

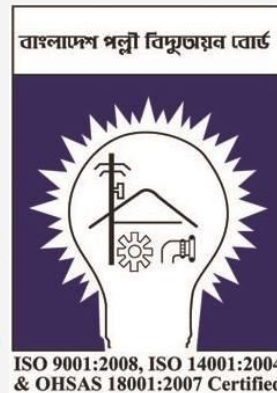
INNOVATIONS IN ENERGY FOR WATER

Perspective: Solar Photovoltaic Pumping For Irrigation



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S.M.Zafar Sadeque

Chief Engineer (P&O)

Bangladesh Rural Electrification Board

Bangladesh.

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ADB

Bangladesh



- ❑ Total Area **147,630** km².
- ❑ Population **166** Million.
- ❑ GDP Growth Rate **7.30%** (2017).
- ❑ Present Generation **20000** MW
- ❑ Peak Demand **11623** MW
- ❑ Per capita Electricity Generation: **464** kWh.
- ❑ Access to electricity (% of population): **90.5 %**



Ministry Of Power, Energy
and Mineral Resources

Power Division



Power Scenario



- ❑ Bangladesh experiencing substantial economic growth, rapid urbanization and steady industrialization.
- ❑ Huge economic and demographic changes form the core drivers for sustain growth in power demand.
- ❑ Vision is to 100% electricity access by 2021 with a generation about 30000 MW .
- ❑ Focusing huge investment in Generation, Transmission and Distribution sector.
- ❑ Renewable energy could play a significant role in the evolution of Bangladesh Power sector and a potentially growing area of investment.

Bangladesh Rural Electrification Board: At a Glance



REB was established with the aim:

- To create cooperatives (Palli Biddyut Samity- PBS)
- Area Coverage rural electrification programme.
- To Bring Electricity to the Rural Population.

01.	Inception	1977
02.	Total PBSs	80 Nos.
03.	Line Constructed	4,32,000 Km
04.	Number of 33/11KV Sub-station	867 Nos.
05.	Capacity of Sub-station	9775 MVA
06.	System Loss (80 PBSs)	11%
07.	Peak Demand	6,200 MW
08.	Consumer	2,34,00,000 (Irrigation 3,20,000)

BREB Plays a Vital Role for The Economy



Renewable Energy (Perspective: Solar Energy)



