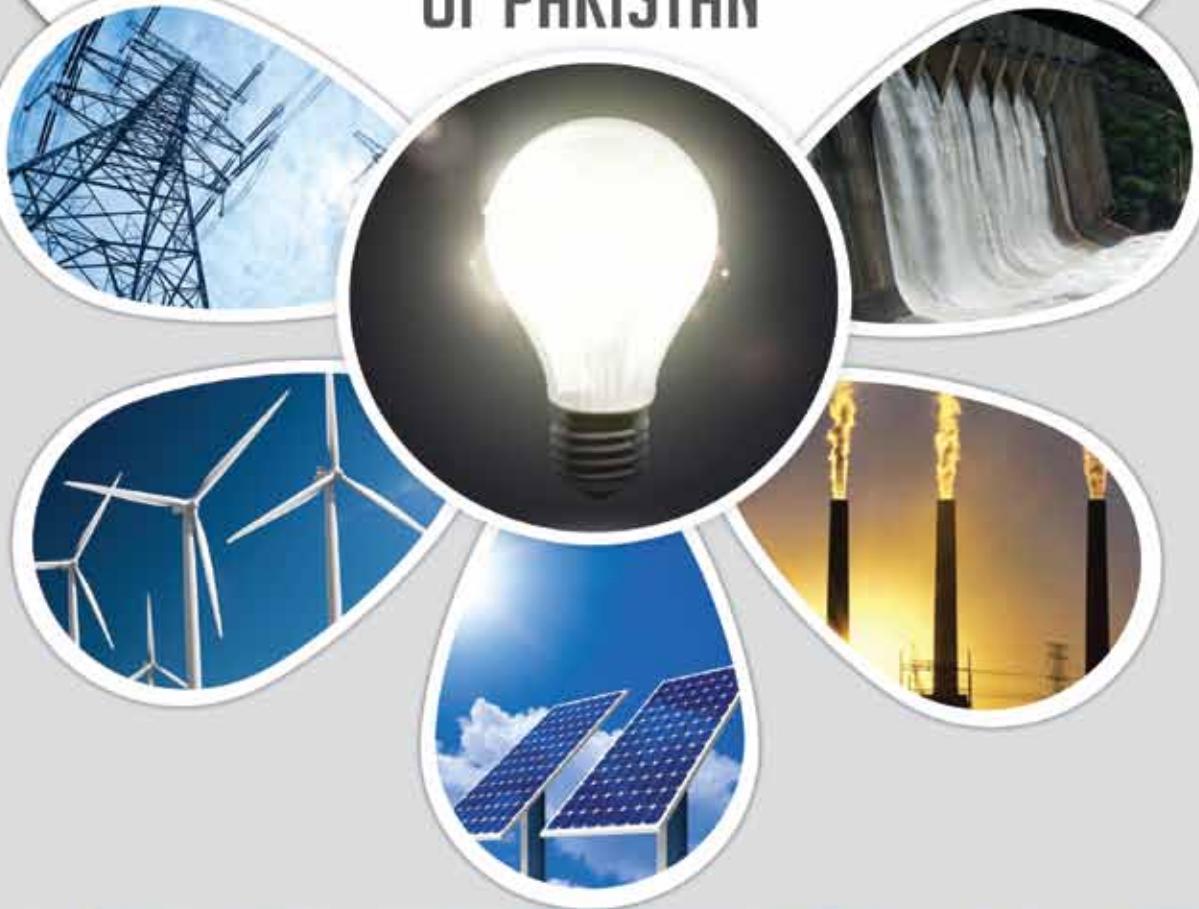


COSTING AND TARIFF SETTING IN

# POWER SECTOR

OF PAKISTAN



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Pakistan

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## **DISCLAIMER**

The purpose and scope of this book is to provide an insight on the power sector industry in Pakistan and its associated issues. All the material included in this publication is based on data / information gathered from various sources, believed to be reliable. Although, due care and diligence has been taken to compile this document, we do not make any representation, warranty or assurance nor assert that all the information provided therein is absolutely accurate or complete. ICMA Pakistan does not assume any liability for any financial or other loss resulting from this book and as such the content of this book should not be relied upon for making any decision, investment or otherwise. The content of the book does not bind ICMA Pakistan in any legal or other form. Reading this publication stipulates that you have also read this disclaimer.

**Author**

**Mr. Abid Latif Lodhi, FCMA**



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# Foreword



It gives me immense pleasure to present this booklet titled '**Costing and Tariff Setting in Power Sector of Pakistan**' authored by a very senior Fellow member of our Institute, Mr. Abid Latif Lodhi who has diversified professional experience in the power and water utilities industry in Pakistan. Based on his practical experience of the power sector, Mr. Abid Lodhi has, very precisely and skillfully, explained the power regulatory regime in Pakistan and how costing and tariff setting is being done by NEPRA and other regulators in the industry. Most importantly, Mr. Lodhi has explained the issue of power sector circular debt and suggested measures to overcome it, which merits attention of the government.

Electricity is regarded as the lifeline of any economy and plays a pivotal role in socio-economic development of a country. The role of electricity is running the wheels of the industry and in lighting our cities and towns need no emphasis. The demand for electricity has been rising consistently mainly due to growing industrial requirement and population explosion but unfortunately, power generation and supply have not been able to meet this rising demand of electricity. The cost of electricity generation is also high due to faulty fuel mix which has led to massive load-shedding and power shortages in Pakistan. There is emergent need to resolve the circular debt issue by revamping the entire power sector, including tariff setting, efficiencies of power generating units, supply chain network and payment recoveries. If this is not done, the future of energy sector would remain at stake.

ICMA Pakistan is a national Institute of international repute and a trusted name in the field of professional education, corporate trainings, industry research and technical support to businesses for the promotion of best practices and to ensure corporate governance. To fulfill its national responsibility towards economic development, the Institute is working closely with the government ministries and departments, industry and corporate sector as well as regulatory authorities such as SECP, FBR, SBP etc.

I congratulate Mr. Abid Latif Lodhi and the Research and Publications Committee of the Institute for accomplishing this task and presenting such a useful publication for the benefit of professionals, industrialists, businessmen, researchers and students.

**Zia ul Mustafa, FCMA**  
**President and Chief Executive**

# Preface



Almost seventy percent of Pakistan's total electricity generation comes from thermal power, which comprises oil, natural gas and coal generated electricity. The remaining thirty percent of generation is shared by hydroelectric power. It is important to note that though hydroelectricity is a major source of electricity generation, this reflects only 13 percent of the total hydroelectric potential of the country. There is not only need to improve the efficiency of power sector but also to expand and diversify generation capacity in order to ensure that the growing demand of electricity could be met efficiently in future.

This publication on '**Costing and Tariff Setting in Power Sector of Pakistan**' is a worthwhile contribution of Mr. Abid Latif Lodhi which covers the tariff setting being done at different stages of complete supply chain of electric power from acquisition of energy sources to generation of electricity, then its transmission and distribution to end consumers in pre-regulatory regime and post regulatory regime. In parallel, it explains costing and pricing mechanism at different level as determined by the Regulator. The booklet also gives a useful insight on the circular debt issue faced by the power sector and its possible solution.

I am really grateful to the Research and Publications Committee and the Secretariat for their efforts in developing this booklet publication on such an important topic of national relevance. I hope that the publication would provide a useful source of reference not only for our members but also for the students and government. I am sure that this book would be warmly received and appreciated by the members and other interested readers.

In the end I would like to suggest to the government to revamp the power generation and supply network and also develop and encourage renewable energy resources in order to resolve the long pending power shortages in the country.

