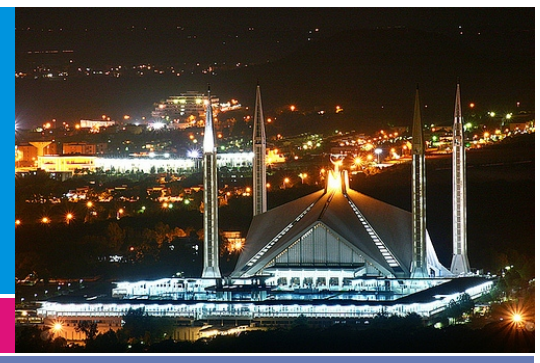
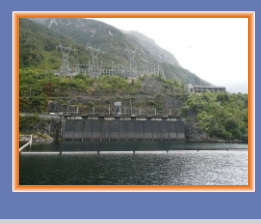
Electric Forum

NEPRA Newsletter

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY



Vol - 6 (No. 3) July - September 2009


NEPRA ACT AND RENEWABLE ENERGY

By Mansoor Elahi, Board Member, AEDB

The regulatory framework is ordinarily directed to protect the short-run and long-run interests of the consumers by promoting economic efficiency. The most direct way to achieve economic efficiency is to encourage or mimic competition. As such, regulatory intervention is required where competition is not feasible, as in areas where there is a natural monopoly (NTDC/Distribution Networks) or in situations where externalities have not been internalized.

The regulator of the traditional electricity utility sector seeks to provide revenues to cover costs and also to provide a specified rate of return on equity or investment. In return the utilities are expected to provide their customers electric power with high reliability at lowest possible rates. There are several ways of accomplishing the regulatory objectives in the electric power industry. Two basic regulatory forms are Cost of Service regulation (COS) and Performance Based Ratemaking (PBR). The data used in these analysis is associated with the market place i.e. cost of capital, operating costs, depreciation, taxes etc.

There is however a need to have a different perspective on renewable energy projects. This is because prices do not always reflect all relevant social and economic concerns which are the underlying concept in the promotion of renewable energy. Substantial differences exist in the application of traditional regulatory cost of service or revenue requirement analysis etc for electricity utility regulation and the need to internalize the social and economic benefits in renewable energy projects to provide a level playing field for investment in these projects.

These differences have the following policy implications for regulatory authorities: -

i. Projects may be viable from the social perspective and not from the private perspective.

ii. Renewable energy should be viewed as an issue that involves multiple objectives such as developing indigenous sources of energy, maximizing regional development, protecting or improving environmental quality etc. This requires internalizing the concept of externalities in the social cost benefit analysis.

iii. Policy maker and regulator needs to be apprised of the fact that renewable energy may be an attractive investment from the overall perspective of society even though private investors may not perceive these benefits.

NEPRA Act was conceived as part of power sector reform to unbundle the generation, transmission and distribution activities of public utility i.e. WAPDA. The

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To ensure regular dissemination of information about important activities and events, NEPRA Newsletter is published on a quarterly basis. This 20th edition of the Newsletter focuses on the prevalent energy paradigm and the pertinent role of NEPRA (1st July - 30th September, 2009)

reform separated the regulatory function of the government to a legally autonomous regulatory authority. It was obviously not expected at that time that renewable energy would be provided an adequate place in the constitution of a legal framework for regulation of electricity sector. Considering that there are substantial differences in the approach towards these two divergent technologies it would not be fair to expect from the regulator to provide a level playing field by interpreting regulatory law where there is no specific mention of the terms on which renewable energy is to be promoted.

The Authority while determining tariff is immediately placed in the political and public perception of comparing the consumer-end tariff during the period of state owned monopolies where prices were artificially suppressed through budgetary support and indirect subsidies. The regulator in this environment tries to balance the interest of the consumers as well as of investors. The consumer interest is however, reflected by maintaining a lid on prices in the short run. It has, however, to be perceived as a long term strategy to continuously provide for maintenance and investment in the electric power sector. This also leads us to the point that a diversified generation capacity makes the consumer less vulnerable to shortages or price increase of a particular fuel. The consumer interest is protected not only by adequate pricing but also by diversity and security of supplies. The regulatory law has to specifically provide for aspects of promotion of renewable energy. The Authority is no doubt legally 'autonomous' but it has to operate within the implied political pressure reflecting populist sentiment to keep the lid on prices. Such pressure may find it difficult to initially reflect higher capital cost of renewable energy as compared to the old depreciated units of thermal energy and 'bulk' hydel.

In view of above facts, it would serve no useful purpose to interpret NEPRA Act & Rules as having enough space and depth to include promotional aspects of renewable energy. This would have been possible if the basis of analysis of renewable energy were the same as those applicable to the cost of service. In view of radical departure in the analytical tools based on social and economic costs, it would be advantageous to identify renewable energy separately in the NEPRA Act. This would provide confidence to the Authority that promotion of renewable energy has specific legal mandate from the parliament. Any effort to interpret the NEPRA Act to allow renewable energy to be fully covered is at best an effort to marginally interpret the law to provide a thrust in that direction. This is even legally a second best alternative. The circumstances in which the law was conceived and the environment in which the regulator has to operate would not provide any comfort to the regulator for promotion of renewable energy. It is, therefore, advisable that a separate chapter may be introduced in the NEPRA Act dealing with power purchase, access to the grid and pricing of renewable energy. An example of the amendments is as follows:

Preamble:

To facilitate a sustainable development of energy supply, particularly exploitation of indigenous resources, of supplying power to remote and far flung areas, protection of environment, by incorporating long term external effects, the development of technologies for the generation of electricity from renewable energy sources is supported.

