A Pilot Project on Capacity Building on Electricity Reforms In Bangladesh, India and Nepal (RESA Project)

TERRITORIAL TRAINING MANUAL ON POWER SECTOR REFORMS IN BANLADESH

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Chapter 1
Introduction

Electricity is considered as the most versatile and civilised form of energy. Because of environment friendly in nature, it is most preferred energy source at the consumer ends. Its alternative uses in order to fulfil basic human needs such as lighting, heating, cooling etc. it is also treated as a necessity of modern life. It is used as a basic input in production process in agricultural, commercial and industrial sectors. Therefore, it invites wide attentions on part of all sections of society for un-interrupted service delivery at affordable prices.

It is one of the important factors responsible for economic shape of a country. Low availability of electricity adversely affects the economic as well social development of a country. Recognising its importance, various international agencies such as United Nations Development Programme (UNDP) has given due weight to *per capita electricity consumption* in concluding *Human Development Reports (HDR).* Therefore, most of the nations have started to pay due attentions to increase the availability of electricity. In this process, they have taken reforms initiatives in the power sector. Before going into discussion on reforms, it is desirable to introduce some of the important characteristics of electricity supply that isolate it from other services/industries.

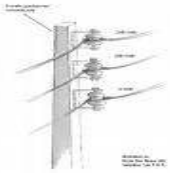
Electricity Supply Industry

There are three distinct features of the electricity in comparison to other services that requires the policy makers, regulators, producers as well as consumers to treat it in a different way. These are:-

1. Continuous Network Requirement: It requires that production as well consumption points are continuously connected. From production to consumption points, on the industry side there are three activities-generation, transmission and distribution.

Figure 1: Flow of electricity from generation point to consumption point




Generation **Transmission** **Distribution** **Consumption**

2. Non-storable output: another important feature is non-storability of output. It is not feasible to store the output at large scale. Suppliers are required to match the supply to the demand at the very point of time. At the same time, if consumption does not take place at very moment, electricity cannot be stored for future use. There are other industries such as telecommunications (wire lines), water and gas-pipelines requiring a network for supply of service. However, non-storability is not an issue in planning the service in these utilities as in case of electricity.

3. Demand remains never constant: The demand for electricity never (hardly) remains constant. It varies across the different months of year and hours of a day. There are well-defined reasons/justifications for these (wide) variations in demand. For example, in a typical city, the demand for electricity for lighting and heating/cooling is expected to be higher in the evening hours. Like this, the demand in the summer or winter months is likely to be higher than the normal months of a year. These variations in the demand impose a challenge on the suppliers to make appropriate adjustment on the supply side to match the supply with demand.

All the above stated characteristics provides strong basis to consider the electricity supply industry as a natural monopoly. Consequently, in most of the countries of the world, it was designed in a monopolistic structure. There are certain advantages of keeping the industry under monopoly.

Economies of scale and Scope

It is possible to exploit the economics of scale and scope. Economies of scale are resulted from larger volume of output or size of the plants/firm. It is because of there are certain fixed costs inherent in the production process. By producing larger amount of production, per unit cost especially the fixed component would be reduced. For example, the cost of installing Pollution Control Equipment is INR 10,000 per year. The cost of pollution control is INR 2.00 for a firm producing 5000 units per year. If the firm is able to produce 10, 000 units in a year, this part of the cost must be INR 1.00. Similar justification may be given for other fixed costs such lump sump tax, insurance, safety equipments, vehicles, management and regulatory cost. Even in the current scenario, the economics of scale are highly relevant. In case of India, where Ultra Mega Power Plants (UMPP) each having a size of 4000 MW are being installed to exploit the economics of scale.

Economics of Scale results when two or more associated economic activities are completed under a single operational system. For example, if a shoo-making companies also produce raw lather with it instead of purchasing it from outside. There are certain advantages that result from this vertical integration.

Historically, most of the utilities were designed in an integrated system to reap out the benefited resulted from economics of scale and scope. For example, in India State Electricity Boards (SEBs) were created in an integrated system combining three major functions-generation, transmission and distribution at the state level. However, in the recent time most of the integrated utilities have been unbundled all over the world. It has been assumed that it will facilitate competition in the sectors. The most common model of reforms in electricity sector includes establishment of electricity regulatory agency, unbundling and privatisation of the generation, transmission and distribution business.

Electricity Reforms in Bangladesh

Bangladesh has set the goal of providing access to affordable and reliable electricity to all citizens by the year 2020. Given the current coverage of 43 percent households and one of the lowest per capita electricity consumption in the world at 165 kWh, the goal appears to be rather ambitious. Moreover, the recent progress in the sector makes the proposition even more difficult. Surely the pace of the power sector development has to be accelerated to a great extent if the country wants to achieve the goal.

Before the Independence of Bangladesh, in the then East Pakistan, there was a system of private sector generation and distribution in a few urban areas. But during latter part of the Pakistan period and subsequently in Bangladesh this changed. The State took over

the responsibility of all the three major functions of electricity supply and integrated them into one state monopoly, the erstwhile Water and Power Development Authority (WAPDA) in Pakistan period which later metamorphosed into the Bangladesh Power Development Board (BPDB) (Asaduzzaman 2006).

The BPDB has been in charge of generation, transmission, and distribution of electricity. These functions are technically separable and separate. As a result many of the technical management issues are also very different although they need to be seamlessly integrated for a smooth supply of electricity to the consumers. BPDB's situation was not unique. State monopolies in power supply from generation to distribution had been the vogue practically all over the world. The organisational structure of the electricity sector in Bangladesh around the 1990s thus could be characterised by a vertically integrated system with the Power Division of the Ministry of Power, Energy and Mineral Resources at the apex with BPDB in charge of all generation, transmission and distribution with one exception (Asaduzzaman 2006).