**Shahzad Ahmad Awan, FCMA**  
**Chairman, Research & Publications**

# About the Author



Abid Latif Lodhi, FCMA

Mr. Abid Latif Lodhi is a Fellow member of Institute of Cost and Management Accountants of Pakistan, having diversified professional experience, spreading over 23 years, in power and water utilities industry. His extensive work experience mostly relating to Pakistan Power Sector i.e. WAPDA (Hydel, Thermal, Transmission and Integrated Financial Planning etc. of Power Wing), National Transmission and Dispatch Company (NTDC), National Electric Power Regulatory Authority of Pakistan (NEPRA), MARAFIQ a Saudi Arabian multi-utility company and Lahore Electric Supply Company of Pakistan (LESCO).

Mr. Abid Lodhi has worked in the area of finance, strategic corporate planning, budgeting, accounting, treasury/fund management, taxation matters, corporate performance, tariff & regulatory affairs, developing of tariff and financial models, loan negotiations with international and local lenders, interaction with ministries, tax department, development of accounting manual, internal audit manual, ERP Documentations etc.

Currently, Mr. Abid Lodhi is working in the USAID Power Distribution Program (PDP) as Financial Management Team Lead. In this capacity, he has developed and delivered new internal audit with risk based approach, new accounting manual, 10 years financial and tariff model to public sector government owned distribution companies. He also implemented Enterprise Resource Planning (ERP) for LESCO and is presently working to implement ERP for couple of distribution companies of Pakistan.

# Chapter 1

# Power Sector in Pakistan – An Overview

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## Chapter 1

### Power Sector in Pakistan – An Overview

Pakistan started with the power generation capacity of 60MW at the time of its independence in 1947. Power infrastructure development gained momentum after the 1970s and installed capacity of 636MW in 1970 rose to 9,094 MW in 1990-91. The country's power sector at that time was managed by two vertically integrated public sector utilities i.e. **Water and Power Development Authority (WAPDA)** and **Karachi Electric Supply Company (KESCO)**. The performance of WAPDA and KESC remained satisfactory till the mid of 1980s. After that, constraints in the availability of capital led to an inadequate generation capacity as well as deterioration in transmission and distribution infrastructure.

The increase in the supply of electricity was insufficient and was unable to keep pace with the increased demand of electricity in that period which was growing consistently at 9 percent to 10 percent per annum. In the early 1990s, power supply lagged behind demand, resulting in excessive shortage of electricity, especially for the industrial and commercial consumers.

Heavy financial losses on account of undue political interference, corruption in the management of limited capital resources, overstaffing and bureaucratic delays in handling routine matters in these public utilities, inappropriate and costly investments, poor quality of services, high system losses and poor collection of bills from the customer; all negatively affected the financial health of the power sector.

The overall operational inefficiencies in the power sector created the need for its restructuring. Accordingly, in **1992** the “Strategic Plan for restructuring the Pakistan Power Sector [PPRSP]” was approved by the Government of Pakistan (GOP)/ Council of Common Interest (CCI) and was followed by Power Policies of 1994 to 2002.

The intention of the government was to move towards the creation of a competitive power market in Pakistan by taking the following initiatives:

- Restructuring and privatizing the then existing thermal power generation, power transmission and distribution functions and assets of existing public sector utilities i.e., WAPDA and KESC;
- Creation of a fully autonomous regulatory authority, National Electric Power Regulatory Authority [NEPRA]; and
- Through its future IPP policy.

The aim of above initiatives was to promote competition and improve financial, operational and management in all tiers of WAPDA to eventually offer affordable electricity to customers. It was also intended to promote commercial viability and enhance business value of the assets block of each corporate entity.

Measures were taken and a comprehensive plan was devised to meet the objectives in three major phases, thereby, WAPDA's functions and assets under Water Wing and Power Wing were segregated in the following manner:

- Unified Power wing of WAPDA comprising of Generation, Transmission and Distribution was restructured into public limited companies under the corporate law and were placed under the management of Pakistan Electric Power Company (PEPCO).
- Power sector assets were restructured to form autonomous commercial entities through the adoption of prudent business practices, enhanced efficiency levels, cost reduction and profit orientation.
- Enhanced privatization initiatives

## Restructuring of WAPDA

In December 1998 the WAPDA Act was amended to permit establishment of PEPCO and unbundling of WAPDA in result whereof WAPDA has been separated into below referred corporate entities. Ultimately, the Power Wing of WAPDA comprising of Generation, Transmission and Distribution was restructured into fourteen (14) public limited companies. These fourteen (14) Corporate Entities are:-

- **National Transmission & Power Dispatch Company** [NTDC]
- **Thermal Power Generation Companies:-**
  1. Southern Generation Power Company Limited [GENCO-1]
  2. Central Power Generation Company Limited [GENCO-2]
  3. Northern Power Generation Company Limited [GENCO-3]
  4. Lakhra Power Generation Company Limited [GENCO-4]

- Distribution Companies: -**

1.	Lahore Electric Supply Company	[LESCO]
2.	Gujranwala Electric Power Company	[GEPCO]
3.	Faisalabad Electric Supply Company	[FESCO]
4.	Islamabad Electric Supply Company	[IESCO]
5.	Multan Electric Power Company	[MEPCO]
6.	Peshawar Electric Power Company	[PESCO]
7.	Hyderabad Electric Supply Company	[HESCO]
8.	Quetta Electric Supply Company	[QESCO]
9.	Sukkur Electric Supply Company	[SESCO]
10.	Tribal Electric Supply Company	[TESCO]

The major steps taken in the restructuring and transition included:-

- Constitution of the Board of Directors of the corporate entities with the induction of Directors from the private sector;
- PEPCO to utilize its experience for formulation of effective corporate policies;
- Execution of Legal agreements such as Business Transfer Agreements (BTA), Operation and Development Agreement (ODA), Electricity Supply Agreements (ESA), Bulk Supply Agreements (BSA) and Fuel Supply Agreements (FSA) between WAPDA and corporate entities for autonomous commercial operation;
- Transfer of WAPDA staff to respective corporate entities (Manpower Transition Program);
- WAPDA prepared, reviewed, approved and adopted opening Balance Sheets of the corporate entities as of 30-06-1998;
- Investment Plans for Distribution Power System Rehabilitation prepared and finalized by the Distribution companies;
- Financial Restructuring of WAPDA was approved by GOP;
- The Companies obtained Licenses from National Electric Power Regulatory Authority (NEPRA).

## Creation of PEPCO

Pakistan Electric Power Company (Private) Limited [PEPCO] as a Private limited management company owned by the Government of Pakistan (GOP), whose Memorandum and Articles of Association, signed on **12.05.1998**, was introduced as the Managing Company to steer, manage and oversee the corporatization/commercialization reforms program of the government. PEPCO was asked to utilize their experience for formulation of effective corporate policies.

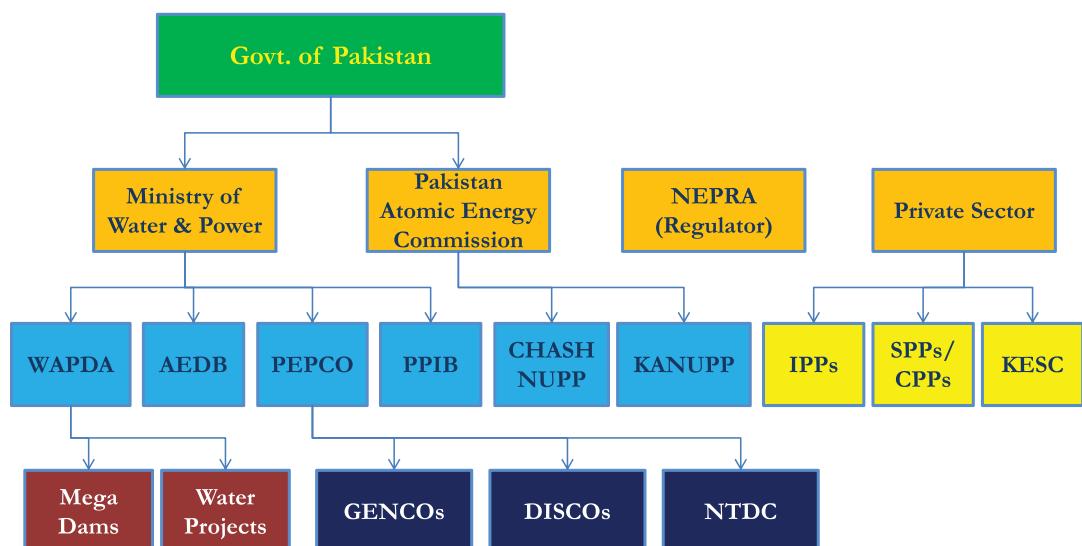
## Creation of Distribution Companies (DISCOs) to replace AEBs

Presently, WAPDA's distribution network has been divided into ten electric supply companies, which are mainly successors of former Area Electricity Boards (AEBs). The AEBs were departments within WAPDA to administer the supply and distribution, construction, expansion, maintenance and operation of the distribution system. The incorporated electric supply companies have been structured in line with modern management practices.