Obligation to Purchase and Transmit Electricity:

NTDC shall immediately and as a priority connect plants generating electricity from renewable energy sources to their systems and guarantee priority purchase and transmission of all electricity from renewable energy sources.

Premium Tariffs:

Renewable Energy (RE) producers shall be able to sell electricity produced by them to NTDC at the premium tariffs set by the regulator/government in respect of each RE technology. The premium tariffs shall include or in addition to the average price of electricity paid by different consumer categories or the general cost of production of those RE technologies supported by the government.

The cost of renewable energy shall be borne by electricity consumers through a charge that is added up to their bills.

Concluding remarks:

Marginal or derived interpretation of NEPRA Act and Rules may not serve the purpose of either attracting private sector investment or create confidence in the Authority to take regulatory decisions for promotion of renewable energy. It would be appropriate to introduce a separate chapter on the Promotion of renewable energy in NEPRA Act. This certainly is far better arrangement than being provided guidelines from the government under section 7(6) of NEPRA Act as has been done in the first phase of renewable energy (upto December 2009). A clear and specific mandate on issues pertaining to renewable energy is a sine qua non for its development.

PUBLIC SECTOR GENERATION COMPANIES (EXWAPDA GENCOS)

by Syed Imam Ali Rivzi, Director Thermal, NEPRA

Background

1 Government of Pakistan (GoP) introduced WAPDA restructure plan in 1992, as a result WAPDA power wing except Hydel Generation was unbundled into GENCOs (04), NTDC (01) DISCOs (08) and PEPCO was also created. WAPDA role was restricted to Water Wing and Hydel Generation. WAPDA Thermal Power Generation Plants were divided originally into three GENCOs namely GENCO-I (JPCL) Jamshoro, GENCO-II (CPGCL) Guddu, GENCO-III (NPGCL) Muzaffargarh. GENCO-IV (LPGCL). Later on GENCO-I was further divided into GENCO-I & GENCO-IV. GENCO-IV (LPGCL) consists of only Lakhra Power House which was taken out of GENCO-I for leasing. It was leased out but handing over of the plant to lessee is pending because of litigation.

2. Each generation company will be discussed and analyzed with recommendations for improvement of its performance. Thermal Power Plants load is ambient conditions dependent. They operate at high speed and high temperature therefore, wear & tear and forced outages are more than Hydel Plants. Cooling tower performance also becomes very poor in rainy and humid season which reduces steam turbine units output.

3. Major reasons for the De-rating / Lost Output of GENCOs Power Plants are common and are mentioned below:-

Aging Factor

Most of the GENCOs Thermal Power Plants are old and have completed their useful life as shown in table 1 & 2.

Table-1
GENCOs Plants Age

Power Plant	Life of Units	No. of Units	MW
TPS Jamshoro (4)	Upto 20 Years	16	2232
TPS Guddu (3)			
GTPS Kotri (CCP-1)			
TPS Muzffargarh (6)			
GTPS F/abad (CCP-1)			
FBC Lakhra (1)			
TPS Guddu (8)	20 to 30 Years	13	845
GTPS Kotri (4)			
TPS Quetta (1)			
GTPS F/abad (8)	More than 30 Years	19	503
SPS F/abad (2)			
NGPS Multan (2)			
GTPS Kotri (2)			
TPS Guddu (2)			
GTPS Shahdara (3)			
Total		**48**	**3580**

Table-2
Units Retired/stopped

Sr. No.	POWER STATION	CAPACITY (MW)
1	TPS Sukkur	**50**
2	TPS Quetta (Unit 1, 2 & 3) Unit 4 & 5 shifted to Panjgur	**60**
3	TPS Multan Cantt.	**20**
4	NGPS Multan (Unit 2, 4)	**130**
5	GTPS Shahdara (Unit 1, 2 & 6)	**41**
6	FBC Lakhra (Unit 2, 3) Stopped for Rehabilitation	**100**
	Total	**401**

4. Lost output of some units is of permanent nature and its cost effective recovery is not possible. However, recovery of lost output of some of the units is possible and about 665 MW is recoverable at the expenditure of US $ 115.71 million, as is evident from table 3.

Table-3
Capacity Restoration of GENCOs

S.#	Description of Activities	Existing Cap. (MW)	Addition (MW)	Expenditure (M US$)	Remarks
PHASE-I					
1.	Up-Rating of Unit 6, 9 & 10 (TPS Guddu)	215	70	10.82 (Mat. Available)	Work in progress.
2.	MOH of Unit 11, 12 & 13 (TPS Guddu)	290	155	7.89 (Mat. Available)	
	Total Addition		**225**	**18.71**	
PHASE-II					
1.	Up-Rating of Unit 5, 7 & 8 (TPS Guddu)	225	55	12.0	
2.	Rehabilitation of Unit 1-4 (TPS Jamshoro)	700	150	45.0	
3.	Rehabilitation of Unit 1-6 (TPS Muzaffarrarh)	1130	165	20.0	
4.	FBC Lakhra	150	70	20	
	Total Addition		**440**	**97.0**	
GENCOs Capacity after completion of jobs					
	Existing Capacity of GENCOs			**3580 MW**	
	Capacity after completion of Phase-I			**3805 MW**	
	Capacity after completion of Phase-II			**4245 MW**	