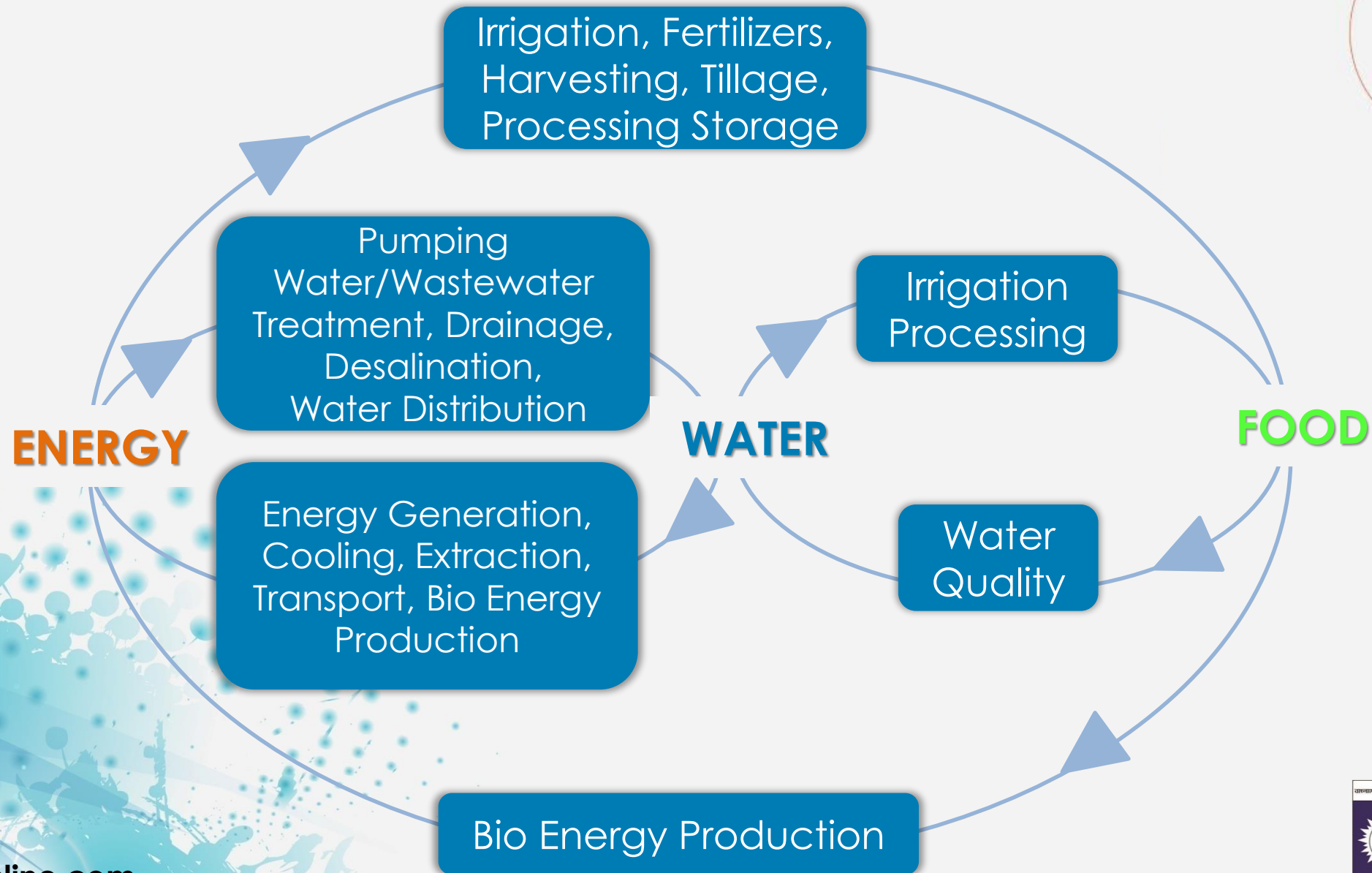
- ❑ Being a tropical country, Bangladesh is endowed with abundant supply of solar energy, insolation average 5 kWh/m²/day.
- ❑ Rainy days indicate good prospects for Solar PV and Solar Thermal.
- ❑ Bangladesh is based on agricultural economy which contributes about 20% of the GDP.
- ❑ More than 70% population and 77% of workforce lives in rural areas.
- ❑ 87% of rural households rely on agriculture.
- ❑ In Bangladesh about 60% land is suitable for cultivation, of which 90% land is dependent on irrigation.
- ❑ Currently there are more than 1.4 million diesel-run pumps for agricultural irrigation, consuming about 0.9 million tons of diesel per year to run these pumps at a subsidized rate, while emitting more than 31 million tons of CO₂ per year.

Renewable Energy (BREB)



Sl. No.	Description	Quantity Installed (Nos.)	Installed Capacity (kWp)
01.	SHS Installed under different projects	15,250	825.50
02.	SHS against PBS New Consumer Connection as per govt. rules (up to 30-04-2016)	30,946	5,933.95
03.	Roof Top Solar Plant: BREB H/Q Training Academy Building	1	49.00
04.	Roof Top Solar Plant: Upazila Complex Building	15	450.00
05.	Solar Powered Irrigation Pump	40	239.00
06.	Roof Top Solar Plant: At PBS Offices	21	44.41
07.	Solar Charging Station	9	198.00
Total Installed Capacity of PV System:			7,739.86

Nexus Of Water and Energy



Nexus Of Water and Energy



- ❑ Water and energy natural partners.
- ❑ Water means Life, Energy means Oxygen of economy.
- ❑ Integrated management proper nexus ensure better life, advanced society & optimal outcome.
- ❑ Short fall of water - energy affect food issues can sabotage economic and business growth as well as social well being.
- ❑ Resources inter related, water needed to produce energy, it takes energy to source, treat and distribute water, both needed to produce food.
- ❑ It is very much in our domain to combat scarcity by taking action at the nexus.