## Existing Structure of Power Sector Entities in Pakistan

The following is the existing structure of the power sector entities in Pakistan which are responsible for policy formulation, planning, implementation, operation and maintenance so as to provide electricity to the consumers:

### Pakistan Power Sector Entities



## A Glance at Sources of Electricity in Pakistan

Presently Pakistan power sector is producing 41%, 21%, 35% and 3% electricity from Oil, Gas, Hydel and other fuel sources, respectively. The total dependable capacity of the country is approximately 18,681 MW. The following table shows the consumers, consumption and revenue mix of the country power market:

Customers	Consumers Mix	Consumption Mix	Revenue Mix
Domestic	81.3	41.0	34.7
Commercial	14.9	8.6	13.8
Industry	2.1	38.6	41.0
Tube-well	1.6	8.2	6.3
Others	0.1	3.5	4.2

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# Chapter 2

## Tariff Setting in Power Sector

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## Chapter 2

# Tariff Setting in Power Sector

## Importance of Pricing of Power Consumption

The price of each commodity is set to recover the operating and maintenance cost of doing business and a reasonable return on investment involved in such business. The price is generally set according to the demand and supply principal in a free market environment. However, for a regulated market, the price is normally set by the regulator according to the cost of service and reasonable return determined through regulatory process and in accordance with preset guidelines and standards.

Timely provision of electricity or expansion of electricity sector in the economy is important for the GDP growth or sustainability of economic growth. The growth in electricity demand of the market requires substantial investment in the supply side (Generation) to maintain continuity of supplies.

According to an estimate, for every 1% of GDP growth in Pakistan, an increase of 1.25% in electricity supply is required i.e. in the past for a 7% GDP growth, the power sector had to grow with a pace of 8.8 percent. This means that high investments were required in response to continuous increase in electricity demand, which is directly linked to economic growth but in the past no timely and appropriate measures were taken for enhancement of supply to meet the demand.

To attract investment in power sector at right time, the starting point should be the right pricing of power consumption. The basic consideration for investment decisions by private sector in any country is the price of electricity that generates sufficient profits to supply electricity in a cost effective way, coupled with mechanism for adjustment in tariffs according to increased inputs costs in timely manner that will help to manage its cashflows and sustainability of growth in the sector.

## Tariff Setting in Power Market in Pakistan

The Pakistan power market is a regulated market since 1998 by independent regulator whereas earlier it was regulated by Government of Pakistan (GOP). The price / tariff for Generation, Transmission and Distribution segments and setting of consumer end tariff is designed by regulator keeping in view the Tariff Standards & Procedure Rules, 1998 as well as the policy direction of the GOP. There are number of drivers which affect the cost, price and tariffs like generation mix, expansion plan, operating and maintenance cost of existing infrastructure and cost of capital for new investment etc. and socio economic objectives of the Federal Government.

### 1) Tariff setting in Pre-Regulatory Regime

In the Pre-Regulatory Regime the tariff was set for two vertically integrated utilities i.e. WAPDA and KESC. The legacy tariff setting mechanism was that the tariff was set based on the formula mainly driven by the two covenants agreed with the donor's agencies i.e. 40% Self Financing equal to average of three years investment program and 1.5 times Debt Service Coverage Ratio.

Later it was relaxed to 25% Self Financing equal to average of three years investment program and 1.2 times Debt Service Coverage Ratio. It means that historical tariff setting was mainly for the recovery of cash costs of whole supply chain and the tariff was structured for the end consumers to meet the covenants keeping in view the economic and social objectives of the government of Pakistan uniformly for whole of the country.

In the legacy tariff setting, the notification was issued by these two vertically integrated utilities companies after getting its approval from GOP.

### 2) Tariff setting in Regulatory Regime

Regulatory Regime, according to 1992, the Government approved WAPDAs Strategic Plan for the Privatization of the Pakistan Power Sector a regulatory body was created with name of National Electric Power Regulatory Authority (NEPRA). NEPRA under the Regulation of Generation, Transmission & Distribution of Electric Power Act, 1997 (NEPRA Act) prepared Tariff Standards and Procedure Rules which NEPRA published in 1998 (Tariff Rules), there is more explicit guidance with regard to tariff setting in Part III, Rule 17, Standards and Guidelines, sub-rule (3)(i) and following.

## NEPRA Tariff Standards and Procedure Rules, 1998

The main relevant clauses of tariff standards and procedures rules are stated below:

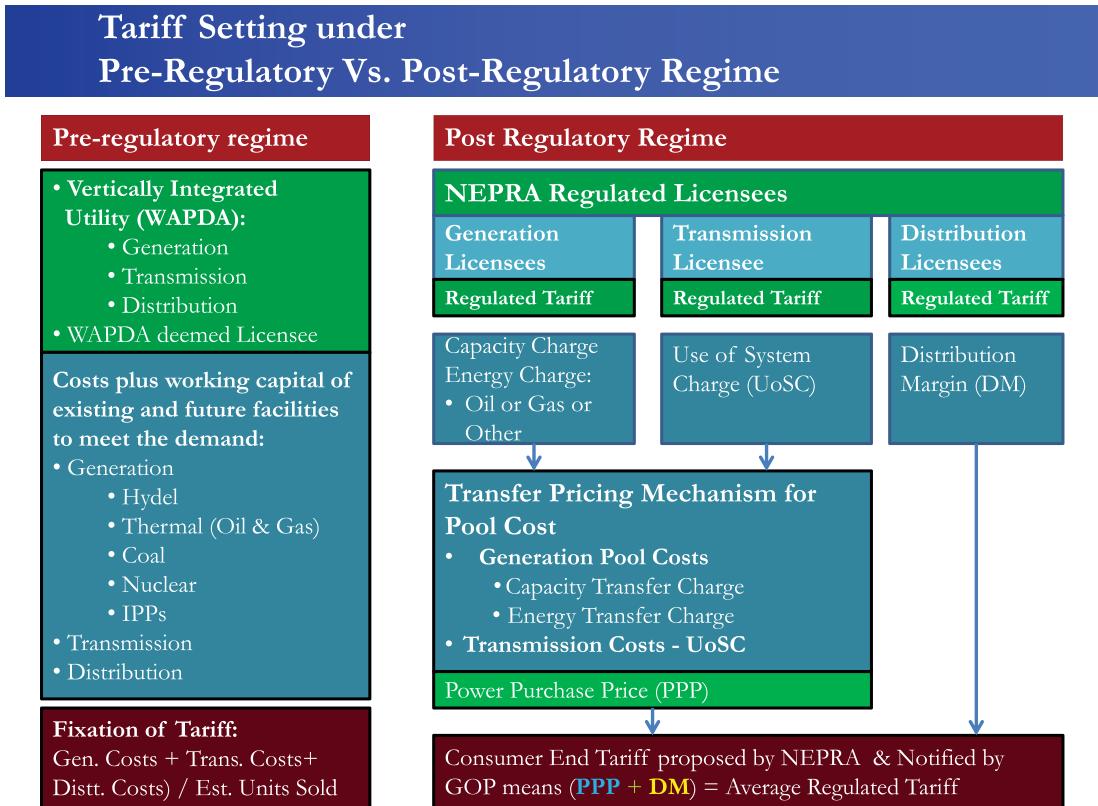
(3) Tariffs shall be determined, modified or revised on the basis of, and in accordance with, the following standards, namely:

- (i) Tariffs should allow licensees the recovery of any and all costs prudently incurred to meet the demonstrated needs of their customers, provided that, assessments of licensees' prudence may not be required where tariffs are set on other than cost-of-service basis, such as formula-based tariffs that are designed to be in place for more than one year;
- (ii) Tariffs should generally be calculated by including a depreciation charge and a rate of return on the capital investment of each licensee commensurate to that earned by other investments of comparable risk;
- (iii) Tariffs should allow licensees a rate of return which promotes continued reasonable investment in equipment and facilities for improved and efficient service;
- (iv) Tariffs should reflect marginal cost principles to the extent feasible, keeping in view the financial stability of the sector;
- (v) The tariff regime should clearly identify inter-class and inter-region subsidies and shall provide such subsidies transparently if found essential, with a view to minimizing if not eliminating them, keeping in view the need for an adequate transition period;
- (vi) Tariffs should, to the extent feasible, reflect the full cost of service to consumer groups with similar service requirements;
- (vii) Tariffs should take into account Government subsidies or the need for adjustment to finance rural electrification in accordance with the policies of the Government;

The main focus of regulatory process is the determination of prudent cost for all the generation, transmission and distribution licensees involved in delivering electric power to the end-user customers. Costs should include all reasonable and necessary costs such as capital, operating, fuel, transmission, financing, and administration, i.e. all prudently incurred costs of generation, transmission and distribution.

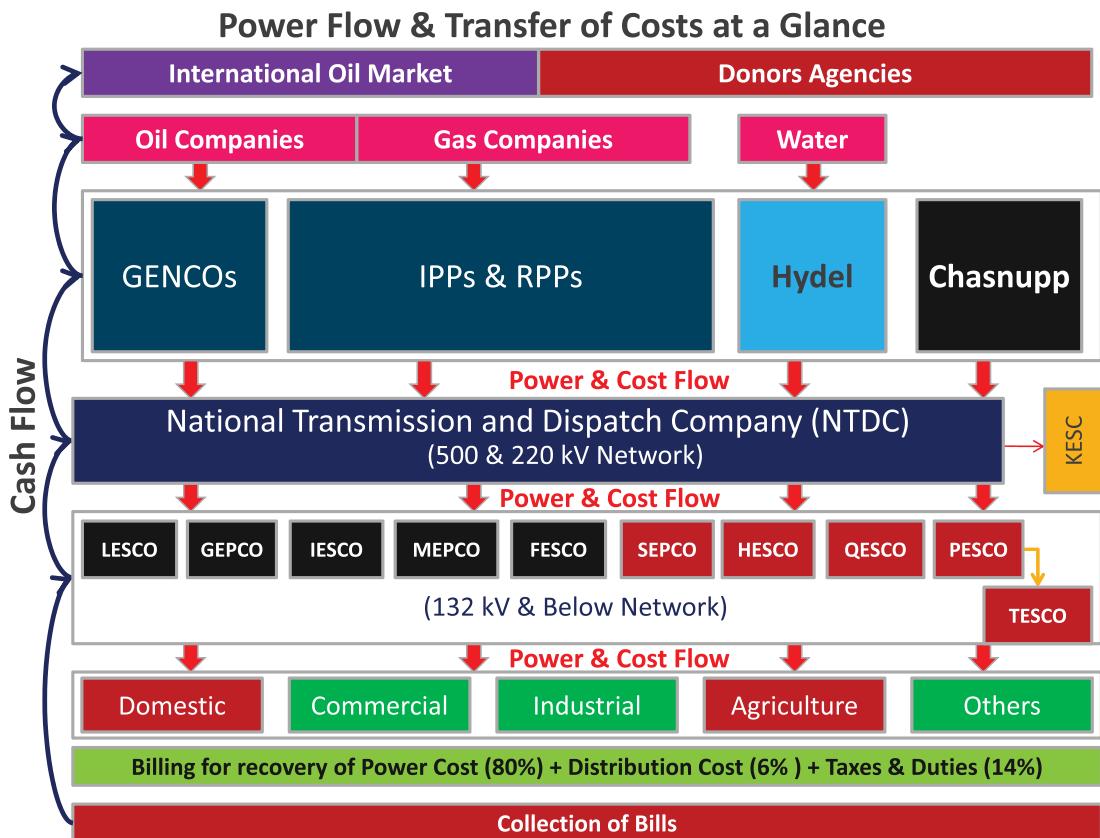
## Tariff Setting under Pre-Regulatory and Post-Regulatory Regimes

The following figure shows the summarized tariff or pricing components of licensees for recovery of costs involved in whole supply chain before regulatory regime and after regulatory regime in Pakistan:



## Power Flow and Transfer of Costs at a Glance

The cost and power flows within the whole supply chain and entities, involved for supply of electricity to consumers in Pakistan, under the single buyer model in a regulatory regime is shown in the following figure:



In Pakistan, NEPRA is the only authority which sets the tariff for generation, transmission, distribution licensees and end consumers. The tariff is set by regulator through regulatory process defined under NEPRA Tariff and Standards and Procedures Rules 1998 which allows licensees the recovery of all costs prudently incurred to meet with the demonstrated needs of its customers. Accordingly, the generation, transmission and distribution licensees' tariffs are being set by regulator through separate tariff process for each of licensee by inviting all relevant stakeholders. The above tariff structure is based on cost plus regulatory return basis.

## Segment-wise Tariff Setting Process of NEPRA

The whole tariff setting process of NEPRA can be classified into three categories i.e.

- 1) Generation Tariff;
- 2) Transmission Tariff; and
- 3) Distribution Tariff

## 1) Generation Tariff

The Generation Tariff has a typical two-part structure vis-à-vis Capacity Charge and Energy Charge. Former is for the available capacity and is fixed in nature whereas the later, variable in nature, is for the energy actually dispatched on the basis of actual kWh off-take, and consists of:-

a) **The Fuel Component**

(including the Price of Fuel; Thermal Efficiency including of ageing and cleaning; Output; Heat Rate; Caloric Value; and Partial Loading); and

b) **The Variable Operation & Maintenance Component**

(that may be Local i.e. pertain to cost of lubricants as well as Foreign that mainly deals with spare parts to be changed on scheduled maintenance and unscheduled maintenance)

**The Price of Fuel is the Variable Component of the Energy Charge.** NEPRA determines a Reference Price that is according to the Price of Fuel invoiced by fuel suppliers to Generation Licensees on each fortnight basis. As for instance, the Reference Price is taken on the date of determination of tariff for licensees which is subject to change as per the actual variation of fuel prices notified by relevant authorities based on actual utilization of plants based on the heat rate determined through the regulatory process.

**Fuel Price Adjustment** is the determination by NEPRA of the variation between the Reference Price and the Actual Cost of the Fuel. This variation may result in upward or downward impact on the tariff.

