Impact of Rural Energy on Economic Development

B D Rahmatullah
Chief Engineer
Rural Electrification Board
Bangladesh.

SOUTH ASIA WOMEN IN ENERGY (SAWIE)

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BACKGROUND

- Bangladesh Government attached priority to accelerating the pace of electrification program throughout the country since independence.
- It is a constitutional obligation to provide electric power in the rural areas.
- The rural areas constitute 90% of the country’s total area virtually had no access to electric power & modern energy.
- Government in 1976 launched Rural Electrification Program in Bangladesh.
- It is a replica of US model of Electric Co-operatives.
Rural Energy Consumption

- Per capita electricity consumption 158 KWh
- Development programs facing serious constraints due to unreliable power supply
- Energy agencies have not been operated and managed efficiently
- Tariff has not been set on rational basis
- Measure have not been taken to ensure rational use of energy
- Adequate attention is absent to meet the total energy needs of rural areas
What is the Rural Energy Needs?

More than 75 percent of total population of the country lives in rural areas.

Rural electrification program meets a small portion of total rural energy needs.

- For overall development special attention is required so that energy needs of rural areas for subsistence and productive requirements (e.g. agriculture, industries, transport) are met on a sustainable basis.

- An area based planning methodology will have to be considered to meet the energy needs of different locations.
Bangladesh

- Bangladesh is one of signatories of 191 member countries of the signatories at the 2005 World Summit in Johannesburg.

- It is well conceived that Energy is the vital ingredient in achieving the MDGs.

- The goals & objectives those are declared in NEP of 1996 are tuned in the same frequency as declared by MDGs such as:
  - Achieve primary education
  - Gender equality & empowerment of women
  - Reduction of child & maternal mortality & reduction of disease
  - Ensure sustainable environment.
  - Increase regional/ international co-operation
Basic Objectives of RE Program

- Ensure electricity available for all;
- Ensure reliability and quality supply of electricity;
- Provide electricity at a reasonable and affordable price;
- Enhance poverty alleviation by bringing rural areas under electrification and minimizing of disparity between rural and urban areas.
- Energy expansion shall be used in rural development vis-a-vis integration of energy with rural development.
Ultimate Objective of RE of the Govt. & Merging Paradigms

- To create employment opportunity
- To develop basic rural Industry

ENERGY AND RURAL DEVELOPMENT

- Rural Development in ENERGY Program;
- Energy in RURAL DEVELOPMENT Program.
Formulating Energy Strategies and Policies for Rural Development

This involves two activities:

1. Formulating energy strategies for rural development;

2. Development of strategy and policy options for sustainable energy development.
OBJECTIVES OF RURAL ELECTRIFICATION AND CREATION OF RURAL ELECTRIFICATION BOARD

- To provide infrastructure for rural development;
- To increase irrigation; and
- To achieve political and security objectives

So Rural Electrification Board was created.
COMPOSITION OF THE RE BOARD

Chairman

Member Engineering

Member PBS & Training

Member Finance

Member Administration

Part time Member

BRDB

BADC

BS&CI CO

PDB
Functions of the RE Board

- Prescribe standards for work, equipment, operation, maintenance, procurement and warehousing, personnel etc.
- Receive grants and raise loans
- To establish generation, transmission & distribution system
Functions of the RE Board

- To Take Steps for effective use of electricity giving emphasis on,
  - for creation economic activities
  - development of agriculture
  - Establishment of rural industries
  - Assisting the disadvantaged group of the community
  - For increasing their income and standard of living
Functions of the RE Board

- Optimizing use of resources for maximum socio-economic benefit.
- Prescribing by-laws for Palli Biddyut Samity and determining the policy and manner they will function.
- Research & development for adopting appropriate technology.
## Comparison of commercial statistics between Country and REB