Solar Photovoltaic Pumping For Irrigation



Cheerful kids playing with water



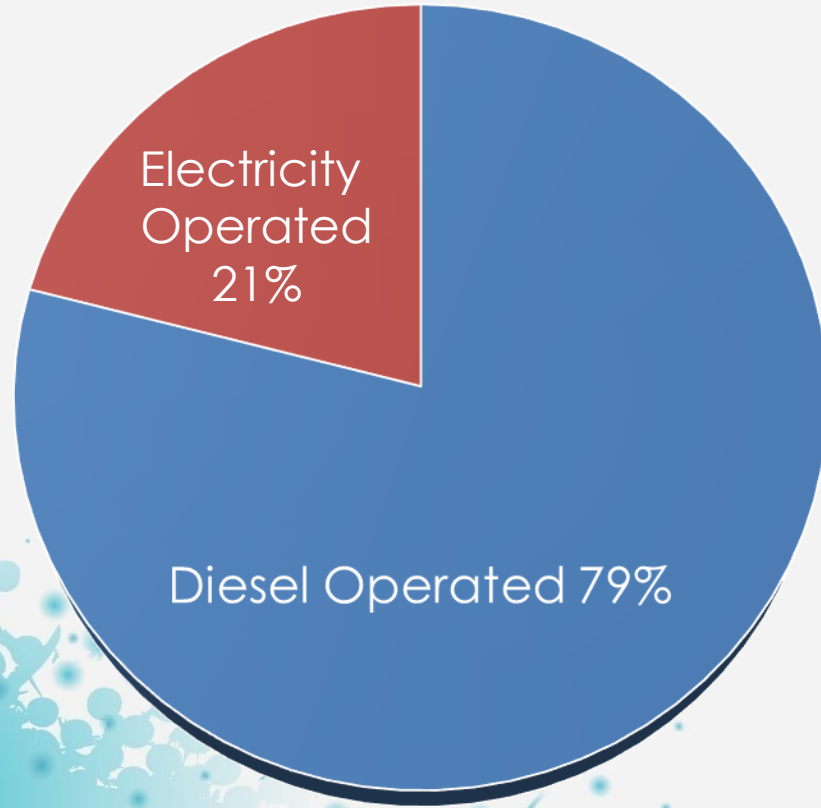
Fulfilling the need for drinkable water

Sl. No.	Organization	Solar Pump Installation
1.	BREB	40 Nos.
2.	IDCOL	923 Nos.
3.	BMDA	105 Nos.
4.	BADC	27 Nos.
5.	Other agencies (e.g. DOE, RDA, DAE, BIRRI, BARI, etc.)	10 Nos.
Total:		1,105 Nos.