**The Fixed Cost component of Capacity Charge for Generation Tariffs includes the following nature of costs-**

- 1) Erection, Procurement and Construction (EPC) Cost
- 2) Taxes & Duties
- 3) Mobilization
- 4) Land purchase, fees and infrastructure
- 5) Development
- 6) Insurance
- 7) Admin & Utilities
- 8) Non-EPC cost
- 9) Financing Fees & Charges
- 10) Interest During Construction
- 11) Debt Service Charges
- 12) Return on Equity

## 2) Transmission Tariff

The Transmission Tariff is also determined by NEPRA and includes:-

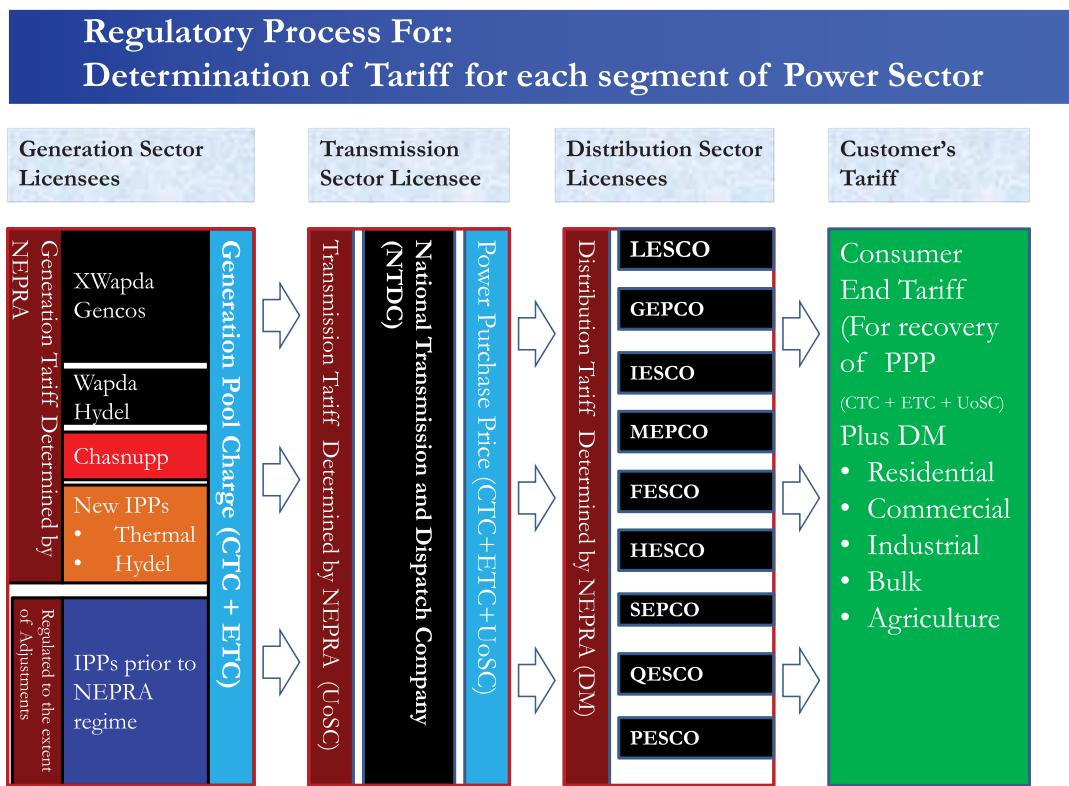
- 1) Use of System Charges (fixed cost); and
- 2) Pool Generation cost (Fixed plus variable cost) transfer pricing mechanism for X-WAPDA DISCOs (Power Purchase Charge for DISCOs). The applicable statutory instrument was issued in the year 2008.

## 3) Generation Tariff

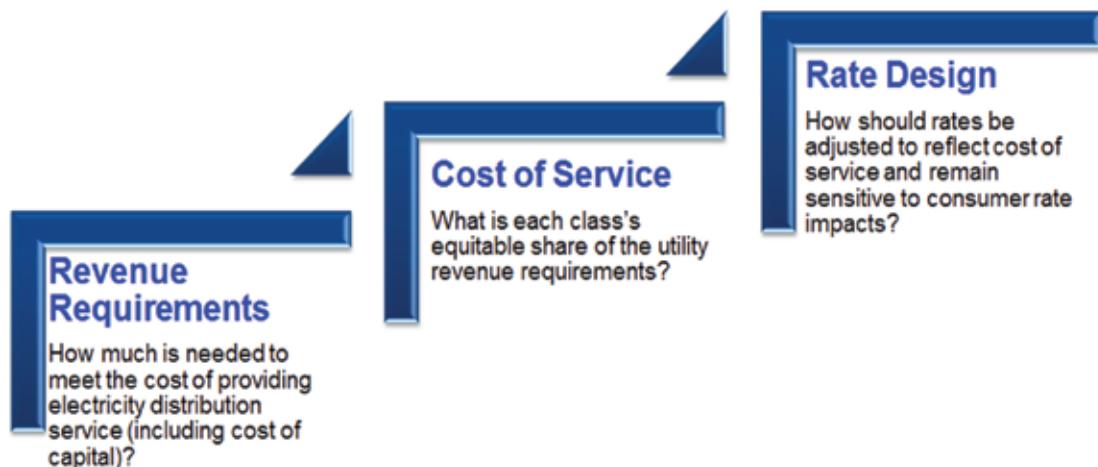
The Distribution Tariff is also determined by NEPRA and includes:-

- 1) Distribution Margin (DM) (fixed cost); and
- 2) Power Purchase Price [Power Purchase Price charged to DISCOs under Pool Charge cost methodology approved by NEPRA]

The Following figure shows how generation, transmission and distribution licensees' costs / (revenue requirements) are being transferred to end consumers in Pakistan:



For determination of consumer end tariff ideally, the regulator has to follow the following steps for proper rate making for each class of consumers



## Transfer Pricing Methodology for Distribution Licensees

All the power generated from different sources is procured by the **National Grid Company (NTDC)** through its **Central Power Purchasing Agency (CPPA)** on behalf of DISCOs at the rates as per tariff determined by NEPRA.

The overall power purchase cost constitutes a pool price which is transferred to the DISCOs according to a mechanism prescribed by the Authority and notified by the Federal Government in its Official Gazette.

The generation pool cost is transferred to the DISCOs according to the Transfer Price Mechanism (TPM) as prescribed by the NEPRA. NTDC shall, for the purpose of clarity intimate to all DISCOs the generation part of the Transfer Charge during a billing period by deducting from the Transfer Charge the Transmission Charge or Use of System Charges. Energy transfer charge shall be calculated on the basis of units delivered after adjusting target transmission losses of 2.5%.

Based on the above and in accordance with Transfer Pricing Mechanism, the tariff for a particular DISCO is established in the following manner:-

- Each of the Distribution Company as well as KESC raises its Maximum Demand for their respective Territory on the basis of which the Generation Capacity is developed, established and maintained.
- The Capacity (Maximum Demand) which is Fixed Cost is calculated in kW.

- **Calculation of Capacity Transfer Rates:-**

- Capacity Payments (Rs.) made to all Generators **divided by** the Total Capacity Demand (kW) of DISCOs and KESC, i.e.,

$$\text{CP} = \text{Rs.} \div \text{kW}$$

- Capacity Transfer Rate of each DISCO & KESC is equal to Rupee per kW (CP) multiplied by Demand of each DISCO or KESC, i.e.,

$$\text{CTR} = \text{CP} \times \text{Demand}$$

- **Calculation of Energy Transfer Rates:-**

- Energy Price is the Total Cost of Generation (Rs.) paid for the total number of units produced (kW) on each hour basis (h), i.e.

$$\text{EP} = \text{Rs.} \div \text{kWh}$$

- Energy Transfer Rate is the multiple of the Total Energy (kWh) delivered to DISCOs and KESC, i.e.,

$$\text{ETR} = \text{EP} \times \text{Energy Delivered}$$

- Power Purchase Price (PPP) for each DISCO / KESC is therefore:-

**CTR + ETR + UoSC (Use of System Charges)**

- Consumer End Price (BILL) is therefore:-

**CTR + ETR + UoSC + DM (Distribution Margin)**

As stated above, the pool cost of generation licensees and transmission licensee is being transferred to the distribution licensees according to the Transfer Price Mechanism approved by NEPRA as pass through cost to the consumers through distribution companies termed as Power Purchase Price (PPP) while determining the overall consumer end tariff.