Although not in a planned and comprehensive form, reforms in the electricity sector of Bangladesh started back in 1977 with the creation of the Rural Electrification Board (REB), which is claimed to be one of the major successes in the sector. Under the REB, 70 large cooperatives were established countrywide through which electricity was supplied to 7 million consumers out of the country's 9.7 million up to 2006. The interventions of the REB also had significant positive impact on poverty reduction and social benefits of the rural people.

Since the early 1990s, unbundling of the electricity sector started. The first attempt was to create the Dhaka Electricity Supply Authority (DESA) to manage the supply of electricity in the capital city in a more efficient way. Unfortunately, the attempt did not perform as expected.

Officially, reforms in the power sector o the country started in 1993 when a high power inter-ministerial committee on Power Sector Reform in Bangladesh (PSRB) was constituted. The committee came up with three major recommendations: (one) unbundling of the sector according to functional lines, (two) corporatization of sector entities and (three) establishment of an independent regulatory commission. The Power Cell was created under the Energy Ministry in 1995 to drive power sector reforms and to promote private power development. Two companies were created in 1996: the Power Grid Company of Bangladesh Limited (PGCB) and the Dhaka Electricity Supply Company Limited (DESCO).

A number of policies were also adopted in the last 10-12 years. The National Energy Policy was adopted in 1996 with emphasis on sector unbundling, private sector participation and establishment of an Energy Regulatory Commission. In the same year, the Private Sector Power Generation Policy of Bangladesh was adopted. Two years later the Policy Guidelines for Small Power Plants (SPP) was approved. Further, Vision Statement and Policy Statement on Power Sector Reforms was declared in June 2000. In 2002, the Ashuganj Power Station, one of the major power generating plants in the country, was corporatized.

In 2003, the very important Energy Regulatory Commission Act 2003 was enacted. In the same year two more important policy measures were implemented: creation of the West Zone Power Distribution Company (WZPDC) and establishment of Electricity Generation Company of Bangladesh (EGCB). Following the Act in 2003, the Bangladesh Energy Regulatory Commission was established next year. In the same

year, the Bangladesh Power Development Board (BPDB) was approved to become a holding company. In 2006, yet another company named Dhaka Power Distribution Company Limited (DPDC) was incorporated. In the same year, a policy guideline for power purchase from captive power plants (CPPs) was prepared.

The processes of reforms in electricity in Bangladesh so far have been highly bureaucratic and devoid of consumer participation and consultation. The reforms initiatives have created almost no scope for consultation with the consumers or their participation. The lack of political will towards effective and participatory reforms of the sector has also been visible.

A perception survey was undertaken in 13 selected districts: Gaibandha, Nawabganj, Rajshahi, Sirajganj, Gazipur, Meherpur, Jessore, Khulna, Barisal, Bhola, Comilla, Khagrachhari, Cox's Bazar to gauge the level of understanding and awareness of consumers/users on the scope for their engagement in the process of electricity reforms.

Simulation Exercise

Participants are asked to write on the VIPP cards one point on each of the two following topics (two different coloured cards for the two different points):

1. One very important reform (in the participant's opinion) undertaken so far in the electricity sector of Bangladesh.
2. One very important reform that should be undertaken to improve the electricity sector.

The cards are put on a board and clustered according to similarity of responses. An open discussion on the responses is held.

ELECTRICITY REFORMS IN BANGLADESH

Reform Objectives

GOB issued its Vision and Policy Statement on Power Sector Reforms in February, 2000, with the following objectives (GOB 2007):

1. Bringing the entire country under electricity service by the year 2020 in phases.
2. Making the power sector financially viable and able to facilitate economic growth
3. Increasing the sector's efficiency
4. Introducing new corporate culture in the power sector entities
5. Improving the reliability and quality of electricity supply
6. Using natural gas as the primary fuel for electricity generation
7. Increasing private sector participation to mobilise finance.
8. Ensuring reasonable and affordable price for electricity by pursuing least cost options.
9. Promoting competition among various entities

Components of Reform

The principal components of the reform programme have been envisaged as follows (GOB 2007):

1. Segregation of power generation, transmission and distribution functions into separate services and creation of BPDB holding company as an apex body where generation, transmission and distribution operating companies will be the subsidiaries of the holding company.
2. Corporatization and commercialisation of emerging power sector entities.
3. Effective regulation under BERC for power and gas.
4. Private sector participation and private-public partnership in power sector.
5. Financial Restructuring and Recovery Plan for the sector.
6. Introduction of cost reflective tariff for financial viability of the utilities and promoting efficient use of electricity.
7. Development of Demand Side Management (DSM) including energy efficiency measures to conserve energy.
8. Creation of appropriate framework and institution to facilitate the development of alternative/renewable energy resources.
9. Utilization of captive power potential of the country through appropriate policy framework.
10. Capacity building and HRD for sector entities and corporatized bodies.

Present Structure of the Power Sector upon Reform

The reform process of the power sector is not yet complete. Particularly corporatization of various entities under BPDB including itself is on-going, albeit, slowly. So far under these reforms, the electricity sector is characterized, at present, by the following (Asaduzzaman 2006):

i. generation, transmission and distribution have been separated from each other;
ii. private sector participation in generation has been allowed;
iii. state enterprises have been corporatized mainly in the distribution part but to some extent also in the field of generation while some others have been made into private companies but owned by BPDB
iv. BPDB is the owner of all corporatized and decentarlized parts of the erstwhile state-owned sub-systems and acts as the single buyer of electricity from both state and private generators;
v. an energy regulatory commission has been put in place which has the mandate of overseeing the electricity sector as well.

Chapter II
Decision-making process

In the pre-reforms, power utilities were operated under government ownership and control in most of the countries. Apart from the policy decisions, the respective government were reporting interfering into day-to-day operational matters of the utilities. It led to inefficient and unprofessional decision-making process. Most of the decisions taken on key issues such as tariff, subsidy, investment, and recruitments were politically motivated. That further resulted into poor commercial outlook of the sector and unsatisfactory quality of service.