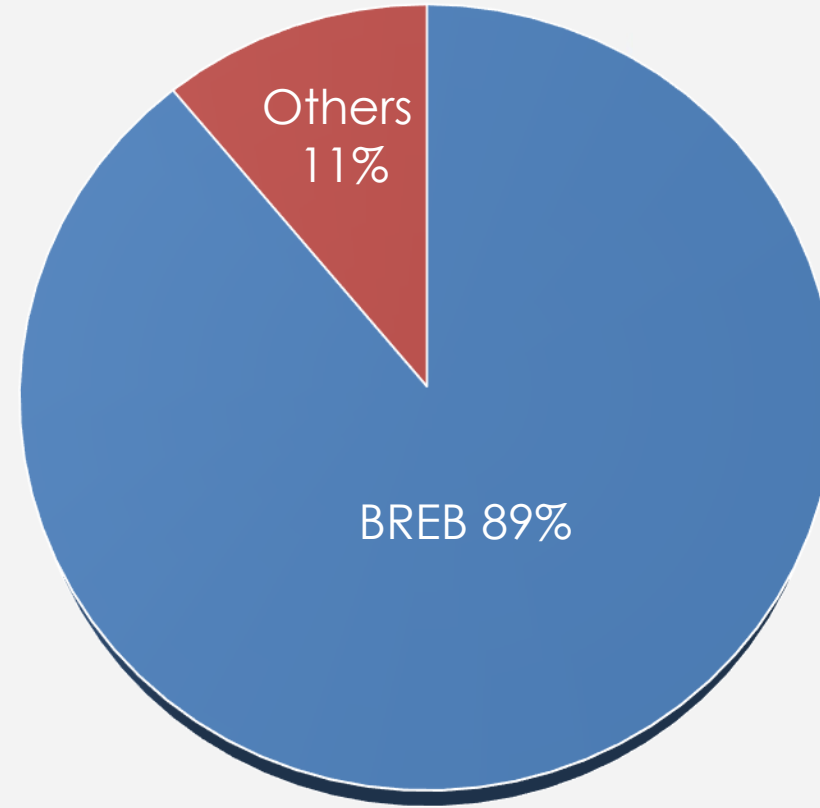


Golden field – wonder of solar irrigation pump

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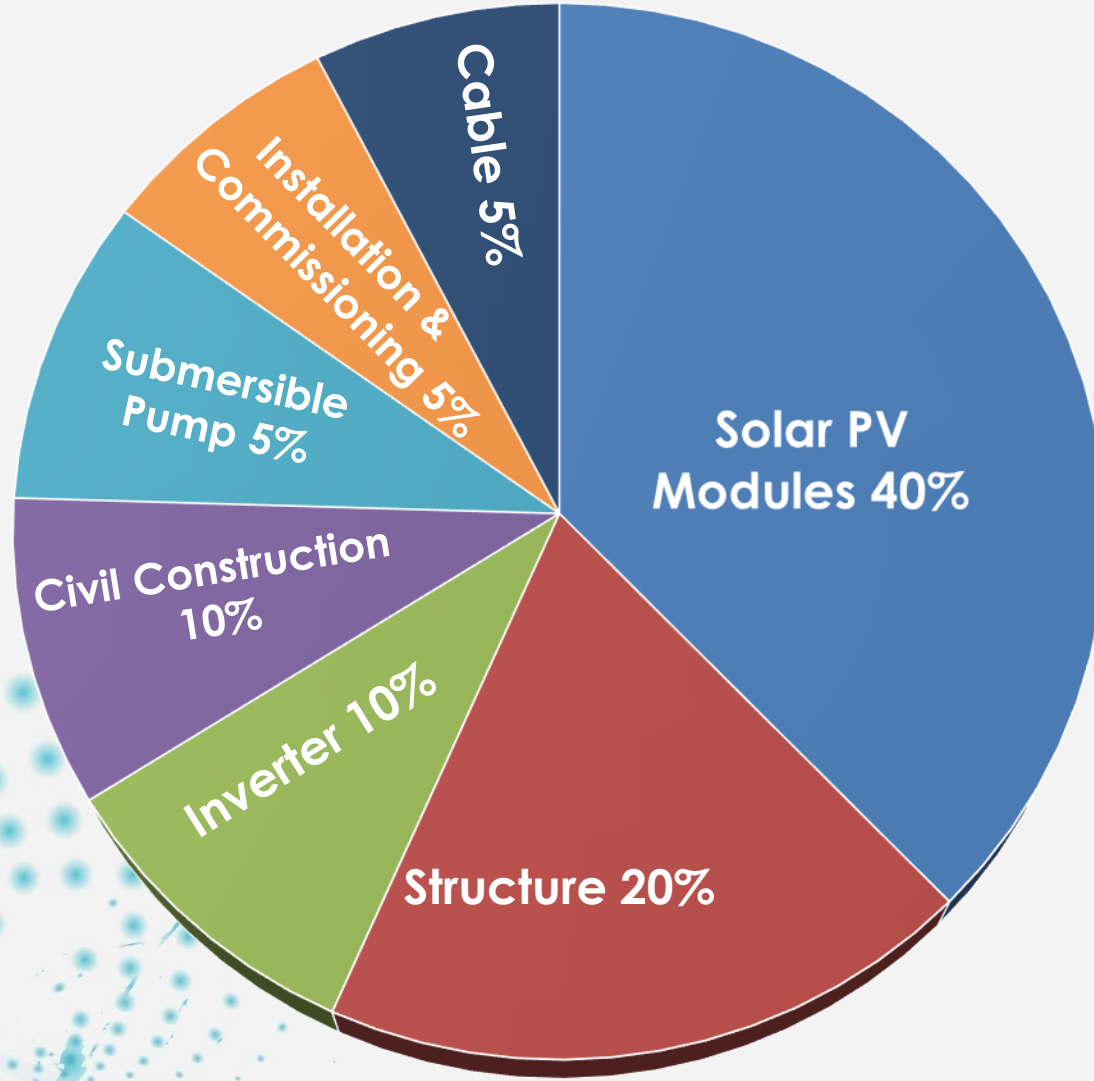


All Irrigation Pumps

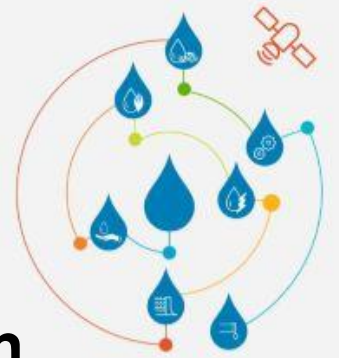


Electricity Operated Pumps

Solar Pump Components



Challenges



- Still relatively high initial investment costs.
- Finance is not accessible or affordable for all.
- Sustainable Business Model Economic viability of solar-irrigation.
- Tariff fixation following project cost and revenue collection.
- Proper site selection based on regional crop pattern, soil properties & water level. .
- Design needs to be fit-for-purpose – e.g. ensuring water delivery during winter morning. Standardization and quality control of products and services.
- Grid feeding mechanism.
- Use of surplus power in non-irrigation season.
- Water and energy management
- Installation of the system, operation and maintenance – optimal operation and maintenance of SPIS requires a certain degree of technical knowledge and skill.
- Long term O&M policy formulation.