Generally, the tariff for distribution licensee is set on annual basis except for KESC based on the revenue requirement of tariff control period. Currently, NEPRA has determined the Tariff Setting Methodology for Distribution Licensees of Pakistan to adjust the consumer end tariff for all categories of the consumers on periodical basis which summarized below:

- Determination of revenue requirement / cost of service / average tariff on annual basis;
- Quarterly Adjustment under approved annual average tariff;
- Monthly fuel price adjustment.

As per the guidelines under Rule 16 of the Tariff Standards and Procedure Rule 1998 the tariff should be predictable. In order to minimize the volatility in the consumer-end tariff due to aforementioned reasons, the Authority determines revenue requirement annually.

## Annual Assessment of Revenue Requirement

The following components of tariff are subject to annual assessment;

- a) Assessment of T & D losses target.
- b) Assessment of Sales target.
- c) Impact of Consumer mix variance.
- d) Month wise assessment of reference values with respect to PPP (including energy, capacity & transmission charges) for the whole control period.
- e) Assessment of Distribution Margin, and ;
- f) Assessment of prior period assessment, if any.

Certain adjustments like impact of losses, variation in capacity transfer price and UoSC, impact of extra or lesser purchases of units are made on quarterly basis.

## Quarterly Adjustments

On the basis of annual assessment, the consumer end tariff for the tariff control period is worked out subject to the quarterly adjustments. Thus, the scope of quarterly adjustments is limited to:-

- a) Adjustments pertaining to the capacity and transmission charges;
- b) Adjustments of Variable O&M as per actual.
- c) Impact of T&D losses on the components of PPP;
- d) Impact of extra or lesser purchases of units on account of PPP.

## Monthly Fuel Adjustments

Adjustments on account of variation in fuel cost component, due to variation in fuel price of PPP are being done on monthly basis. This adjustment reflects in the consumers' monthly bill as Fuel Adjustment Charge. In case, NEPRA observes abnormal variation in fuel prices having substantial impact on PPP; then NEPRA may review references set for fuel price adjustment along with any quarterly adjustment. Further, this is clarified that PPP is pass through for all the DISCOs (variable cost).

## NEPRA Determination of Consumer End Tariff

The **Consumer End Tariff** is also determined by NEPRA to recover the cost of whole supply chain. NEPRA determines the Consumer End Tariff structure at each stage of generation, transmission and distribution licensee, on the basis of various Slabs depending on nature of connection and the consumption.

The overall cost of generation, transmission and distribution (each determined at relevant stages by the NEPRA) is published in the Gazette of Pakistan under **Schedule – I**.

The Government of Pakistan, in order to facilitate end Consumers gives subsidy and reduces the tariff chargeable from end Consumer that is provided by **Schedule – II**.

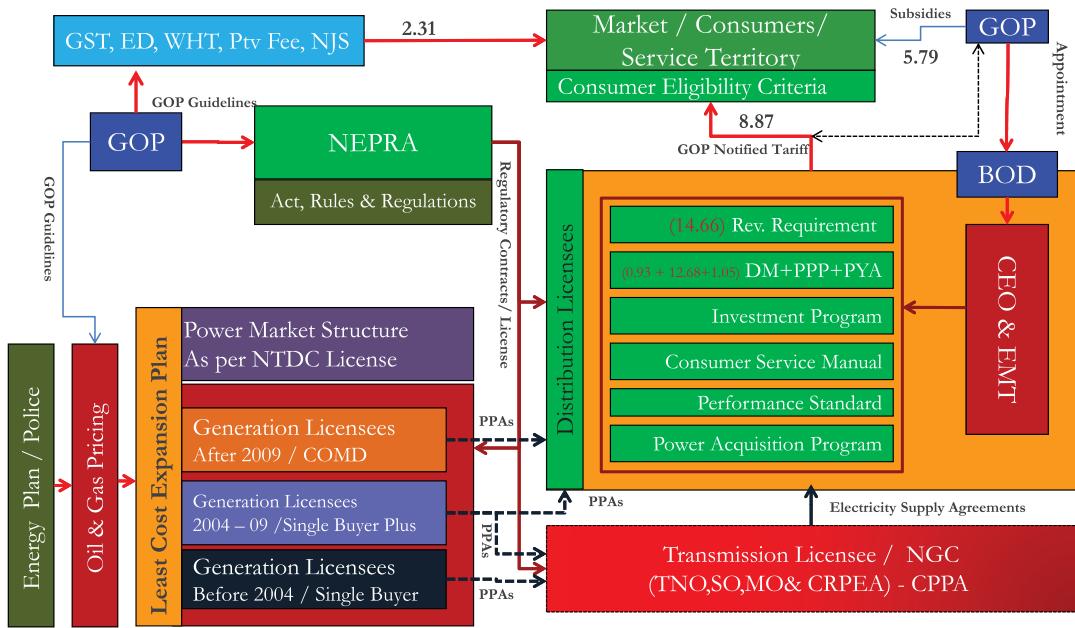
Based on the tariff and price setting methodology explained above, the Power Purchase Price, Distribution Margin of each of distribution licensees is determined for financial year 2012-13 on projected numbers, which in turn formulates the reference values for the monthly fuel adjustments & quarterly adjustments with respect to Capacity and Transmission Charges for the DISCOs.

The NEPRA Determined revenue requirement of each of service territory of the distribution companies / licensees is tabulated below:

Discos	Nepra Determined Average Requirements / COS				
	PPP	PPP Adj.	DM	PYA	Average Rage
	Rs. / kWh				
IESCO	11.45	0.14	0.95	1.10	13.64
GEPCO	12.12	0.05	0.66	1.17	14.00
LESCO	12.09	(0.23)	0.97	1.13	13.96
FESCO	11.85	0.32	0.88	1.34	14.39
MEPCO	12.78	0.01	0.80	1.26	14.86
PESCO	14.25	(0.10)	1.18	1.11	16.45
QESCO	13.54	0.50	1.74	1.50	17.29
HESCO	12.42	(0.06)	0.91	(0.71)	12.56
SEPCO	14.51	1.02	1.13	0.31	16.96
<b>Average</b>	<b>12.58</b>	<b>0.11</b>	<b>0.93</b>	<b>1.05</b>	<b>14.66</b>

The following figure shows the summary of the whole power sector with distribution licensee which contribute towards the determination of end user tariff:

## Pakistan Power Sector – Regulatory view



### Recovery of Costs by Distribution Licensee from end-Customers

The tariff structure through which above determined average revenue requirement/ cost of service is recovered along with the level of subsidy provided to customers of distribution companies / licensees (Difference of NEPRA determined rate and GOP notified rate) is tabulated below:

Discos	Nepra Determined Average Rate			GOP	GOP
	Fixed Charge	Variable Chare	Average Rate	Average Rate	Subsidy
Rs. / kWh					
IESCO	0.49	13.15	13.64	8.56	5.08
GEPCO	0.46	13.51	13.96	8.60	6.37
LESCO	0.55	13.45	14.00	9.25	4.76
FESCO	0.53	13.86	14.39	8.70	5.69
MEPCO	0.57	14.29	14.86	8.55	6.30
PESCO	0.54	15.91	16.45	8.82	7.63
QESCO	0.61	11.95	12.56	7.95	4.61
HESCO	0.31	16.98	17.29	10.03	7.25
SEPCO	0.28	16.68	16.96	9.92	7.05
<b>Average</b>	<b>0.51</b>	<b>14.15</b>	<b>14.66</b>	<b>8.87</b>	<b>5.79</b>

The customers class-wise average rates and average subsidy worked out based on NEPRA determined rates and GOP notified rates of May 16, 2012 for each of customer's class is tabulated below:

Customers Classes	Nepra	GOP	Subsidy
	Average Rs. / kWh		
Domestic	14.08	7.73	6.35
Commercial	16.77	11.81	4.96
Industry	13.91	8.58	5.33
Bulk	14.53	9.39	5.15
Agriculture	13.49	8.21	5.28
Others	13.80	8.44	5.36
<b>Average Variable Charge</b>	<b>14.15</b>	<b>8.39</b>	<b>5.76</b>
<b>Average Fixed Charge</b>	<b>0.51</b>	<b>0.48</b>	<b>0.04</b>
<b>Overall average Charge</b>	<b>14.66</b>	<b>8.87</b>	<b>5.79</b>

The Distribution licensee is supposed to recover all costs allowed by NEPRA and accordingly cash collected through billing on approved rates for recover of all costs of supply chain to be paid in reverse order i.e. cash collected from consumers is required to pay to NTDC / CPPA after deducting its DM and transmission company / license is required to pay to generation licensees after retaining its UoS. Any shortfall in this regard will create circular debt within the regulatory determined costs. However, if distribution and transmission licensee retained cash more than the regulatory determined costs, it will further add to circular debt under the single buyer model and system has to incur additional financial cost to support the working capital requirement beyond the normal limits.