One of the main objectives of creating independent regulatory bodies is to insulate the decisions-making process from political interference. The decisions should be taken is a transparent manner by professional body rather than political parties. There are three basic requirements of a good process

- Transparency
- Accountability
- Public Participation

A decisions making process is said to be transparent when it is open for all stakeholders. The process to be followed should be pre-defined. For example, in India all ERCs have issued Conduct of Business Regulation (CBR) to ensure transparency in the decision-making process. How Commission will conduct public hearings and who will participate in the hearings, have been specified in the CBR.

Another important feature requiring that regulators be accountable to the decisions made by them. If any of the stakeholders/involved parties is aggrieved by the decisions, law should allow them to challenge the decisions before the higher authority such as appellate authority or court of law. In India, Appellate Tribunal for Electricity has been constituted to hear the appeals against the decisions of ERCs. Further, ERC are held accountable to the Act as well as National Electricity Policy 2005. ERCs are guided by certain policy guidelines in the process of making decisions.

Public participation is very important issues especially when decision-making authority is an independent agency. Law requires the regulatory bodies to listen consumer views before passing the decision. Effective public participation also helps regulators in passing fair decision. At the same time, it ensures protection of consumer interest. Unless consumers participate adequately in the process, their interest is unprotected in the sector. The typical decision-making process followed by various ERC in India is given here.

Step I: Preparation of the draft proposal- a draft proposal on important issues such as Annual Revenue Requirement (ARR), tariff application, quality of service standards etc. is prepared by respective electricity utilities.
Step II: Submission of the proposal- it is submitted to the regulatory commission before the due date. For example in case of ARR or tariff application, it should be filed to the regulatory authority 3 to 4 months before the starting of financial year. It is required to ensure that decision is passed before the start of new financial year.

Step III: Issuance of Public Notice- public notice giving salient features of the proposal are published in newspaper inviting public comments. The information about the relevant documents with respective prices if any is also given.

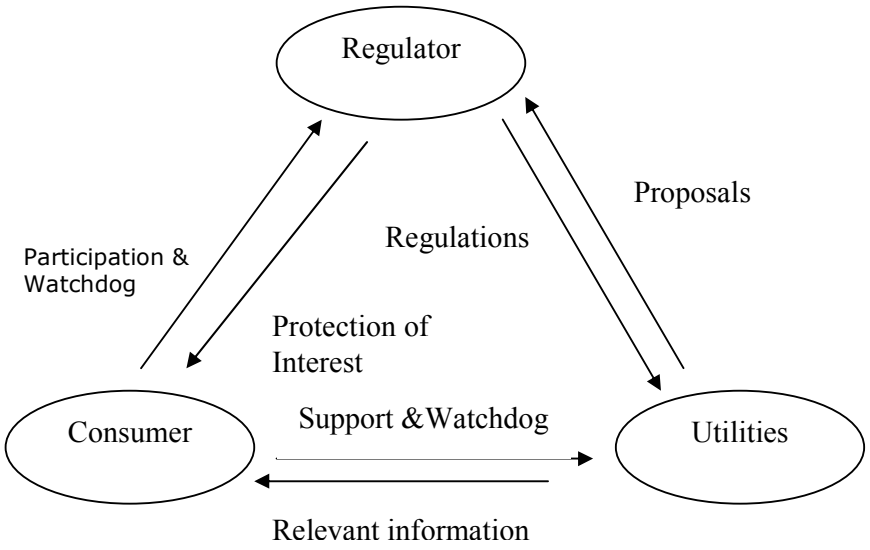
Step IV: Response to the public Comments- the respective licensee/company is required to respond to the comments received on behalf of consumers/stakeholders.

Step V: Public Hearings- the respective regulatory commission conducts public hearing. Consumers are allowed to participate in the open house discussion. Apart from the stakeholders who have submitted written comments, other also may participate in the hearings.

Step VI: Decision on the proposal- the commission takes into account views of all stakeholders while processing the decision. Sometime, an interim order is issues to seek further comments/views of the stakeholders in order to make the decision more acceptable.

As it is shown in the diagram the consumers have important role to play in the decision-making process. They act as a watchdog on the regulatory institutions as well as utilities.

Diagram 1: Regulatory Decision Making Process



After its constitution in 2000, RERC has issued number of orders including tariff orders for the generation, transmission and distribution companies for the respective years. All the orders were issued after having due consultation with consumers. However, public participation in most of the cases was ineffective. Steps should be taken by RERC to increase public participation in the public hearings.

Chapter III
Electricity Tariff Some Issues

Tariff is a schedule of prices for various consumer categories. Electricity supply like other commodities/services imposes certain cost on the suppler. This cost must recovered from the beneficiaries to sustain the supply in future. Earlier, the respective government took the decision on consumer tariff. Now, it is the independent regulatory body that fix the tariff payable.

The decision on tariff is a complex issue. It requires the regulator to make a balance among various interests conflicting in nature. Certainly, tariff results as a cost for end-users, therefore, seeking for a lower tariff. Higher tariff may result into loss of consumer welfare. On the other hand, un-reasonably lower tariff may leave the supplier with deficit revenue and lead to poor quality of service. However there are certain principles/objectives that need to be followed while determining tariff for end users.

Principle of Economic Efficiency: Economic efficiency implies that the cost of supply is minimum given the level of technology. Tariff should be a signal to utilities forcing them to ensure economic efficiency in the sector. No cost of inefficiency on part of the supplier should be imposed on the consumer.

Principle of Adequacy: Approved tariff should be adequate in order to recover all reasonable cost of production. All expenses on part of power purchase, manpower, operation& maintenance, depreciation, acceptable energy losses and reasonable return should be met out of the tariff. If tariff approved is too low, it would not only affect the present financial performance of the company but also hurt level of future investment in the sector.

Principle of Economy: Energy is a scare economic resource. On the consumption side, it should be utilised in a most efficient manner. Tariff should also a signal for the consumer for making efficient use. It will help in saving energy and further reducing the cost of supply. It requires progressive tariff structure i. e. higher tariff for higher amount of consumption.

