

## **REMOTE AREA POWER SUPPLY SYSTEMS (RAPSS)**

**Ibrahim A.S.Al Mohtad**

*Sub Divisional Engineer, System Planning Directorate  
Bangladesh Power Development Board, Dhaka, Bangladesh.*

### **BACKGROUND**

Bangladesh, with a population of about 135 million, has one of the lowest levels of per capita consumption of electricity (151 kWh per Capita per Annum in 2005). Less than 33% of the total population have access to power. In rural Bangladesh, the figure is about 10%, and in coastal and remote areas, it could be as low as 3%. Given the current rates of growth of electrification, and population, the rate of electricity penetration in rural areas (about 200,000 new connections a year) could be less than 1% per year. At this rate, access to power supply through the national grid for all Bangladeshis may take between 50 to 100 years. In remote areas, specially the coastal areas, with an estimated population of about 10 million, the inhabitants are likely to receive power well after fifty years. Loss of economic opportunities due to lack of power in these remote areas would thus be enormous. For the last 10 years, electricity growth rate was 7.5% p.a in line with the GDP growth rate around 5%. To alleviate poverty, Bangladesh requires an economic growth rate of more than 7%. To achieve 7% growth rate, availability and accessibility of electricity is the prime requirement. Shortage and unreliable power supply has constrained economic growth.

The Remote Area Power Supply Systems (RAPSS) project is designed to redress this situation.

### **LONG TERM GOALS FOR THE POWER SECTOR OF BANGLADESH**

- To make electricity available for all by the year 2020
- To ensure reliable and quality supply of electricity
- To provide electricity at a reasonable and affordable price

### **PRESENT STATUS OF POWER SECTOR**

#### Generation

Installed Capacity (Total) : 5,178 MW

BPDB : 3,888 MW

IPP : 1,290 MW

#### Generation Capacity (By Fuel Type)

Hydro : 4.90%

Gas : 84.50%

Oil : 10.60%

Maximum Generation so far : 3782 MW on 30/10/05

Per Capita Electricity Generation : 171 KWh/anum

Access to Electricity : 33%

## **POWER SECTOR DEVELOPMENT BY 2025**

Power Sector Master Plan-2005 has been completed by June,2006. The forecasted period of this study ranges from 2005 to 2025. The main outcomes of this study are:

- Electricity demand is increasing very fast (about 8.2 % per year) .
- To supply expected demand, 16000 MW generation additions will be required from 2006 to 2025.
- Transmission and distribution facilities will have to be developed for evacuation and distribution of power.

## **KEY PROBLEMS IN POWER DISTRIBUTION**

The problems of the existing power system are

- High System Loss
- Large amount of accounts receivables
- Existing tariff rates & structure affecting the financial viability of the distribution entity
- Lack of appropriate cost and asset accounting system
- Acute scarcity of resources from national budget for further investment in distribution
- Absence of clear organizational goals, adequate financial and commercial autonomy and lack of adequate incentive
- To address the above problem, Distribution sub-sector is under reform process focused on Distribution Expansion to Cover Whole Area Of Bangladesh

Existing Distribution Structure Ob Bangladesh

### Urban Distribution

- Capital City – 2 or 3 Distribution Companies- DESA, DESCO, REB
- Other City and Towns – 4 to 5 Distribution Companies: BPDB, REB, WZPDCo.
- Urban distribution will expand commercially

### Rural Distribution

Rural Electrification through Palli Bidyut Samities will continue  
Rural Distribution needs subsidy at the initial stage

### Remote Isolated Area Distribution

RAPSS Program is involving through Private Sector Participation and emphasizing renewable energy solutions.

Remote Area without grid accessibility

- Islands
- Haors
- Remote Hills and Forests

At present, Small diesel power stations supplies power to a small number of consumers.  
Power supply at those places is limited to only 4-5 hrs at evening.

## **OBJECTIVE OF RAPSS**

Since *no power* may truly be the most costly power in terms of opportunity loss, the objective of the proposed RAPSS project is to provide faster access to power in the remote islands and coastal areas of Bangladesh through private sector investments in integrated rural power generation and distribution facilities

## **RAPSS AND ITS BENEFIT**

The RAPSS targets are to achieve maximum electrification. The targets for some areas will be much higher than others, depending on the commercial viability. Some areas are much richer than others, some have a notably higher potential for commercial and industrial loads that can afford to pay more. More or less the benefits expected are:

- 75% rural areas are unconnected after more than 36 years of independence
- Targeted for remote, underdeveloped areas, mostly poor
- Freedom from capital constraints
- Freedom from uniform tariff of BPDB or REB
- Better control on output through output based subsidies
- Clear accountability of the private sector especially where independent of national grid
- Technical Standards Matched for Local Needs