Gas constraints

In the country, fuel (gas & RFO) shortages are continuing since 2006 and are going from bad to worst with time. Gas reserves in use are in declining trend and new gas fields are not developed proportionate to the demand. To meet the fuel requirements of Thermal Power Plants, RFO is imported which involves heavy foreign exchange. Despite GOP commitment to provide financial assistance, the oil companies are at the verge of default. Due to fuel constraints, about 800 to 1000 MW thermal capacity is available but not utilized. Most of the time units, load is restricted to less than base load by sacrificing the efficiency. After reduction of gas allocated quota or in some cases gas cut-off, GENCOs plants are continuously operating on RFO which causes;

- Low Efficiency
- Decrease in Load
- Decrease in Availability
- Increase in Forced Outages
- Decrease in Reliability
- Frequently Choking of Air Pre-Heaters and Damage due to Corrosion
- Soot Formation on Boiler Tubes etc.

5. The data and major issues of each GENCOs are discussed as follows: -

5.1 GENCO-I:

Jamshoro Power Company Ltd (JPCL) consists of Thermal Power Station (TPS) Jamshoro and Gas Turbine Power Station (GTPS) Kotri. Unit-wise detail of each plant is shown in table-4:-

Table-4
GENCO-I Plants

Power St./ Unit	Comm. Date	Inst. Cap. (MW)	Present Cap.(MW)	Peak Load*	Eff. %	Remarks
TPS Jamshoro						
ST-1	Jan. 1990	250	180	Unit wise load not available	33	It uses only RFO
ST-2	Dec.1989	200	180		29	Dual fuel with gas primary fuel and RFO as standby.
ST-3	Jun.1990	200	170		29	
ST-4	Jan.1991	200	170		29	
Total		**850**	**700**	**555**		
GTPS Kotri						
GT-1	Dec.1969	15	10	Unit wise load not available	16	Both GT1 - GT2 are duel fuel (Gas & diesel) and are very old.
GT-2	Jan.1970	15	10		16	
GT-3	May.1979	25	20		30	Initially Gas Turbine Units-3 to 6 were commissioned as simple cycle but later on converted to combined cycle operation. Combined cycle plant efficiency is about 30%.
GT-4	May.1979	25	20			
GT-5	Apr.1981	25	20			
GT-6	May.1981	25	20			
CC-7	Dec.1994	44	40			
Total		**174**	**140**	**80**		

**Peak load sharing in the table has been reproduced from the daily operational data supplied by National Power Control Centre (NPCC), Islamabad for September 10, 2009.*

5.1.2 As a thumb rule, half of the gas turbine output can be recovered from exhaust of GT by addition of HRSG and steam turbine (ST), e.g. for two GTs 20 MW each, 20 MW can be produced by combined cycle steam turbine unit (i.e. 20 MW GT + 20 MW GT + 20 W ST). That is why the gas turbine originally commissioned in simple cycle mode have been converted to combine cycle.

5.1.3 **Major Rehabilitation Works to be Carried out at TPS Jamshoro**

Unit No. 1

- Major overhauling
- Rehabilitation of Air Pre-heater and cooling tower
- Replacement of Final Super Heater Coils, flu gases duct, auto burner control

5.1.4 **Unit No. 2, 3 & 4**

Rehabilitation of:-

Cooling Towers, Electro Hydraulic and Mechanical Hydraulic Governing System, drain valves, soot blowing system.

Replacement of:-

Under ground cooling tower makeup lines, Turbine Vibration System, regulating control system, HP Heater along with the valve and controllers, Final Super Heaters Coils, make up lines, burner control and supervisory system.

5.2 **GENCO-II**:

Central Power Generation Company Ltd. (CPGCL) consists of Thermal Power Station (TPS) Guddu, Thermal Power Station (TPS) Sukkur (retired) and Thermal Power Station (TPS) Shiekhmanda Quetta. The Unit-wise detail is in table 5.

Table-5

Power St./Unit	Comm. Date	Inst. Cap.(MW)	Present Cap. (MW)	Peak Load*	Eff. %	Remarks
TPS Guddu						
ST-1	Mar.1974	110	50	Unit wise load not available 100	28	Very old and inefficient units
ST-2	Oct.1974	110	75		28	
ST-3	Nov.1980	210	150		31	Unit-3 is older than unit 4 but its performance is better
ST-4	Dec.1985	210	150		31	
CC-5	Dec.1987	100	70	Unit wise load not available 678	33	Three Combined Cycle Plants each with 2 GTs and ST. i. GT-7, GT-8 and CC-5 ii. GT-9, GT-10 and CC-6 iii. GT-11, GT-12 and CC-13 If minor issues are settled, the plants are capable of running close to base load.
CC-6	Marc.1988	100	65		33	
GT-7	Dec.1985	100	75		33	
GT-8	Apr.1986	100	80		33	
GT-9	Mar.1986	100	75		33	
GT-10	Apr.1986	100	75		33	
GT-11	Sep.1992	136	80		39	
GT-12	Dec.1992	136	115			
CC-13	Mar.1994	173	95			
Total		**1685**	**1155**	**778**		
TPS Quetta						
No-6	1964	35	25	25	30	Simple Cycle GT

**Peak load sharing in the table has been reproduced from the daily operational data supplied by National Power Control Centre (NPCC), Islamabad for September 10, 2009.*

5.2.2 Generation cost of GENCOs most inefficient plants is determined by fuel but capacity payment is not involved. Despite inefficient in operation, GENCOs units cost / Kwh is lower than the most modern and efficient IPPs plants. In the country where intensive load shedding is carried out mercilessly throughout the year, efficiency and heat rate are of secondary importance. Hence GENCOs are left with no option except to keep the inefficient units running till they meet some serious accident.