Principle of Affordability: Affordability implies that existing tariff is not acting as a barrier in fulfilling the basic human needs such as lighting, cooling etc. If certain class of consumers is unable to attain the minimum required consumption at the existing price, some concession in the tariff is desirable. It may be done by cross-subsidy or direct subsidy by the government. Cross-subsidy is the subsidy given to one consumer category at the cost of another categories. But again, it requires proper identification of the target beneficiaries to avoid misuse of subsidy.

SIMULATION EXERCISE

Participating in the tariff making- process of Electricity Regulatory Commission

The objective of this exercise is to provide a basic idea to the trainees about the tariff-making process and role of consumers in protecting their interest. This is divided into two parts, as given below:-

1. Reacting to the to Public Notice

This is the public notice published by Haryana Electricity Regulatory Commission to invite comments on the Annual Revenue Requirements (ARR) of power companies in Haryana (India). Please go through this notice and answer the questions listed at the end of part I.

PUBLIC NOTICE

INVITING OBJECTIONS / SUGGESTIONS ON THE APPLICATIONS FILED BY HPGCL, HVPNL, UHBVNL AND DHBVNL FOR APPROVAL OF ANNUAL REVENUE REPORTS FOR FY 2008-09

Haryana Power Generation Company Limited (Generation Company, Bulk Supplier and Trading Licensee in Haryana), Haryana Vidyut Prasaran Nigam Limited (the Transmission licensee in Haryana); Uttar Haryana Bijli Vitran Nigam Limited and Dakshin Haryana Bijli Vitran Nigam Limited (the Distribution and Retail Supply licensees in Haryana) have filed their application for generation tariff, bulk supply tariff, trading margin and Annual Revenue Reports (ARR) for the financial year 2008-09 for their respective businesses. Complete set of respective filings are available for public consultation during office hours on any working day at the Head Quarters of HPGCL, HVPNL and UHBVNL at Shakti Bhawan, Sector – 6, Panchkula and DHBVNL at Vidyut Nagar, Hisar and also at the offices of SE/Operations of HVPNL / UHBVNL / DHBVNL.

A complete set of each of these documents may be obtained on payment of Rs.1000/-, copy of the main ARR without Annexure at Rs. 300/- and copy of the condensed summary at Rs.50/- in cash or through demand draft, from the aforesaid offices. The condensed summary is also available on the web site of the Haryana Power Utilities i.e. www.haryanaelectricity.com and www.dhbvn.com.

Written objections/ suggestions/ comments are invited from the public and other organisations on the above filings. All interested parties should submit seven copies of their objections along with supporting material, if any, to the Secretary, Haryana Electricity Regulatory Commission, Bays No. 33-36, Sector 4, Panchkula - 1341112 and one copy should be directly submitted to the Managing Director of respective licensee at HPGCL / HVPNL / UHBVNL, Shakti Bhawan, Sector – 6, Panchkula or DHBVNL, Vidyut Nagar, Hisar. All comments should be sent by messenger or through registered post so as to reach before 5 P.M. of 10th February 2008. Any interested person, who wants to be heard in person, should mention so.

Concerned utilities shall submit seven copies of reply to the objections / comments before 5.00 PM of 17th February, 2008 to the Commission and one copy to the objector. The objectors may submit seven copies of rejoinder, if any, to the reply of the utilities on their objections before 5.00PM of 22nd February, 2008 to the Commission and one copy to the concerned utility. The objections should carry full name and postal address of the person sending the objection and shall be supported by an affidavit as per the Haryana Electricity Regulatory Commission (Conduct of Business) Regulations, 2004.

The submission of objections / reply to the objections / rejoinders and Public Hearing on the ARRs of HPGCL, HVPNL, UHBVNL and DHBVNL shall be held before the Haryana Electricity Regulatory Commission as per schedule given hereunder :-

Sl. No.	Licensee	Last date of filing objections	Last date of filing reply to the objections	Last date of filing rejoinder to the reply	Date of Public Hearing	Time	Venue of Public Hearing
1	HPGCL	10.02.2008	17.02.2008	22.02.2008	25.02.2008	11.30 A.M	Court room of Haryana Electricity Regulatory Commission, Bays No. 33-36, Sector 4, Panchkula
2	HVPNL	10.02.2008	17.02.2008	22.02.2008	26.02.2008	11.30 A.M	
3	UHBVNL	10.02.2008	17.02.2008	22.02.2008	27.02.2008	11.30 A.M	
4	DHBVNL	10.02.2008	17.02.2008	22.02.2008	28.02.2008	11.30 A.M	

The objectors and the petitioners may appear in person or through their authorised representative on the appointed date, time and place for making presentation of their case.

Secretary
Haryana Electricity Regulatory Commission

For the Group

- Which of the ARR is most important from consumer point of view for the purpose of making submission? And Why?
- How many days should be available to consumers/CSOs for making comments on the ARR and Tariff filing?
- Is the price fixed for getting a copy of ARR is justified? If not, then what is the possible solution to reduce this burden for consumers?
- What about the cost of participation during public hearings? How this expenditure should be financed so that the wider public interest is protected?

2. Understanding the ARR

1. The table given below provides information on the energy projections and transmission and distribution losses (T&D losses) for the respective years. It also provides information on the total cost of supplying power including power purchase cost, employee cost, operation and maintenance cost etc.

Table 1: Energy Projections made by DHBVN

	FY 2007-08	FY 2008-09 (Projected-I)	FY 2008-09 (Projected-II)
Energy Input (MU)	12562	13158	13158
Loss (%)	29	26	24
Loss (MU)	3452	3421	**?**
Energy Sales (MU)	8982	9737	**?**
Total Cost of Supply (Million Rs.)	25906	29130	29130

For the Group

- What is average cost of supplying power to consumers for the year 2007-08?
- What is the average cost of supplying power if 26% of T & D losses are allowed
- What is average cost of supplying power if 24% of T & D losses are allowed
- What will be the total savings to all the consumers if the whole gain on account of reduction in T&D losses (from 26% to 24%) is transfer to them as a rebate in tariff?