## **RAPSS FEATURES AND POLICIES**

In early 1996, Government of Bangladesh announced the present National Energy Policy, which allows private sector participation in the development of the Power Sector both from local and expertise entrepreneurs. Possible modes of participation are (i) Generation (ii) Distribution (iii) Contracting of Services and (iv) Wheeling arrangements. In 1998, a policy guideline for small power plant in the private sector was announced by Power Cell stating that the GOB has decided to allow private sector investors to establish Small Power Plant (SPP) on a fast track basis for generation of electricity for their own use and to sell the surplus to other users on a BOO basis.. This envisaged that private sector investors/sponsors would come forward to establish SPPs of 1-10 MW in size, on a fast track basis. The sponsor could directly get into contracts with customers for sale of power on terms mutually agreed upon. The sponsor could also build local distribution systems for supply of electricity to contracted customers. A good number of potential entrepreneurs showed interest in such an idea but substantial progress has not been made so far. In 1999 the concept of RAPSS was initiated to provide faster access to power in remote areas with the following features:

- Small power generation and distribution projects on the basis of a limited-period concession from the Government;
- Allowable within the framework of the existing policies;
- To be located in remote rural and coastal areas away from the grid;
- For On-Grid: Tariff almost same as REB
- For Off-Grid: No tariff regulation until Conversion Date or regulated with Buy down