5.2.3 TPS Sukkar has been retired being old, obsolete, in-efficient in operation and not cost effective. Its installed capacity is 50 MW (4 x 12.5 MW).

5.2.4 **Major Rehabilitation Works to be carried out at TPS Guddu**

Unit No. 5-10

- Major overhauling/Up-rating of units using Hi-Tech GT parts.
- Installation of Hi-Tech Hardware and Up-gradation of GTs and ST Control System.
- Replacement of SSS Clutches and HRSG Economizer Tubes.
- Repair of Exhaust Ducts.
- Rehabilitation of Cooling Towers and Cooling/Sealing Air Pipeline.

Unit No. 11-13 Siemens

- Major Overhauling of the Units,
- Replacement of turbine old blades, Flame Tube, Mixing Chamber, Generator Bearing and Control Valve.

5.3 **GENCO-III:**

NPGCL consists of TPS Muzaffargarh, NGPS Piranghaib Multan, TPS Multan Cantt., GTPS Shahdara, GTPS Nihatabad, Faisalabad and Steam Power Station (SPS) Nishatabad, Faisalabad. Unit-wise detail is given in table-6.

Table-6

Power St./Unit	Comm. Date	Inst. Cap.(MW)	Present Cap.(MW)	Peak Load*	Eff. %	Remarks
TPS Muzaffargarh						
ST-1	Sep.1993	210	185	Unit wise load not available	33	This steam power station is the last commissioned by WAPDA. Its primary fuel was gas but now gas is curtailed and the plant is running on RFO.
ST-2	Mar.1994	210	200		33	
ST-3	Jan.1995	210	210		33	
ST-4	Dec.1997	320	320		35	
ST-5	Feb.1995	200	200		29	
ST-6	Aug.1995	200	200		29	
Total		**1350**	**1315**	**750**		
NGPS Multan						
ST-1	1958	65	30	Unit wise load not available	21	
ST-3	Nov.1960	65	30		21	
Total		**130**	**60**	**20**		
GTPS Faisalabad						
GT-1	Mar.1975	25	19	Unit wise load not available	21	The 4 GTs units are operating in simple cycle mode.
GT-2	Mar.1975	25	19			
GT-3	May.1975	25	19			
GT-4	Mar.1975	25	19			
GT-5	Jul.1975	25	23		35	The 4 GTs units and ST are operating in combined cycle mode.
GT-6	Jul.1975	25	23			
GT-7	Jul.1975	25	23			
GT-8	No.1975	25	23			
CC-9	Dec.1994	44	42			
Total		**244**	**210**	**124**		
SPS Faisalabad						
ST-1	Jun.1967	66	50	Unit wise load not available	27	Identical units, the boilers are very week, sometimes load is restricted to 30 MW.
ST-2	Nov.1967	66	50			
Total		**132**	**100**	**70**		
GTPS Shahdara						
GT-3-5	1967 1968	44	30	(0fuel constraints)	18	

5.3.2 NPGCL gas quota has been curtailed and diverted to Bhiki and Sharpur Rental Power plants. Gas is hardly provided for startup of the GENCO units which are converted to RFO for continuous operations.

5.3.3 **Major Rehabilitation works to be carried out at TPS Muzaffargarh**

Unit No. 1, 2 & 3

- Replacement of Boiler Super Heater Tubes and RAH elements.
- Rehabilitation of Cooling Towers and modification of Excitation system.

Unit No. 4

- Re-blading of LP Rotor
- Rehabilitation of Cooling Tower, Flue Gas Ducts and replacement of Control Valve of Turbine drains.

Unit No. 5 & 6

Replacement of I.D. Fan Rotor, Housing, dampers, GRC Fan Impeller/rotor, of Cooling Towers, Fan gear Boxes and parts.

5.4 **GENCO-IV:**

It consist of only one Plant i.e. FBC Lakhra, three coal fired units 50 MW each; two units are off the bat, only one is running at 30 MW load. It was leased out but handing over of the plant is delayed due to litigation. Labour union and others appeals are pending in Apex Court of Pakistan.

5.4.2 **Major Rehabilitation/Replacement Work** to be carried out at FBC Lakhra are the following:

- Complete Coal Handling System.
- Turbine Auxiliaries.
- Turbine Supervisory and Control Equipment.
- Water Intake System.
- Cooling Towers and Condensers.
- Water Treatment System.
- Boilers and Auxiliaries.
- Switch gears and Switchyard equipment

Power St./Unit	Comm. Date	Inst. Cap.(MW)	Present Cap.(MW)	Peak Load*	Eff. %	Remarks
FBC Lakhra						
ST-1	Dec. 1995	50	30	25		Plant is under process of leasing

Total Generation of GENCOS

As per NPCC data, total installed capacity of GENCOs thermal power plants is 4829 MW but one unit 65 MW at NGPS Multan and two units 50 MW each at FBC Lakhra have been stopped. The current installed capacity has been reduced to 4664 MW as shown in table-7.