3. The given below Table (3) provides information on the energy purchased and energy sold to consumers by a power distribution company.

Table 3: Energy sale and energy purchased (Monthly basis)

Month	Energy Purchased [MU]	Energy Sales [MU]
Jan'06	1004.12	585.72
Feb'06	1041.69	597.83
March'06	943.67	567.98
April'06	914.49	562.26
May'06	881.91	597.96
June'06	987.50	623.66
July'06	908.18	639.64
August'06	895.74	672.00
Sept'06	882.95	680.99
Oct'06	910.87	656.78
Nov'06	1022.42	664.92
Dec'06	1044.33	656.18

For the Group

On the basis of this information given in Table 3

a) calculate the month wise percentage distribution losses
b) average distribution losses for the whole year (2006)

Comments on the trend of these losses.

Methods of Tariff Regulation

In order to follow these principles of tariff, there are various methods available for the consideration of the regulators. Each of the methods has its advantages and disadvantages. Selection of appropriate method depends upon the socio-economic characteristics and degree competition existed in the sector. There are three most popular methods/approaches used by different regulatory agencies across the world.

- Cost Plus
- Price Cap
- Performance Based Regulation

Cost Plus: This is also termed as Rate of Return (ROR) method. It allows companies to earn a reasonable rate of return on the investment after meeting all other expenses. All cost items are segregated and discussed. On the basis of information available for the last two/three year, cost is approved. Under this method, the licensees are also entitled to

make a claim for the unforeseen expenses such as fuel surcharge adjustment etc for the past years. The simple formula used for approving tariff using cost plus method is given below.

$RR = PPC+E+D+T+(B \times r)$

Where
RR: Revenue Requirement of the Utility

PPC: Cost of Power Purchase

E: Operating expenses. Cost of items such as labour (Employees), fuel, repair and maintenance (not used for construction work) etc.

D: Annual depreciation expenses.

T: Taxes payable to the Government.

B: Rate Base, the amount of capital invested in the business

r: Allowed or reasonable rate of return.

Price Cap: Under Price Cap regulation, on the basis of historical cost and future efficiency gains, a ceiling price is fixed by the regulator. While approving tariff, no segregation of cost takes place openly. Regulator approve tariff taking into account the general price level and future efficiency gains.

Performance Based Regulation (PBR): Under PBR approach, tariff is linked with the performance of the utility. For example if a utilities is able to reduce more T&D losses, it may be allowed to earn more return on the capital base. On the other hand poor performance may resulted into no return of negative rate of return (= penalty).

As stated, the selection of the appropriate method depends upon a number of parameters such as availability of adequate and reliable information, responsiveness of market, degree of competitiveness and other socio-economic factors. Almost all Indian Electricity Regulators have followed the rate of returns method.

Components of Tariff

The total cost of supply may be segregated into various cost components. Whatsoever method the respective tariff-setting authority uses, calculation of tariff is an important exercise in order to assess the financial performance of the utilities. In the detailed tariff regulation such as Rate of Return as in case of India, each of the components is explicitly scrutinised by the respective regulatory body. Various stakeholders are invited to make comments on the various cost components. While in case of price cap regulation this detailed cost examination is an internal exercise. The major components of tariff are discussed here.

Table 1: Cost Components of a Generation Company

Fuel Cost	Depending upon the type of plants such as thermal, nuclear hydro etc. fuel is required. In thermal and nuclear power plants, it is major cost item. In case of Hydropower plants, it is almost negligible.
Transportation Cost	It is mainly the cost incurred in transporting fuel to plants. It may also a major component if the plant is not located nearer to pit heads/source of fuel
Employee Cost	This is the cost on account of salaries and other benefits payable to the employees engaged in the Generation business.
Repair and Maintenance Cost	On part of the accidental and routine repair & maintenance of the plants.
Depreciation Cost	It is an item for the wear and tear of capital. In other words the cost of one time investment made in the business. Total investment should be recovered during the useful time of the asset.
Pollution Control Expenses	All thermal power plants are required to installed pollution control equipments for the safety of citizens.
Taxes	Any tax especially in case of private power plants imposed by the government
Return on Capital	It is surplus over the expenses. A minimum rate of return is necessary to attract the required capital in the sector.

In case of a transmission company, depreciation, salary of employees, repair & maintenance, metering etc. are major cost items. During the transmission, some energy is lost. The cost on account of thee lost is call as transmission losses. For the purpose of a distribution company the generation cost and transmission cost becomes power purchase cost (PPC). Distribution company point of view PPC is an external cost component because it has no control to reduce this cost. However, if adequate energy is available, a distribution company can ensure merit order purchase. This move may force the high-cost companies to reduce the cost of generation. But given the shortage of power and existence of long-term agreements between distribution and generation companies, it is not taking place in most of the countries including India.

Table 2: Cost Components of a Distribution Company

Power Purchase Cost	It the cost on account on energy purchased from all sources such as directly from the power plants, traders, captive power plants, imported etc. If it is purchased from the market traders, it also includes trading margin that is presently 4 Paise fixed by CERC in case of India.
Employee Cost	This is the cost on account of salaries and other benefits payable to the employees engaged in the Distribution business.
Repair and Maintenance Cost	On part of the accidental and routine repair of the distribution lines, transformers etc.
Depreciation Cost	It is an item for the wear and tear of capital. In other words the cost of one time investment made in the business. Total investment should be recovered during the useful time of the asset.
Energy losses	It is a major cost item for most of the electricity utilities. Theft of power, underestimation of consumption, technical losses (not very much) etc constitute energy losses.
Taxes	Any tax especially in case of private licensee, imposed by the government
Return on Capital	It is surplus over the expenses. A minimum rate of return is necessary to attract the required capital in the distribution business.

