e. color TV, fridge, fan 24/7 in remote rural areas where expansion of grid electricity is challenging;

- IDCOL has financed 1 and approved 3 mini-grid projects;
- IDCOL has a target to finance 50 mini grids by 2016;

- The sponsors identify locations & customers and install & operate project;
- IDCOL provides technical and financial supports to the sponsors;

- **Financing terms:**
 - ✦ Debt, equity and grant : 30:20:50
 - ✦ Interest rate : 6% p.a.
 - ✦ Tenor : 10 yrs with 2 yrs grace period

Flow Diagram of the Project



❖ Approximately project cost of a 100kw mini grid is USD 0.52 ml

Load Packages



Type	Packages	Appliances	Monthly bill including line rent (USD)
Commercial	Package-1	2 LED lights & 1 fan	4.20
	Package-2	3 LED lights, 1 fan & 1 color TV	8.70
	Package-3	4 LED lights, 2 fans & 1 refrigerator	15.20
	Package-4	4 LED lights, 2 fans, 1 color TV & 1 refrigerator	19.60
Household	Package-5	3 LED lights & 1 fan	3.80
	Package-6	4 LED lights, 2 fan & 1 color TV	8.30
	Package-7	6 LED lights, 2 ceiling fans & 1 color TV	9
	Package-8	6 LED lights, 3 ceiling fans, 1 color TV & 1 refrigerator	19.20

Mini Grid: Challenges and Mitigations



Challenges	Mitigation
Selection of right site for mini grid in off-grid areas	Jointly work with Power Division to identify potential area for mini grid project that are not in the priority list of GoB for grid expansion
The risk of grid expansion earlier than expected	Government's mechanism to address the risk of grid arrival in a mini grid project area by purchasing power from the project by government/utilities after 5 years at a preferential tariff
High mini grid tariff of BDT 30/ kWh compared to grid tariff of BDT 6/ kWh	Use of advanced and cost effective technologies. However, mini grid electricity is still a better option for people living in off-grid areas as opposed to existing diesel run generators (BDT62/ kWh).

Discussion Questions



- 1. Technology:** What is next after SHS? How can the higher electricity needs of SHS households be met? is Grid integration of SHS technically feasible?
- 2. Policy:** What policy incentives are needed to make SHS more affordable or poorer segments of the population?
- 3. Financing:** How can the program move from a subsidized public sector financing to full commercial financing?
- 4. Implementation:** How can the feedback channel from customers be strengthened?