Table-7

COMPANY	INSTALLED CAPACITY (MW)	DEPENDABLE CAPACITY (MW)
GENCO - I		
TPS JAMSHORO	850	700
GTPS KOTRI	174	140
TOTAL	**1024**	**840**
GENCO - II		
TPS GUDDU	1655	1155
TPS QUETTA	35	25
TOTAL	**1690**	**1180**
GENCO - III		
TPS M/GARH	1350	1130
NGPS MULTAN	130	60
GTPS F/ABAD	244	210
SPS F/ABAD	132	100
GTPS SHAHDARA	44	30
TOTAL	**1900**	**1530**
GENCO - IV		
FBC LAKHRA	**50**	**30**
TOTAL PEPCO	**4664**	**3580**

6. Public Sector Power Plants

Three power plants construction have been allowed to PEPCO; these power projects and relocation of 320 MW Abu Dhabi donated power plant are being executed in public sector by PEPCO. Their status is shown in the table-8.

Table-8
PUBLIC SECTOR POWER PLANTS IN PROGRESS

Capacity	**425.10 MW CCP NANDIPUR. (03 No. GT & 01 No. ST)**
Fuel	HSFO
Location	Nandipur (Distt: Gujranwala)
EPC Cost	Euro 78.0 Million + US$164.914 Million + PKR 3050.062 Million
Commissioning Schedule	GT-1 October 2010 GT-2 December 2010 GT-3 February 2011 CC (ST) April 2011
Status	Contract has been awarded to M/s Dongfong Electric Corporation (DEC), China on 28.01.2008. Contractor has mobilized at site and civil work is in progress. Manufacturing of GTs, HRSGs & ST is in advance stage.
Capacity	**526.867 MW CCPP Chichokimallian on Gas. on Gas. (3 No. Gts & 1 No. ST)**
Fuel	Gas / HSFO / HSD
Location	Within premises of existing Small Hydel Power Station Chichokimallian (Distt: Sheikhupura)
EPC Cost	Euro 95.846 Million+ US$164.414 Million + PKR 3050.062 Million
Commissioning Schedule	GT-1 24 months GT-2 26 months GT-3 28 months CC (ST) 30 months
Status	Contract has been awarded to M/s Dongfong Electric Corporation (DEC), China on 01.04.2008. Work at site not yet initiated due to delay in L/C opening.
Capacity	**721 MW CCP GUDDU on Gas (02 No. Gas Turbines & 01 No. ST)**
Fuel	Gas/HSD
Location	Within premises of existing Thermal Power Plant, Guddu
EPC Cost	US$ 602 Million
Commissioning Schedule	36 months from date of commencement
Status	Letter of award has been issued to M/S Harbin Power Engineering (HPE), China. ECC approved the project on 17.08.09.
Capacity	**320 MW. Abu Dhabi Donnated Plants (05 Nos. Frame-5 Turbine each of 16 MW capacity & 08 Nos. Frame - 6 Turbine each of 30 MW capacity)**
Fuel	Gas/HSD
Location	Within the premises of existing Gas Turbine Power Plant, Faisalabad
Scope	Project would be implemented in two phases: Phase-I (Plant Dismantling, Packing & Local Transportation to Zayed Port, Abu Dhabi) Phase-II (Transportation to Pakistan, inland transportation to site and Erection/ Commissioning etc)
EPC Cost	The entire cost of phase-I & phase-II will be borne by the Government of UAE/ADWE
Commissioning Schedule	Yet to be firmed up
Status	Phase-I Packing of 5 Nos Frame - 5 dismantled machines is in progress. Phase-II Finalization of contract is in progress

7. RECOMMENDATIONS:-

Restoration of Gas Supply to GENCOs Plants:

i. GENCOs Thermal Power Plants are dual fuel (Gas & Oil) except the unit-1 at GENCO-1 Jamshoro. It is the only unit on RFO. On rest of the GENCOs Plants, gas is the primary fuel and RFO/Diesel is the standby fuel. Plants are designed on gas but due to gas shortage, the units are being run on RFO continuously. This mode of operation has increased the O&M Cost and outages manifold. For smooth, reliable and efficient operation of GENCOs Plants, GOP may be advised to restore the gas supply to the GENCOs.

ii. GENCOs may be made independent entities and may be given full financial and administrative powers in letter and sprit. Their raised invoices be paid by CPPA in the similar manner as the invoices of IPPs. It will improve the performance of GENCOs and ensure timely completion of scheduled maintenance and payment of fuel supplier.

iii. Gas supply to captive power plant be discouraged as these plants are small and old, therefore, inefficient in operation. The pipeline quality gas of these plants may be utilized at most modern and efficient plants (at about 60% efficiency) available in the market.

iv. GOP may review its policy to ban construction of power houses in public sector. Only three combined cycle power plants have been allowed to PEPCO by relaxing the power policy at belated stage resulting in high project cost and power crises in the country. The policy and performance of the institutions which have failed to provide affordable and sustainable electricity to the consumers need complete evaluation and review.