After examining the various cost components, the total cost of supply in other words Annual Revenue Requirement is calculated by the Regulatory authority. Then, the regulatory body is required to fix the tariff on the basis of cost of supply. However, there are some other socio-economic factors such as paying capacity of the consumers that needs to be taken into account by the regulatory bodies.

Single or Two-part energy tariff for consumer

Earlier, most of electricity utilities used to billing the consumers only on the basis on energy consumption. It is termed as a signal part tariff. However, for the efficient use of electricity, two parts electricity tariff at consumer ends is advocated. In the two part tariff, there are two components of tariff- 1) capacity charges and 2) energy charges.

Capacity charges are justified on account of network capacity (also generation capacity if the utility is integrated) dedicated to the consumer. Generally, these charges are positively proportionate to the maximum demand or the connected load of the consumer. While energy charges varies according to the energy consumption.

SIMULATION EXERCISE

1. Understanding the tariff structure

Table 1 provides information on the existing and the proposed tariff structure.

Table 1: Tariff Structure for various consumer categories (In Rs.)

Category of Consumers	Existing Tariff	Proposed Tariff		
	Energy Charges	Demand Charges	Energy Charges	Demand Charges
Rural Domestic (0-50 Units)	1.55	0.00	1.75	Rs. 20/- per KW
Rural Domestic (51 Units +)	2.20	0.00	2.75	Rs. 20/- per KW
Urban Domestic (0-50 Units)	1.55	0.00	1.75	Rs. 20/- per KW
Urban Domestic (51 Units +)	2.20	0.00	2.75	Rs. 20/- per KW
Non Domestic (0-100 Units)	2.64 + 1.46	0.00	3.04 +1.46	Rs. 40/- per KW
Non Domestic (101 Units +)	3.04 + 1.46	0.00	3.44 +2.46	Rs. 40/- per KW
Agricultural Metered – General Category	0.70	0.00	0.95	0
Urban Wells (before 1995)	1.10	0.00	1.65	0
Urban Wells (From 1995)	1.40	0.00	1.65	0
Farmhouse Wells	2.20	0.00	2.75	0
Agriculture – Flat				
General Category	60.00 per HP	0.00	0	Rs. 85/- per HP
Urban Wells (before 1995)	95.00 per HP	0.00	0	Rs. 145/- per HP
Urban Wells (From 1995)	120 per HP	0.00	0	Rs. 145/- per HP

Farmhouse Wells	----	0.00	0	Rs. 145/- per HP
Nursery	1.40	0.00	1.65	0
Poultry – Rural	1.10	0.00	1.65	0
Poultry – Urban	1.40	0.00	1.65	0
Small Industry	2.03 + 1.46	0.00	2.03 + 1.46	Rs. 30 per HP
Medium Industry	2.36 + 1.46	0.00	2.36 + 1.46	Rs. 45 per HP
Large Industry	2.59 + 1.46	0.00	2.59 + 1.46	Rs. 70 per kVA
Public Water works – Small	2.03 + 1.46	0.00	2.03 + 1.46	Rs. 30 per HP
Public Waterworks – Medium	2.36 + 1.46	0.00	2.36 + 1.46	Rs. 45 per HP
Public waterworks – Large	2.59 + 1.46	0.00	2.59 + 1.46	Rs. 70 per kVA
Bulk supply to mixed load	2.36 + 1.46	0.00	2.36 + 1.46	Rs. 45 per HP
Electric Traction	2.59 + 1.46	0.00	2.59 + 1.46	Rs. 70 per kVA
Public Street Lighting (I Lac population)	1.54 + 1.46	0.00	1.54 + 1.46	Rs. 30/- per point
Public Street Lighting (more than I Lac population)	1.84 + 1.46	0.00	1.84 + 1.46	Rs. 45/- per point

For the Group

- What is the justification for charging the demand charges separately from the energy charges?
- Calculate the percentage increase in billed amount (proposed) for the consumption of 100 units (KWH) and connected load 1KW assuming tax and other surcharges as nil for the following categories

  -Rural Domestic
  -Urban Domestic
  -non Domestic
  -Agriculture metered (general categories)

- What are the implications of the metered and un-metered supply to agriculture sector on the utility's revenue and efficiency in consumption?

Some Issues in the Tariff Application

2. Dakshin Haryana Bijli Vitran Nigam Limited has made the following observations in its ARR petition for the year 2008-09 on the matter pertaining to subsidy to some specific consumer categories.

a). Subsidy to some Consumer Categories

- The State Govt. has decided that electricity tariff applicable to registered *Gaushalas* (A place where cows are kept for non-commercial purpose) should be Rs.2 per unit. The State Govt. would provide an amount of Rs.2000/- per month per registered Gaushala on this account

- As per directives of the State Govt., the tariff of horticulture & fisheries has been revised from existing Rs. 4.28 per unit to Rs. 2/- per unit. It was decided that the difference between the cost of supply to these consumers and the tariff charged would be compensated by the State Govt. in the form of direct subsidy in line with subsidy given to agriculture pump-set consumers.

b). Change in tariff to certain consumer categories:

The following incentives were allowed by the Licensee to the consumers:

(i) Rebate of 10 paise per unit to women consumers (where domestic connection has been issued in the name of women consumers)

(ii) Charging of domestic tariff instead of non-domestic tariff from Elementary Schools. (It may be noted that non-domestic tariff is about 40% higher than the domestic category.)
(iii) Financial incentive of 5% for rural domestic and rural agriculture pump set consumers who have been regularly paying their bills for last 10 months prior to 17.6.2005.

- The Hon'ble Commission in its orders dated 14/11/2005 on the ARR of DHBVN for FY 2005-06, under directive No.5, directed the Licensee to seek compensation from the State Govt. for the incentives allowed to the consumers.
- The matter was taken up with the State Govt. jointly by UHBVN & DHBVN. The State Govt. vide letter dated 31/08/2007 has asked the distribution licensees to approach HERC for allowing this expenditure as a part of ARR. Accordingly the financial impact of these incentives amounting to Rs.8.03 million is being claimed in the ARR.