It is pertinent to highlight that whole power supply chain i.e. generation, transmission and distribution is working for the end consumers / market. As already stated that under the regulatory regime, issuance of distribution licensees means that each distribution company has its defined service territory and accordingly has specific cost of service for supply of electricity to its service territory.

In short, the entire country is now divided into regional markets and each distribution company is responsible to meet the supply requirement of its own market / service territory. The cost of service means differential tariff of each market or service territory. The whole supply chain is working to provide the electricity to the customers of the regional markets so all the prudent costs incurred would be required to be recovered from customers through tariff.

Fulfillment of Customer requirements and financial requirements are mandatory for uninterrupted power supply. The consumers' contribution to the costs incurred / required

for the four areas provided in the scorecard below can achieve the objective of provision of uninterrupted power.

**The tariff for each of the licensee i.e. generation, transmission and distribution sector is being approved by the regulator in order to recover the all prudently incurred costs to meet with the demonstrative needs of its customers including the setting of performance parameters for each of licensee.**

## Balanced Scorecard view of Power Sector

Enhance Shareholder Value / Reduce GOP Subsidy

Governance – BOD / GOP		Accountability by BOD				
Financial	Sustainable Revenue Growth			Maximize Asset Utilization		Financial
Customer	<b>Electricity Customer Value Preposition / Demonstrative needs of Customers</b>				Customer	
Internal Processes	<b>Generation</b> <ul style="list-style-type: none"><li>• Power Policy</li><li>• Demand Vs. Supply</li><li>• Energy Policy deriving the Generation Mix</li><li>• Power Planning, Expansion Plan</li><li>• Power Purchase Agreements</li><li>• O&amp;M Generation Plants</li><li>• Licensing &amp; Tariff Setting</li></ul>	<b>Transmission Network</b> <ul style="list-style-type: none"><li>• Planning integrated with Generation and Distribution Networks per Grid Code</li><li>• Investment Plan aligned with Distt. network</li><li>• System Operator for all generators and inter DISCOs tie lines</li><li>• O&amp;M Transmission Network</li><li>• Licensing &amp; Tariff Setting</li></ul>	<b>Distribution Network</b> <ul style="list-style-type: none"><li>• Planning integrated with Transmission Network as per Distt. Code</li><li>• Investment Plan</li><li>• O&amp;M Distribution Network</li><li>• <b>Licensing &amp; Tariff Setting</b></li></ul>	<b>Customer Services</b> <ul style="list-style-type: none"><li>• Customer Care Centers</li><li>• Walk by HHUs with RF enabled meters</li><li>• Automatic Meter Readings (AMRs)</li><li>• Accurate billing and efficient complaints handling mechanism</li><li>• Compliance to regulatory standards</li></ul>		Internal Processes
Human Resources	<b>HR Best practices</b> <ul style="list-style-type: none"><li>• Organization Structure</li><li>• Competency &amp; Skill requirements</li><li>• Performance Management System</li><li>• Competency and Skills Gap Analysis</li><li>• Periodic review of HR Policies</li></ul>	<b>Hiring and Succession Planning</b> <ul style="list-style-type: none"><li>• NEPR approved hiring plan</li><li>• Succession Planning for key management position</li><li>• Capacity Building &amp; Trainings</li></ul>	<b>Capacity Building and Training</b> <ul style="list-style-type: none"><li>• Management Training</li><li>• Job related Training</li><li>• Career Development Training</li><li>• Automation related Trainings</li></ul>	<b>Corporate Social Responsibility</b> <ul style="list-style-type: none"><li>• Management training program for youth</li></ul>		Human Resources

The above picture shows four perspectives i.e. Financial, Customer, Internal Processes and Learning & Growth (Human Resource). The internal processes of generation, transmission network, distribution network and customers services must be align in area of planning, expansion and operation towards the electricity value preposition which has four critical ingredients of electric needs of a customer i.e. reliable load/supply, meet technical parameters, efficient customer services and in return charging of predictable regulatory tariff. The power sector has to hire those professionals which have relevant education, skills, experience and competencies aligned towards internal processes. Alignment of human resources towards aligned processes and processes alignment towards customers' delivery will in return enhance shareholders' value and reduce subsidy being paid by GOP to power sector.

# Chapter 3

# Power Sector Challenges - The Circular Debt Issue

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## Chapter 3

# Power Sector Challenges - The Circular Debt Issue

The power sector in Pakistan is facing innumerable problems and bottlenecks in almost all the areas such as policy, regulatory, governance and operational problem. In addition to these problems, the political mindset is also working with provincial focus to address these issues. The country energy policy/ plan derive the power policy and plan which should be aligned with the country's regulatory framework. As power policy and plan will derive future generation mix, as such investment by public sector or private sector will impact distribution licensees and its customers.

The power sector is also lacking mainly in integration planning and integrated thinking due to which it has a worse energy mix that results in higher power generation cost which ultimately has negative impact on the economy in terms of unemployment and inflation. The sector governance system is also having serious performance challenges in power planning and alignment with regulatory regime and overcome the factors contributing towards creation of circular debt.

## Circular Debt Issue

Some of the main factors contributing to the accumulation of circular debt in the power sector are identified under the following heads:

### XWAPDA Gencos

- Actual heat rate/efficiency of GENCOs plant are more than NEPRA determined heat rate. The additional heat rate consumed per unit produced is not covered in any tariff and resultantly adding to the circular debt straightway.
- Increased pay and allowances due to the hiring of employees beyond NEPRA determined manpower cost is also adding to circular debt straightway and is not covered in any tariff.

### NTDC /CPPA

- NTDC tariff is set on 2.5% transmission losses whereas actual losses are more than that set by NEPRA. As a result, cost pertaining to excess loss by NTDC is not being recovered from any tariff which ultimately adds to the circular debt.

- Increased pay and allowances due to hiring of employees beyond NEPRA determined manpower cost is also not being allowed to recover from tariff and resultantly adding to circular debt straightway.
- Late payment surcharges paid by CPPA of NTDC to the IPPs resulting from the inability of the DISCOs to pay for the power cost in timely manners is also not covered in any of the tariff setting mechanism.

## DISCOs

- DISCOs network loss is more than NEPRA determined T&D loss which range from 0.02% to 11.52% among efficient performing DISCO to worst performing DISCO. The cost pertaining to excess loss of and above the NEPRA determined loss level is not being recovered from any tariff and adds to the circular debt.
- Increased pay and allowances due to hiring of employees beyond NEPRA determined manpower cost is also not being allowed to recover from tariff and resultantly adding to circular debt straightway.
- Poor revenue collection by the DISCOs on average is 20% low due to which liabilities of power sector towards power cost is not being paid and this poor revenue collection is adding to the circular debt as wells as load shedding.
- Prolonged stays on fuel price adjustments granted by the Courts and impact of court decisions that have delayed payments to DISCOs.