v. Keeping in view the cyclic output of Hydel Power Plants which is dependent on the factors controlled by nature, like rain, summer, winter seasons etc, thermal generation is unavoidable. Thermal Power plants capacity may be enhanced but not on RFO. Nuclear power plants or the other alternative energy resources of the country be paid more attention in future energy policies. Coal plants at the mouth of the mines or at coast (in case of imported coal) be preferred to RFO based combined cycle plants.

vi. Pay structure for GENCOs employees is very poor as compared with the pays and benefits of the employees of IPPs and rental power plants engaged in similar business. The result is, Engineers, Technicians, skilled labour and other professionals are inducted, trained and learn at the cost of GENCOs. After gaining the experience, they leave GENCOs and go abroad or in the country to serve other companies for better emoluments and prospects. They plan to leave the GENCOs even before joining them. This brain drain is contributing to poor performance of GENCOs which can be prevented by bringing the pays at par with IPPs.

vii. GENCOs power plants are not environment friendly. Most modern combustion techniques are not in place. When installed, the plants were far away from the cities of Multan, Faisalabad, Muzaffargarh, Jamshoro, but now these are in the heart of the cities and major cause of Nox, Sox, CO, CO_2 and noise pollution. The waste water from the plants is discharged in the canals and rivers at high temperature and pressure without neutralization. The GOP be advised to run these plants within NEQS.

viii. The GENCO units which have outlived their useful life and are inefficient in operation, maintenance cost is high, spares parts are not easily available and the plant is being operated by canablization of rest of the identical units. Their lost capacity is of permanent nature, and recovery is not economical, may be retired as a safety precaution, otherwise threat of fatal accidents will continue. These units may be disposed off and be replaced with latest efficient plants. In case of financial hardship of GOP, public-private partnership may be encouraged.

ix. Once the maintenance schedule for GENCOs plant has been finalized and approved by the Competent Authority, its timely execution be ensured on due dates. In case of deviation or delays in carrying out the maintenance plant it may be discussed, analyzed, responsibility be fixed and financial loss to GENCOs be ascertained. Liquidated Damages and Bonus be introduced in GENCOs. GENCOs performance after the major overhauling and determination of Annual Dependable Capacity and heat rate be made mandatory.

x. All GENCOs and WPPO/CPPA must sign a PPA and comply with it in letter and spirit without any further delay.

xi. RFO metering station is not functioning. Transparent measurement of fuel consumed is necessary for assessment of performance of GENCOs plant including efficiency and heat rate determination. It will also minimize the corrupt practices in RFO handling.

RENTAL POWER PLANTS - A VIABLE OPTION?

By Jamal Sarwar, Economist, NEPRA

At present Pakistan is experiencing electricity generation shortfall of demand of roughly 4000 MW. Lengthy power cuts have become common. There is lack of investment in existing power plants, outdated grids, rampant electricity theft and build up of arrears in recovery. Some grid companies experience line losses of up to 30-40 per cent. Many independent power producers (IPPs) operate well below capacity on account of non-payment of their fuel bills. The crisis has crippled the industry, notably textiles, the main export sector and largest employer in the manufacturing sector.

The use of Rental Power Plants (RPPs) is expected to expand significantly in a booming economy as demand increases and the competitive power markets slowly take shape. Rental power provides fast-track solutions for managing growth in demand and assuring customers of a reliable power supply at competitive prices. Rental Power Plants are typically commissioned within 4-6

months based on available technology. Rental periods are normally 5-7 years depending on the country's need. Building an Independent Power Plant (IPP), on the other hand, takes two to five years.

The rental power business gained larger publicity in the midst and aftermath of the power shortages and transmission problems that plagued California in the USA, the Asian and African Blocks including South West Asia (India and Pakistan) during 2002 onwards. Utilities scrambled for supplemental power to compensate for inadequate power generation and transmission capacities and during severe weather conditions.

Rental Power Plants have been set up in the USA, UK, India, Bangladesh, Kuwait, Sri Lanka, Turkey, UAE, Saudi Arabia, Egypt, Guatemala, Mexico and West Indies. Surging economies like China and Turkey have also gone the short-term rental route to bridge power supply gaps.

Power shortage of 5000 MW in 2010 was envisaged in Pakistan during 2005, staring from 1000 MW in 2006. The concept of rental power plants was introduced in Pakistan in 2007 when two projects were awarded to GE and ALSTORM, both from the US, for 150MW and 136MW each respectively.

The Economic Coordination Committee (ECC) in its decision of August 21, 2009 approved a total capacity of 1500 MW for induction of rental power plants into the national gird. The Federal Cabinet in a decision on August 26, 2009 endorsed the ECC decision for additional generation capacity of 750 MW**,** bringing the total to 2250 MW on a fast track basis. Originally 7% of mobilization advance was envisaged with a supporting Stand by Letter of Credit (SBLC). It was subsequently raised up to 14% against a bank guarantee to be furnished by the rental sponsors and is normally kept by the lending banks as collateral to ensure compliance. It is adjustable in the monthly rental payments accruing after commissioning of the plant. The Government of Pakistan is to pay only for the rental price of the service.