For the Group:

What objections you must raise, if any in the above matter? Why/Why not?

Chapter IV
Quality of Service Standards and Compliance

Tariff and Quality of Service (QOS) are two very important issues affecting the consumer interest. Electricity Reforms Acts enforced in various countries envisage improved QOS standards. Regulatory bodies are in process to frame the regulation/code of conduct for the standard of performance. Consumers/CSOs are expected to present their views on the proposed regulations based on upon their experience and reports in media etc. Among others, the following are important issues:-

1. Procedure for getting a New Connection
2. Metering and Billing
3. Disconnection and Restoration of Electricity Supply
4. Quality of Service Monitoring
5. Redressal of Consumer Complaints

On behalf of utilities, adequate information should be made available so that consumers are well aware of the process and procedures. Unfortunately, the quality of consumer services is very poor. It has also been revealed from the recent consumer survey concluded under this (RESA) project.

1. Procedure for New Connections

The procedure for getting new connection should be simple and consumer friendly. New connections should be issued in a transparent manner. At the time of submission of application, consumer should be informed about the process and time to be taken in getting the service.

In many cases, it has been observed that no reliable information is provided to the consumers about the process and charges payable for getting new connection. As a result consumes get lot of harassment.

2. Metering and Billing

Proper metering and billing of electricity consumption is very important issue affecting the consumers 'interest at large. Electricity distribution companies should ensure that consumption is estimated with 100% accuracy and consumers are satisfied with the metering and billing process.

The Electricity bills should contain adequate information to understand the bill amount. All the detail should be provided in a transparent manner. Difficulties faced by the consumers while making payment of electricity dues are also important problems of consumers. These include

- Inadequate time available to consumers for making payments.
- The payment counters of the distribution companies are opened just for few hours (Generally between 10:00 to 1400 hours)
- Long queues at the payment counters
- Consumer complaint regarding bill correction is not attended properly

The licensee should ensure that consumers are satisfied with metering process. It is for them to pay the dues.

SIMULATION EXERCISE

Participants are provided with copies of computerised electricity bills used by the Rural Electricity Board (REB). The resource person explains the bills (different terms and items) and the participants ask about different confusions.

3. Disconnection and Restoration of Electricity Supply

Statues authorize the distribution companies to disconnect the connection of a consumer in case of non-payment of electricity bills. But in certain cases it was reported that dues are pending because of the following reasons:

- Consumer was not satisfied with the reading of the electricity meter
- utility had send a bill that was due for a long time but consumer was not aware of the same
- dues were pending towards the previous occupant of the house/premise
- consumers did not receive (current) bill within the stipulated time period, thus it is lying pending

It has been reported that it is very difficult for the consumers to reconnect to the system. A utility also takes restoration charges in addition to the payment of pending dues towards consumer. It is suggested that procedure for re-connection should be simple and transparent.

4. Quality of Service Monitoring

Supplying power with continuity and within acceptable voltage limits are main issues concerned with quality of service. It has been reported that consumers suffer from poor quality of service including frequent interruptions, load shedding and low voltage etc. As a result consumers have to make additional investment to ensure uninterrupted power supply and safety of the equipment.

Given the development in the technology, consumer groups/CSOs may keep a check on the quality of service supplied by utility. For example, PRAYAS, a Pune based NGO has initiated the process to monitor the quality of service in the certain areas of Pune City (Maharashtra), India. Under its programme, Electricity Supply Monitoring Initiatives (ESMI), three data loggers have been installed at different locations of the city. PRAYAS is providing regular feedback to the regulatory body of the state as well consumes. (For detail, please log on www.prayaspune.org)

To take similar initiatives in other areas, consumes should have an access to resources and aware of the technology/process. With the support of distribution companies as well regulatory bodies, it is possible to empower the consumers with these tools.

5. Redressal of Consumer Complaints

Redressal of consumer complaints is an important issue. It is duty of the distribution company to take proper and timely action in order to resolve the complaint registered by a consumer. Regulatory bodies are also in process to frame guidelines on the proper redressal of consumer complaints. In this process, CSOs may play important role in helping the regulatory bodies to make the effective regulations on this important issue. However, it requires the CSOs as well consumers to be well aware of the process and take appropriate actions on behalf of the consumers.

SIMULATION EXERCISE

Participants are provided with blank forms that one of the electricity authority uses for complaint redressal. The resource person goes through each of the fields of the form and discusses how to fill it up.

Chapter V
Responsibilities on Part of the Consumer

Consumers have very important role to play in the electricity reforms process. Apart from participating in the decision-making process, they can help the government as well utilities in reducing the requirement for additional energy. Broadly their role may be classified into these three areas.

1.Policy and regulatory process
2.Reducation of energy losses
3. Energy Conservation

1.Policy and regulatory Process

The newly established regulatory mechanism supposes electricity consumers to participate in the policy formulation as well as regulatory decision-making process. It will help in making it more transparent and accountable. Unless active participation on behalf of the consumers/CSOs is ensured, consumer interested remains unprotected. Therefore, the consumers should actively participate in the process. Some important areas for consumer participation include:

- Comments on the draft/proposed electricity law (s)
- Views on the draft electricity policy
- Interventions during the regulatory decision-making process
- Feedback on the utility's performance

2.Reducation of energy losses

A high T&D loss is one of the major problems in power sector in many countries for both consumers as well utilities. As a result of high losses, honest (paying) consumers suffer from the shortage of power and poor quality of service. On the other, utilities loose substantial part of their revenue that further results into low investment and inadequate infrastructure. High T&D loss is a problem related to consumers, as theft of power constitutes a significant portion of these losses. Apart from being honest, they should educate other consumers. They should inform the utilities about the sites where theft is taking place. They should discourage all unfair mean such as tempering with lines/meter etc. By doing this, they are reducing the cost of supply and finally tariff payable. It is because; ultimately it is the consumer who has to pay for these high losses.