## Decision making

- Inadequate budgeting of TDSdelays payment and increases financing costs;
- Delay in tariff notification by the government adds to the power cost due to which payment to IPPs is also delayed which have additional financing costs;
- Lack of regulatory understanding compounded by interference and delayed tariff determination;
- A fuel price methodology that delays infusion of cash to the power sector;

## Consumers / Market related Problems

- Affordability of consumers as high tariff is beyond the capacity of consumers to pay in spite of heavy tariff subsidy from GOP.
- Highly influenced big industrial consumers keep on extending their sanctioned loads resultantly increase in load shedding.
- Political interference in certain areas for posting and transfer of officers creating following problems for management which have effect on efficiency:
  - a) Increase in theft and line losses in the area.
  - b) Overbilling to certain consumers to overcome theft resulted in low collection of receivables.
  - c) Discretionary priority in Load Shedding.
  - d) Politically driven uneconomic investment from utility funding in certain areas.

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# Chapter 4

## Way Forward - Strategy to overcome Circular Debt Issue

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## Chapter 4

# Way Forward - Strategy to overcome Circular Debt Issue

A comprehensive strategy need to be adopted by all the stakeholders in the power sector i.e. government, NEPRA, NTDC, DISCOs, Gencos etc to overcome the circular debt issue in Pakistan. In this context, the following short-term and long-term measures are suggested to overcome or gradually reduce the circular debt:

### Speedy BMR of GENCO Plant

- BMR of existing GENCOs plant which is already under way, need to be completed within shortest possible time so as to bring its efficiency to the NEPRA determined benchmark level. This will facilitate increase in generation with same consumption of fuel and reduce the circular debt to the extent of extra fuel consumption over and above the NEPRA determined heat rate.
- XWAPDA Gencos need to prepare proper justification to convince regulator to allow impact of increased pay and allowance beyond NEPRA determined manpower cost for those employees hired under the existing yardstick criteria (Sanctioned strength) approved under the legacy system by WAPDA and in future any such hiring should be done after having regulatory approval to the yardstick according to the criteria developed on the basis of best utility practices.

### Periodical Review of NTDC Technical Losses

- NTDC technical losses varies on the basis of flow of power in different season and to different load centers, so there must be a mechanism according to which periodically NTDC technical losses should be reviewed based on third party analysis and the same should be rolled in tariff.
- Cost of working capital need to be made part of the rate base so that late payment penalty paid by NTDC / CPPA to the IPPs resulting from the inability of the DISCOs to pay to NTDC / CPPA for power purchased resulted due to non-collection of bills from government and private consumers.
- NTDC / CPPA needs to prepare proper justification to convince regulator to allow impact of increased pay and allowance beyond NEPRA determined manpower cost for those employees hired under the existing yardstick criteria (Sanctioned strength) approved under the legacy system by WAPDA and in future any such

hiring should be done after having regulatory approval to the yardstick according the criteria developed on the basis of best utility practices.

## Improving Efficiency of DISCOs

- The BOD and management of DISCOs should take the following measures:
  - a) Bring line losses to the level of NEPRA approved line losses target;
  - b) Improve collection from Government department / agencies;
  - c) Improve collection from Private Consumers;
  - d) Effectively work with legal department for vacating the prolonged stays on fuel price adjustments granted by the courts;
  - e) Bring transparency in load shedding and give priority between the economic loads vs. non-economic load.
  - f) Work with NEPRA to allow impact of increased pay and allowance due to hiring of employees beyond NEPRA determined manpower cost.
  - g) Implementation of business controls through automation of business processes by introduction of new technologies etc.

## Reducing Power Purchase Cost to decrease Consumer Tariff

- For reduction in Power Purchase cost, the following steps are required:
  - a) Improve in Generation Mix by adding generation on coal (imports in medium term and local in long term), increase in hydel generation in rationalized manner as it is depended on water.
  - b) Sufficient gas allocation to the power sector.
  - c) Impact of delayed tariff and fuel prices adjustment in billions need to be passed on to consumers through multiyear tariff regime.
  - d) Comprehensive review of tax regime on electricity sector as on one hand, tax is levied on tariff and on the other, heavy subsidy is given to the power sector.

## **Revising Tariff Differential Subsidy (TDS) Mechanism**

- Tariff Differential Subsidy (TDS) should be limited to the extent it is provided in the fiscal budget. NERPA may issue tariff determination after considering the TDS to the extent provided in budget and notify the tariff directly without referring it to the government.
- The TDS settlement among the stakeholders could be done by NEPRA at central point and disbursement of cash for TDS by Ministry of Finance could be directed to CPPA on behalf of DISCO on the direction of NEPRA.
- Once TDS mechanism is revised as above, NEPRA may be given responsibility to issue tariff notification, instead of the government. This would speed up the process as normally ample time is taken by MWP to decide for issuance of notification in view of required clearance for TDS from multiple authorities.

## **Introducing Automatic Tariff Adjustment (ATA) Mechanism to overcome Fuel Price Adjustment Issue**

- To overcome fuel price adjustment issue, an Automatic Tariff Adjustment (ATA) mechanism should be introduced through which the DISCOs in first step may implement impact of variation in predetermined tariff to the extent of fuel price variation according to mechanism determined in annual or multiyear tariff determination. This should be reviewed by NEPRA periodically and difference, if any, must be adjusted in next period pool cost determination;

## **Restructuring of NEPRA / Regulatory Authority**

- Competent, hardworking and honest professionals from the market, having prior experience of working in the power sector, should be considered for appointed as Members and Chairman NERPA including the professional staffs after having necessary amendments in NEPRA Act.
- Restructuring of Regulatory Authority after having complete process review compared with the regulatory deliverables in short, medium and long term.
- After having process review, the development of JDs having complete list of skills set, competencies and experience requirement including the KPIs.
- Review of existing employees' competencies and skills set vis-a-vis required competencies and skills set and accordingly develop training plan and new recruitment, if required.

## Restructuring of Boards of DISCOs

- Elimination of political appointees on the BODs of power sector entities and revisit the same in accordance with guidelines provided in code of corporate governance for public sector entities and further clarified by Honorable Lahore High Court in its decision on famous case of CEO appointment in DISCOs;
- The size of BOD should be reduced to 07 members including the CEO.
- Full autonomy should be given to the BOD of DISCOs to take following actions:
  - a) Appointment of CEO, CFO and Head of Internal Audit;
  - b) Performance Contract between GOP and BOD;
  - c) Performance Contract between the BOD and Management in support of performance contract with GOP;
  - d) All employees related matter to be dealt at company level including the promotion, transfer and posting of officers of BPS 18 and above, no interference from any external agency.

## Power Policy for Power Sector

- Power policy need to be developed in line with the power market structure mentioned by NEPRA in NTDC license.
- The power market structure for the power sector can be changed or reviewed, if required, with the involvement of stakeholders. However, power policy and the regulatory framework should both be in line with each other.
- Expedite the completion of new thermal plants and BMR of existing Xwadpa generation plants as already mentioned.
- The rationalization of gas allocation to power sector should also be reviewed in order to improve the generations mix.

## Reviewing Power Market Structure

- To move to the next stage of power sector reform, the review of power market structure, including its time line as defined in NTDC license, is important.

- All the additional new generation capacity should be added in system in accordance with power market structure to meet the demand of specific market or service territory of DISCO and accordingly it should be made part of the power acquisition program of distribution licensee responsible to meet the demand of that specific market or service territory. Presently, Power Market Structure and its timeline are mentioned by NEPRA under NTDC license (not followed in practice since 2002).
- All regulatory timelines which are not achieved, needs to be reviewed with the participation of all stakeholders so that necessary steps could be taken up which are prerequisite to implement certain advancement or interventions or power market structure envisaged by the law makers.





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