The characteristics of rental power plants include: (i) Short-term implementation to meet emergency requirements; (ii) Short-term commitments allowing flexibility to opt for long-term hydel, nuclear, coal and other projects; (iii) Rental plants serve as an example of efficiency and competence to the country's other power plants, particularly in the public sector; (iv) No capital investment in the power projects; (v) If electricity is not supplied to the grid, no payment is made; (vi) Nothing is paid for the purchase and setting up of rental power plants and no guarantees are made for any repayments to the lenders; and (vii) Rental sponsors invest hundreds of millions of dollars in fast-track development of the rental plants.

The View Point of Critics

The Pakistan Electric Power Company (PEPCO) has conducted a detailed review of the status of 15 Independent Power Producers for July 2009. The installed capacity of these IPPs is 6,068 MW. Dependable capacity stands at 5,493 MW. The total energy produced in July was 3,068 MW. There is a net shortfall of 2,425 MW of their dependable capacity, and ironically far in excess of the 2,250 MW proposed through the rentals. The approximately 800-1000 MW of idle power lying in WAPDA's thermal plants for want of maintenance and spares has not been accounted for here.

The opponents of RPPs question as to why the much needed electricity was not produced, when the capability was available and people suffered through persistent load shedding? They also argue that mostly second-hand equipment will be used which would be less efficient and that the tariff will rise and that the government would be better off spending money on upgrading and using the idle existing capacity. IPPs are permanent investments on an ownership basis. The Government is bound to continue to pay capacity tariff to these IPPs whether operational or otherwise. Ready capacity is available which can be translated immediately into power if only a small percentage of what is to be spent on rental plants is diverted to the IPPs (debt payoffs) and WAPDA's own thermal units, operating presently at less than 25% to 30% of their optimum level.

The Basis for Rental Power Plants

Demand/supply projections available in the Ministry of Water & Power and the Water and Power Development Authority (WAPDA)/PEPCO reveal that if all power projects which are under implementation come on-line as per schedule, Pakistan would still be facing around 1500-2000 MW deficit in power supply by the end of 2009. It was in this background that the Government of Pakistan decided to explore all possible options to improve the power supply situation by induction of new power plants for elimination of load shedding from the country on a fast track basis. The options available to the government were to induct new power plants through (a) public sector (b) IPPs and (c) rental power projects.

Due to paucity of funds, projects' approval and construction time, policies of Development Financial Institutions (DFIs), prevailing international financial crises and internal political & financial situation of Pakistan, the public sector was not a viable option. Similarly, due to the lengthy process of project appraisal (by lenders and sponsors), legal documentation, arrangement of funds (loans, equity), construction time, etc., IPPs were expected to have a lead time of 3-5 years from award to commissioning and were not feasible. Therefore, the only option available with the Government of Pakistan to bring new power plants online at the earliest was to induct rental power projects. Rental power projects are expected to come online within 6-8 months after award and fulfillment of basic

pre-requisites, such as signing of Rental Services Contract (RSC), advance payment, and the provision of SBLC or Guarantee by the Government of Pakistan.

The government is working on a multi-pronged strategy to address the problem through building new dams and setting up new permanent power plants. What the government is putting in place is a substitute power structure, combining IPPs and RPPs to provide immediate relief to the people of the country on a fast track basis. The policy measures have been approved by the ECC and all the power projects are processed according to the approved guidelines.

Rental Power Projects versus Independent Power Producers

There cannot be an apple-to-apple comparison between the two different sets of power projects. RPPs are simple cycle plants, have a different fuel consumption pattern and can be converted into combined cycle ones over a period of time. The reference tariff of IPPs is subject to adjustments on Commercial Operation Date (COD), whereas the rental charge is not subject to indexation. Only Indexation due to change in fuel price has been allowed. Hence, the tariff for RPPs is less than the reference tariff of IPPs for the first 10 years of IPPs operation. RPPs being short-term solutions to meet system energy shortfalls are perforce generally based on used machinery as the lead time for the purchase of new machinery may be anything up to two years. Thus, in order to ensure the availability and sound performance of RPPs, companies are required to furnish guarantees. Further, the efficiency of rental power plants, being based mostly on refurbished/second hand plants meant for quick delivery equipment, may not be compared with state-of-the-art IPP plants. However, Rental Power is not exclusive to used equipment. The Karkey Rental Power Plant is an example which is based on new machinery. Rentals have a 3-5 years technical life span when based on second hand machinery compared with a 25 years life cycle of IPPs. There are variations in project cost due to difference in technology and age of machinery and variations in financing.

In the case of RPPs, the Government of Pakistan (GOP) guarantee is available like the ones to IPPs to cover only the default events of the buyer i.e. PEPCO and entire performance risk is assumed by the rental sponsors / lenders. Rental projects are funded, normally, on an 80:20 debt-equity ratio with banks demanding 20 percent cash up-front. Valuation of the plant and machinery is done by reputable, independent auditors appointed by the competent forum, and who report directly to the lending banks. It is invariably mandatory for the rented equipment not to have an efficiency of less than 30% (net) on RFO based operation and 33% (net) on Gas and Coal based operation at base load. This compares with an efficiency of 52% on pipeline gas, 48-49% on low btu gas, 39.9% on coal and 45% on RFO for combined cycle power plant IPPs. Gas-based RPPs require 92% availability guarantee and RFO-based 85% compared to gas based IPPs requiring 90%-92% availability and RFO based 88%. RPPs are slightly more expensive than IPPs mainly because IPPs are brand new machines having latest technology and greater efficiency due to combined cycle plants.