SIMULATION EXERCISE

A. 1% OF SYSTEM LOSS/YEAR IS AROUND 200 MKwh of ENERGY.IF 1 UNIT OF ENERGY SALE IS TK.4.00. WHAT IS THE LOSS IN SALE OF 12% POWER THEFT/YR ?
B. WHAT IS THE ENERGY LOSS OF THE COUNTRY /YR FOR AVERAGE 500MW LOAD SHED/DAY?
C. WHAT IS THE COST OF LOST POWER FOR PER UNIT OF LOST POWER & TOTAL ECONOMIC LOSS OF THE COUNTRY/YR FOR 'B' ABOVE?
D. IF AN UTILITY PAYS SALARY IN A YEAR.

E. Tk. 3790 mln AS BASIC, BUT THEY CAN SAVE THROUGH REDUCTION OF (a) LOSS Tk 3200 mln (b) OVER INVOICING OF PROCUREMENT Tk.4500 mln (c) O & M AND ADMINISTRATIVE INEFFICIENCY Tk.2500 mln (d) LOAD SHED LOSS Tk. 30000 mln IN A YEAR, IF NOW ½ OF THE TOTAL LOSS IS SAVED AND BY A
F. CONTRACT THROUGH **PTA** IF THEY GET A TOTAL 12 BASIC AS BONUS IN A YEAR AS PER AGREEMENT THEN WHAT WILL BE THE ADDITIONAL INCOME OF THE UTILITY IN THAT YEAR.

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3. Energy Conservation

Most of the countries are facing problem of inadequate power supply. Citizens have to remain without power for long hours. There are two ways to deal with this problem. One is to increase the generation capacity. The other one is to reduce the demand by promoting energy saving schemes. The second option will not only help in reducing the cost of supply but also contribute to the sustainable environment.

Consumers can contribute a great in saving energy. In all segments of the economy-household, industry, business, agriculture etc, there is huge scope for energy saving. Saving energy is more important than producing energy in order to tackle the problem of shortage. In a county like India where T&D loss level is about 50%, you need two units to supply one unit of energy at the consumer ends. It implies that is one unit is saved at consumer end, it results into surplus of two units that may be supplied to other consumers.

SIMULATION EXERCISE

Participants are divided into three groups to work on the following three topics. Each group discuss among themselves and write the points on poster paper and one of the members of each group presents the points at the plenary.

1. Role of individual consumers in conservation of energy.
2. Role of local CSOs in conservation of energy.
3. Role of the national level organization (Consumers Association of Bangladesh) in conservation of energy.

How to save energy

The first step in this regard is to make the consumer aware. Unless a consumer is aware and prepared to save energy, no better outcome is expected. The following are some suggested measures that may help consumer to save energy.

Designing a house/building

In an economy, about 50% of the total electricity consumption is used to meet lighting, cooling and heating purposes. The design engineering of the building is a major determinant for electricity consumption. More the energy-inefficient design of the building, more the consumption of power. While designing a building, we should target to reduce the demand for energy. Sun and air are natural resources available to us, should be utilised fully as far as possible.

Use of Energy Efficient Equipment

Apart from the purpose of use, energy consumption also depends upon the efficiency/quality of the electrical equipment. Same purpose may be fulfilled by consuming less amount of energy. For example, if we use a Compact Fluorescent Lamp (CFL) instead of an ordinary bulb, it can save energy about 75% and reduce the electricity bill in the same order. Same thing applies to the energy efficient motors, coolers, and refrigerator, AC etc.

The list of energy efficient equipment is available with the govt agencies engaged in rating of equipment. For example in India, Bureau of Energy Efficiency (BEE) has made it mandatory for the manufacturers to get their products rated. It makes possible for the consumers to compare different products. Every product has been labelled from one star (*) to five Stars. More stars mean more energy efficient equipment.

It may be noted that one time cost of equipment having more stars may be slightly higher than one having lesser stars. However, during the lifetime of equipment, consumer saves lot of money since operation cost of more efficient equipment is very low. This message needs to be conveyed to consumers

Stop Wastage

Electricity is a very scare economic resource. Consumer should make its optimal use. Electricity appliance should be switched off when not in use. Wastage of energy is very common in households as well govt office. Even a consumer has paid for the wasteful consumption, wastage is a net social cost.

SIMULATION EXERCISE

(1) We have industrial motor load around 1400Mw. By installing IMC if we save 500 Mw demand (a) what is saving of gas if all runs by gas and for 1Mw we need gas around 50 MCF (million cubic feet) (b) if BDTk.40 million is required for installing a complete 1Mw power station, how much taka is saved? (c) if this 500mw load is saved from the system for avoiding load shed and it adds to economy , considering cost of lost power what is yearly economic benefit of the nation?

(2) If a magnetite ballast costing Tk.8 is replaced by an electronic ballast costing Tk. 30.00 in a tube light, which now consumes watt 25 instead 50 watt serving the same purpose. The light is used for 6 hours in a day. If tariff of per unit electricity is tk.3.50, what is the pay back period of using EB instead of MB?

(3) 1(one) CFL costs Tk.300.00, consumes 20watt of same light of a 100 watt of incandescent bulb which costs Tk.20.00. The bulb's life is 1080 hours whereas CFL's is 10800 hours. The consumer needs the light (bulb or CFL) to use every day 6 hours. If the consumer buys a CFL replacing bulb, what is the pay back period?

(4) Per unit (KWh) peak power production cost is BDTk.6/KWh and non-peak power production cost is BDTk.2/KWh . We have 6 hours peak demand during evening . Peak demand is 5500Mw and non-peak demand is 4000Mw.It is practically not possible to eradicate the total peak demand from the system. If we can reduce the 1000Mw demand from peak and shift to non-peak period, what will be benefit of the generating company? (Assuming peak and non peak tariff is same).