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Indicator</th>
<th>Country</th>
<th>REB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System Loss</td>
<td>21%</td>
<td>12.09%</td>
</tr>
<tr>
<td>2</td>
<td>Collection/Bill Ratio</td>
<td>69%</td>
<td>100+%</td>
</tr>
<tr>
<td>3</td>
<td>Account Receivable</td>
<td>2.92</td>
<td>1.77</td>
</tr>
<tr>
<td>4</td>
<td>Consumer/Staff</td>
<td>90</td>
<td>300</td>
</tr>
</tbody>
</table>
## Category-wise energy consumption (GWh) and number of consumer for the FY 2006-2007

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Consumer Category</th>
<th>Annual Consumption</th>
<th>Consumer connected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MWh</td>
<td>In %</td>
</tr>
<tr>
<td>1</td>
<td>Domestic</td>
<td>3,326,805</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>Commercial</td>
<td>486,295</td>
<td>6.5</td>
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<tr>
<td>3</td>
<td>Industry</td>
<td>2,870,676</td>
<td>37</td>
</tr>
<tr>
<td>4</td>
<td>Irrigation</td>
<td>755,244</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Others</td>
<td>25,000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7,473,020</td>
<td>100</td>
</tr>
</tbody>
</table>
RE Program
Multiple Potentials to Create Multiple Effects

ENERGY SERVICES

- Income & economy
- Entrepreneurial opportunities
- Technology use
- Information & communication
- Environmental improvements
- Energy enterprise
- Rural development
- Food & nutrition
- Gender social equity
- Leisure
- Education & knowledge
- Health & sanitation

Multiple Potentials to Create Multiple Effects
IMPACT OF RURAL ENERGY ON AGRICULTURE

- Number of irrigation connections are about 50% of the total
- Consumption by the irrigation consumers are about 10% of the total
- Reduces production cost
- Increases productivity
- Provides storage facilities
- Diesel engines disturbances have led to the preference for electricity
IMPACT OF RE ON INDUSTRY

- About 38% of the total rural energy used is by the industries.
- Industries do not emerge spontaneously with the introduction of electricity.
- Industrial consumption is a sine-qua-non for the financial viability of the PBSs; no planned efforts have yet been made either by REB or by PBSs.
- Industries can be promoted in rural areas with assistance from REB, the PBSs, RDB, Krishi Bank, Grameen Bank, Bangladesh small & Cottage industries corporation.
- PBSs and rural Bangladesh have potentials of small, medium scale, big cottage industries.
IMPACT OF RE ON INFRASTRUCTURE & OTHERS

- Educational Institution
- Rural Health centre
- Growth centre
- Commercial Centre
- Rural club / Entertainment centre
- Rural linking roads
Operational Performance

- In addition of the phenomenal progress made in creating new facilities,
- RE program in Bangladesh *had* achieved higher operational standards compared to other utilities in this part of the world. While the overall system loss of the 70 PBSs is 13% while some of the PBSs could confine their system loss less then 10 percent.
- Outstanding accounts receivable is only 1.77 months equivalent to billed amount excluding the current month’s billing amount.
- During last FY PBSs average rate of collection was 100+ percent of the billed amount against the total year.
- Probably REB is the only organization in Bangladesh that has no outstanding debt service payment liability for energy purchase including duties & taxes payable to the government.
RE PROGRAM BANGLADESH KEY STATISTICS
(AS ON 30 JUNE 2007)

Launching of RE Program
Rural Electrification Board was established under a Presidential Ordinance on 29 October 1977.

First PBS energized
Dhaka PBS-1 on 2 June 1980.