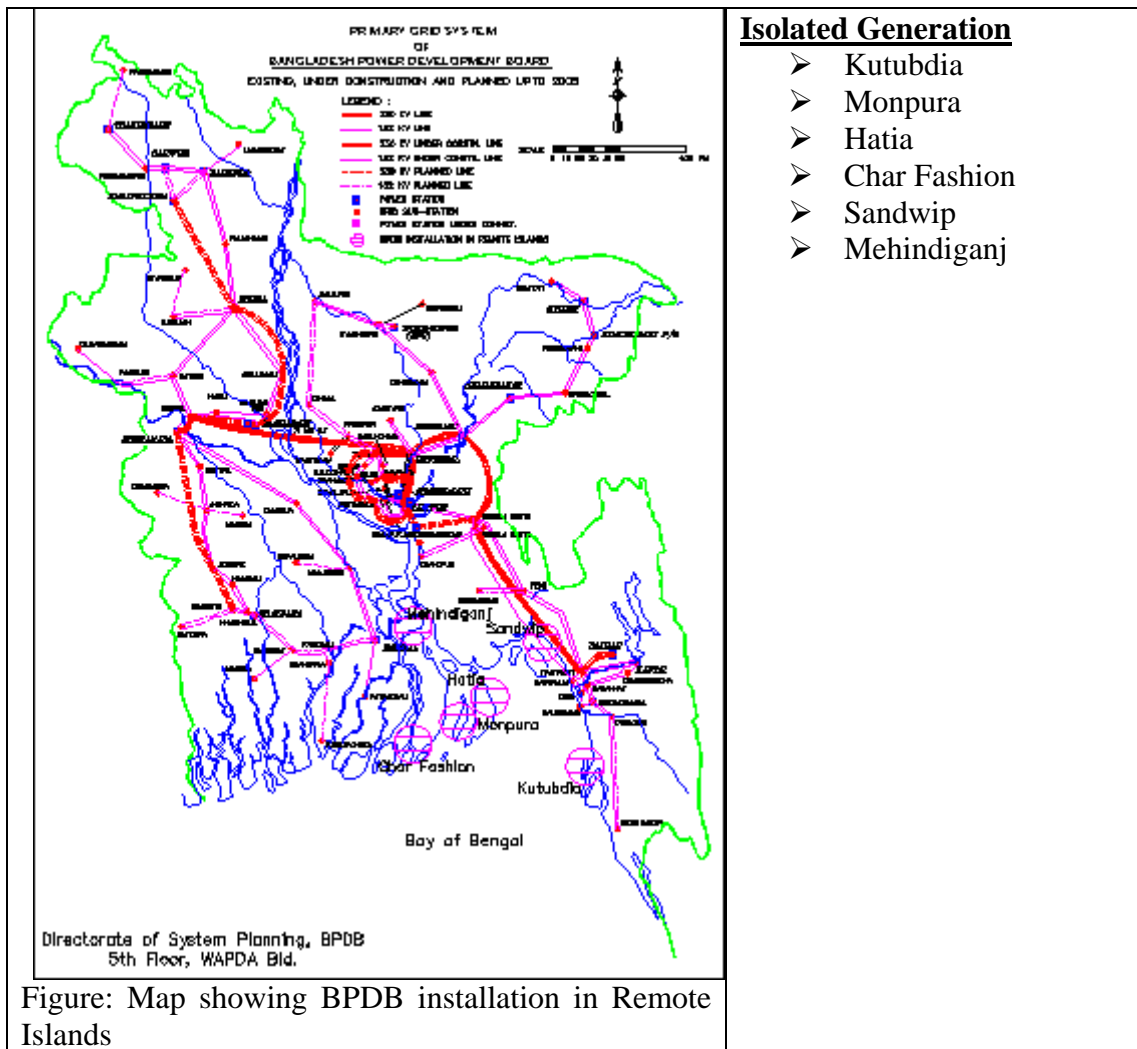


Figure: Map showing BPDB installation in Remote Islands

## OFF-GRID RAPSS CONCEPT

The legal framework for RAPSS projects together with assistance to the project by such measures as exemption of fuel from duty and tax holidays will be reviewed with the GOB. That means Off-grid schemes may need subsidy, both to offset fuel tax and toward overall costs with the following concept:

- ❖ Utilization of Private Capital for Rural Electrification
- ❖ Remote Area Power Supply System Outside the National Grid
- ❖ Generation Supply to be Installed
- ❖ Needs Sub-transmission and Distribution
- ❖ Consumer Base to be Defined
- ❖ Defined Concession Area
- ❖ Retail Prices not Subject to Regulation or Regulation with Buy down or Output Based Aid
- ❖ Allows Rapid Load Growth in Distant Corners, making future transmission lines viable

## **ON-GRID RAPSS CONCEPT**

For on grid places the entrepreneur will purchase power from PDB on same terms as REB or Arrange supply direct and wheel through PGCB/PDB/REB systems. In either case: any price adjustment will pass through immediately to the retail tariffs. REB is dependent upon scarce government funds for their electricity in distribution. This is not sufficient to meet the government objective of electricity to all by the year 2020. RAPSS will bring in private capital for a rapid roll-out of electrification, unconstrained by capital availability. On-grid RAPSS schemes should generally not require subsidy based of REB's retail prices and BPDB's bulk power supply tariff with the following main features:

- Utilization of Private Capital for Rural Electrification
- An evolution from the successful PBS model
- Bulk Power Purchase from Grid
- Existing Sub-transmission and Distribution
- Existing Consumer Base
- Defined Concession Area
- Retail Prices Subject to Regulation

## **POTENTIAL BENEFITS**

We engaged two consortiums of consultants to prepare pre-feasibility studies. They have judged that On-Grid RAPSS may generally be viable based on REB's tariffs and BPDB's bulk power price the following benefits:

- ❖ Some of the remote locations may have significant economic potential (e.g., fishing, agro-processing, etc.) that cannot flourish without power.
- ❖ With access to power, the economic multiplier effect will alleviate poverty in the area.
- ❖ Average household's capability to pay for power will increase
- ❖ Significant improvement in quality of life.

## **DISTRIBUTION AGREEMENT OF LICENSE**

The RAPSS targets are to achieve maximum electrification. The targets for some areas will be much higher than others, depending on the commercial viability. Some areas are much richer than others, some have a notably higher potential for commercial and industrial loads that can afford to pay more. Subject to a minimum set on an area by area basis, the connection targets will be determined by completing bidding. The companies seeking to be licensee will offer the number of households that they are willing to connect; the one with the highest offer will be awarded the license. The winning bidder should provide performance security. A scheme is being considered that would levy a penalty for each connection below the agreed rate, with the possibility of getting that penalty back when cumulative performance is back on schedule. It is the duty of the operator to attract customers, and to offer supply and connections in a way that is persuasive with the following regulation and rules;

- A franchise area given to a sponsor for 10 to 20 years or perhaps longer.
- RAPS to be regulated under the Bangladesh Electricity Regulatory Commission Act 2003
- Electricity price not regulated by GOB or alternatively, regulation with buy down.
- At the end of Term, wires and energy functions separation.
- Other energy traders/companies may compete through the wires company.
- Concession companies will abide by the country's technical, environmental and safety standards.