“Solar Photovoltaic Pumping for Agricultural Irrigation”



Project Plan

Project Title	Solar Photovoltaic Pumping for Agricultural Irrigation.
Sponsoring Ministry/Division	Ministry of Power, Energy & Mineral Resources/ Power Division
Implementing Agency	Bangladesh Rural Electrification Board (BREB).
Development Partner/ Donor Agency	Asian Development Bank (ADB) [ADB Loan 2769-BAN, Part B (iv)]

Project Financing

Loan	US\$ 20.000 Million [Loan 2769- BAN(iv)]
Grant	US\$ 24.000 Million
GOB	US\$ 3.360 Million
BREB Own Fund	US\$ 0.076 Million



Project Objectives

“Diffusion of solar PV pumping system for agricultural irrigation and reduction of sudden thrust on grid power during irrigation season in project area.”

- ❑ To install 2000 nos. of solar PV irrigation pumping systems in project area.
- ❑ To generate electricity using solar PV systems.
- ❑ To introduce a long term O & M strategies with effective return of investment.

Project Scope

Irrigation System	Unit	Quantity
2.2 KW Irrigation Pumping System	Nos.	490
4.0 KW Irrigation Pumping System	Nos.	530
5.5 KW Irrigation Pumping System	Nos.	500
7.5 HP Irrigation Pumping System	Nos.	320
11 KW Irrigation Pumping System		160
	Total:	2000



Project Phases



□ Project Preparation Phase

- Appointment of Management & Supervision Consultant.
- Detailed Feasibility Study and Finalization of Business Model.
- Social & Environmental Safeguard Policy.
- Identification of Location and Users.
- Public awareness Programs.
- Formation of Farmers' community.
- Agreement between PBS and Community.
- System Design, Specification, BOQ and Bid Document Preparation.

Project Phases



❑ Project Implementation Phase

- **Tendering Process**
- **Installation of Pumps through turn-key solution.**
- **Arrangement for selling of electricity in the locality during off season (no demand of water).**
- **Operation through Farmers' community.**

❑ Project Operation & Maintenance Phase

- **Dedicated O&M set-up at each PBSs.**
- **Service through contractors up to warranty period.**
- **Monitoring and evaluation.**

“Solar Photovoltaic Pumping for Agricultural Irrigation”



Project Location

Sl. No.	Name of PBS
1	Brahmanbaria PBS
2	Bogra
3	Kishoreganj PBS
4	Manikganj PBS
5	Mymensingh PBS-3
6	Naogaon PBS-1
7	Netrokona PBS
8	Rangpur PBS-1
9	Satkhira
10	Thakurgaon PBS

- 10 PBSs are primarily proposed as reference based on the feasibility study conducted by ADB consultant.
- Final site would be selected after consultant's recommendation during project preparation period.

“Solar Photovoltaic Pumping for Agricultural Irrigation”

Business Model



- ❑ GoB fund is assumed 8%, the grant from ADB 50% and loan from ADB 42%.
- ❑ 15% down-payment from the sponsor(s) (farmers' community/ individuals/ entrepreneur/ PBS as sponsor compare with IDCOL model).
- ❑ Therefore, the effective loan amount will be 27% @ 4% rate of interest for 10 years.
- ❑ Until the loan is paid by the sponsors the owner of the project will be the project executing agency i.e. BREB/ PBS.
- ❑ The ownership will be transferred to the ultimate owner of the project i.e. the sponsors.
- ❑ Here also the land leasing contract has been planned for 20 years where the loan period will be expired after 10 years.

Way Out



- ❑ Cooperation and continuous support from ADB and other stakeholders is very crucial for successful implementation, operation and maintenance of the project.
- ❑ Success of this pilot project will encourage large scale implementation of solar irrigation pump projects.

“But Success is optimizing the available technologies, building partnerships to implement solution to challenges.”

“The Best way to change the future is to Create it”

- Peter Drucker



**“Lets Put Our Head & Hands Together
For The Betterment Of Our
Future Generation”**





Thank You