Number of PBSs organized 70
Number of PBSs commercially operating 70

Number of districts under the program 61
Number of Upa-zilla under the program 414

Number of Villages energized 47,000
Distribution lines constructed 2,35,000 Km

Total number of 33/11 Kv sub-stations around 400
Number of total consumers 75 Lakh

Number of PBS financially Viable 18 Nos. only
A BRIEF COMPARISON BETWEEN URBAN & RURAL DISTRIBUTION

<table>
<thead>
<tr>
<th>Sl No</th>
<th>ITEM</th>
<th>URBAN</th>
<th>RURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line, KM</td>
<td>65,000</td>
<td>2,13,000</td>
</tr>
<tr>
<td>2</td>
<td>Consumer</td>
<td>25 Lakh</td>
<td>75 Lakh</td>
</tr>
<tr>
<td>3</td>
<td>Consumption MKWh</td>
<td>10,000</td>
<td>6,000</td>
</tr>
<tr>
<td></td>
<td>Consumption KWh/Consumer</td>
<td>3800/Year</td>
<td>1045/Year</td>
</tr>
<tr>
<td>6</td>
<td>Consumption /KM/Yr</td>
<td>175 MWh</td>
<td>35 MWh</td>
</tr>
<tr>
<td>7</td>
<td>Investment/ consumer</td>
<td>TK 43000</td>
<td>TK. 28000</td>
</tr>
</tbody>
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The PBSs that are operating with positive margins:

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1 DHAKA PBS-1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2 TANGAIL PBS</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 COMILLA PBS-1</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 MOULVIBAZAR PBS</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 PABNA PBS-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 SIRAJGONJ PBS</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7 NATORE PBS-1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 NATORE PBS-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 FENI PBS</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 DINAJPUR PBS-1</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 CHITTAGONJ PBS-1</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 MADARIPUR PBS</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 NOAKHALI PBS</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 NARSHINGDI PBS-1</td>
<td>12</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15 NARSHINGDI PBS-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 MYMENSHING PBS-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 MUNSHIGONJ PBS</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 DHAKA PBS-2</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>5</td>
<td></td>
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</tbody>
</table>
Energy Consumption Pattern

- Energy consumption for 70 PBS = 85,00,000 Mwh.
- Yearly sale for 10 Top PBSs consuming 2,00,000 MWh+

<table>
<thead>
<tr>
<th>PBS Name</th>
<th>MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhaka PBS-1</td>
<td>7,57,941</td>
</tr>
<tr>
<td>Gazipur PBS</td>
<td>6,71,920</td>
</tr>
<tr>
<td>Narayangonj</td>
<td>7,64,885</td>
</tr>
<tr>
<td>Narshingdi PBS-1</td>
<td>2,29,370</td>
</tr>
<tr>
<td>Serajgonj PBS</td>
<td>2,02,645</td>
</tr>
<tr>
<td>Comilla PBS-1</td>
<td>2,42,077</td>
</tr>
<tr>
<td>Narshingdi PBS-2</td>
<td>2,13,804</td>
</tr>
<tr>
<td>Munshigonj PBS</td>
<td>2,13,556</td>
</tr>
<tr>
<td>Dhaka PBS-2</td>
<td>2,82,820</td>
</tr>
<tr>
<td>Manikgonj PBS</td>
<td>2,40,258</td>
</tr>
</tbody>
</table>

Total for 10 PBS = 38,19,276 MWh
Energy Consumption Pattern

- Estimated Break even sale is around 250,000 MWh
- So here 5 PBS running at positive operating margin
- Top 10 PBS consumption is 38,19,276 MWh

Then what is average sale for the rest 60 PBS?

- Yearly average PBS consumption stands = 78,000 MWh
- Which is far below the break even i.e. 250,000 MWh.

So what is to be done?
Figure: Electricity – GDP trajectories 1973-85

Log [GDP/Capita in 1993 $ USA]

Regression line excluding Bangladesh, Indonesia, Myanmar
Six GIS Base Model PBS. & Grid S/ S Location

Five Grid S/S
33KV Line Network In Six GIS Base Model PBS.

1. Orange Color Box Show Grid S/S Location.
2. Black Color Box Show PDB S/S Location.
3. Pink Color Box Show REB S/S Location.
Generation to 132/33KV Grid S/S Line Network
Generation to 132/33KV Grid S/S Line Network

Grid S/S to 33/11KV Sub_Station Line Network
So Clearly We Are to Give Same Priority on the Following 2(two) Issues:

(a) System Improvement

(b) Power Availability
THANK YOU