### **Investor's role**

- Take over the existing power fixed assets.
- Development of Power distribution system in Concession Area.
- Connection of domestic customers to achieve guaranteed minimum number of connections.
- Arrange bulk supply of electricity.
- Supply electricity to customers in accordance with agreed performance standards.
- Run it as a business
- Existing assets can be paid for in installments over 20 years
- Investor provides financial security on this
- Other investment to be paid from investor's own funds, cash flow, local lending sources, at investor's discretion
- Medium term loans normally available from commercial banks

### **IDEAL ENTREPRENEUR/INVESTOR FOR RAPSS**

Based on the above features an ideal Entrepreneur/Investor for RAPSS may be:

- A successful local businessman who needs power for his own business, and so by generating power on a larger scale, and distributing the surplus power, can keep the cost of power for his own use down;
- A local businessman who wants to diversify his/her business;
- A successful urban businessman who has roots in the specific remote area under consideration, and who is willing to collaborate with a local businessman/ entrepreneur.

### **COMMERCIAL OBJECTIVE**

The entrepreneurs will enjoy 15 years tax holiday freedom from VAT and customs on new assets and exemption from stamp duty on the following commercial objectives:

- The project should be designed so that it can work commercially
- It should have profit potential Expansion orientation (incentive)
- Licensee should undertake active role to get new customers
- Pricing should be broadly similar to REB (Special financing applicable to REB is not available for RAPSS on-grid)

## RAPSS FUND

It is proposed that the funds received from the sale of existing assets to the On-Grid RAPSS operator be transferred to a fund, to be called the RAPSS Fund. The purpose of the RAPSS fund will be to provide subsidy in Off-Grid RAPSS projects. The RAPSS Fund will also seek grant support from bilateral and multilateral donors.

At the end of the license, the assets must be available for transfer to a new licensee at the option of the Regulator, but continuity of supply is essential.

At the end of the full term of the concession, depreciated replacement value would be used.

The new licensee would be the buyer, and would have raise own finance. There will be no obligation to accept payment by installments.

## PROGRESS MADE SO FAR

Memorandum of Agreement Signed between IIFC, IFC and ERD (Ministry of Finance) to develop RAPSS in 14 Districts. Of them Development Service Agreement (DSA) signed with Ministry for four locations:

- ✓ Hatibandha and Patgram - on grid
- ✓ Debhata and Assasuni - on grid
- ✓ Kutubdia island - off grid
- ✓ Sandwip island - off grid

Feasibility studies for two off grid and two on grid Completed and now on offer to investors

## PROJECT AWARD SCHEDULE

The Power Division intends to award the Project and sign the Implementation Agreement with the selected tenderer as quickly as possible, in accordance with the schedule in Table below. However, the Power Division reserves the right to modify the schedule as necessary, and will notify immediately all relevant tenderers at the time of such modification.

Task No	Activity	Start Date	Completion Date	No of Days	Cumulative Days
1	Issuance of IFT	12 Jun/2006	-	0	0
2	Pre-tender Conference	12 Jul/2006	-	30	31
3	Time to prepare tenders	-	10 Sep/2006	60	91
4	Deadline for Submission of Tenders	-	10 Sep/2006		91
5	Evaluation of Tenders	11 Sep/2006	10 Oct/2006	30	121
6	Approval of Tenders Evaluation Report	11 Oct/2006	9 Nov/2006	30	151
7	Issuance of Letter of Intent	10 Nov/2006	14 Nov/2006	5	156
8	Finalization of Agreements	15 Nov/2006	14 Dec/2006	30	186
9	Vetting and Approval on Agreements	15 Dec/2006	13 Jan/2007	30	216
10	Issuance of License and Signing of Agreement	14 Jan/2007	19 Jan/2007	5	222

## **CONCLUSIONS**

The present two tariff levels structure of BPDB and REB make it difficult to supply electricity to areas where the cost of electricity supply is high. To meet government goals and economic emulsification, full and rapid electrification in Bangladesh, private sector participation is required through RAPSS concessions. Government of Bangladesh is fully committed to the RAPSS Program. Innovative financing mechanisms are needed to keep tariffs at affordable levels for the poor. RAPSS will make Electricity Available in remote area through the private sector participation.

## **REFERENCES**

1. Infrastructure Investment Facilitation Center "Remote Area Power Supply Systems (RAPSS), The Project Concept and a Framework for Project Development and Facilitation Work," Investment Promotion Workshop, Sheraton Hotel, Dhaka, 13 October 2003.
2. Atos Consulting "RAPSS -Kutubdia Upazila Pre Feasibility Study," Draft -23 May 2004 ,.
3. Power Cell, Power Division, Ministry of Power, Energy and Mineral Resources "Renewable Energy Policy (Final Draft)" November-2005
4. Nazrul Islam, Executive Director & Chief Executive Officer, IIFC Dhaka, " The RAPSS Concept for Rural Electricity Supply, A framework for Implementation and Operation" Investment Promotion Workshop, Sheraton Hotel, Dhaka, 13 October 2003.