The Award Process

Rental Power projects are legitimately processed by the Private Power and Infrastructure Board (PPIB), PEPCO and the National Electric Power Regulatory Authority (NEPRA) in a transparent manner. Rental power plants have all been awarded by PEPCO and the PPIB through an International Competitive Bidding (ICB) process. The ICB process is conducted according to the international standards. All interested parties are given a fair and equitable chance to participate in the bidding. The projects are awarded after several rounds of negotiations by the Negotiation Committees after seeking possible reductions in quoted tariffs, and improved project completion schedules. However, the prices received are reflective of the market appetite for investment in the power sector, risk reward matrix due to very short commissioning time and ready availability of equipment and conditions of the financial markets.

The Government of Pakistan has no liability to pay for setting up of the rental power plants, rental plants are paid for electricity delivered to the grid and the Government takes no responsibility for payment of loans taken by rental sponsors. The investment obligation rests exclusively with the investor who obtains finances from market sources and personal assets mobilization. The government only pays for the services and not for the investments.

The Economic Coordination Committee, in September 2008, while approving the Rental and IPP projects, decided that in case any of the approved projects fail to achieve crucial milestones as per agreements towards timely project implementation, then the project is to be immediately cancelled with penalties. The deficit power generation capacity is then to be expeditiously arranged through addition of IPPs/RPPs, both solicited and unsolicited, on a fast track basis.

Rental power projects are normally cash flow negative in the first 3-5 years but yield profits in their second run after the initial contracts have expired. This is a risk that rental sponsors take. Rental tariffs are also competitive. PEPCO is to pay for rental power only after it has recovered finances from consumers, i.e., 60 days after power is actually delivered into the national grid. Rental Plants provide a cash float to PEPCO. There also is a give-or-pay guarantee which PEPCO monitors very carefully and if power is not produced by the rental plants, there are heavy penalties charged. Furthermore, there are no financial guarantees whatsoever given by either PEPCO or by the Government of Pakistan to cover any event of default on the part of rental sponsors. This is a risk which is taken by lenders against such collaterals as they deem fit. The Government of Pakistan's guarantee covers an event of default on the part of PEPCO only. Failure to attain availability of 92% for gas-based rental power plants and an availability of 85% for rental plants running on furnace oil attracts substantial liquidated damages. Onus of performance is on the rental power companies, and mobilization

advance to rental power companies (7% - 14%) is fully secured through bank guarantees.

Conclusion

There remains a wide gap between power supply and real power demand. The Government is working not only to bridge the immediate demand-supply gap by refurbishing the old plants but to also build in additional capacity to keep pace with projected economic growth. Both foreign and local companies are being encouraged to invest in the power sector by setting up IPPs, RPPs, dams, and wind, solar and coal based power units. Rental power projects are intended to bridge the demand-supply gap in the immediate short-term. The contract life of these projects is between 3-5 years, after which the Government has no obligation to purchase power from these units.

Rental power is a viable choice for the immediate, short-term solution to meet the crises of power shortages. Rental power plants can provide breathing space for Pakistan while completing medium and long-term projects. Rental Power plants can be equipped with new or refurbished equipment. In any case equipment for the RPP must be essentially according to NEPRA guidelines that require it to be less than 10 years old and having less than 60,000 operating hours.

The Rental Payment to the Company is to commence after successful commissioning of a project and the plant is required to achieve (85-92) % availability throughout the year. In case the sponsor is unable to meet the guaranteed availability, it would be liable to pay penalty which is 1.5 times of the rental rate. If the availability achieved is reduced by more than 10% of the contracted value, the power purchaser has the right to terminate the contract without any financial liabilities.

The consumer end tariff was not increased during the period 2003-2007 although during this period the price of RFO increased tremendously. This resulted in the creation of circular debt. Circular debt is the main stumbling block for investment in the energy sector as it jams the functioning of the whole market, which retards the flow of investment. The present government took bold steps and a company “Power Holdings (Private) Ltd” was set up to absorb the liabilities amounting to Rs.216 billion of the PEPCO and its corporate entities. In addition Rs.85 billion has been generated through term finance certificates to erase the circular debt. To ensure that circular debt does not reemerge in future line losses have been planned to be reduced as per international standards and cash flows of distribution companies are to be monitored monthly and the difference will not be allowed to exceed the subsidy of Rs.55 billion.

In view of the Government of Pakistan's initiatives in hydropower generation, refurbishing GENCOs and emphasis on wind, coal and renewable technology, the tariff impact would have no likelihood of the circular debt reemerging. The Government is not spending out of its pocket for the RPPs. The investment obligation exclusively rests with the investor who obtains finances from market sources and personal assets. The government only pays for the services and not for the investments.

In the deregulated future, flexibility is likely to make rental power a strategic tool for competing successfully in the electric power industry. The availability of fast-track, temporary solutions are likely to enable utilities to deploy physical and financial assets as efficiently as possible and provide reliable, price-competitive service to customers. Countries can hire power units from overseas manufacturers that can be shipped in kit form and installed.

With communication and Customer Relation Management (CRM) becoming indispensable tools for getting closer to the market, dedicated expertise will have to be sourced to cater to utilities that seek flexibility to meet customers' needs while minimizing financial risks in a rapidly changing marketplace. Power rental companies will need to increase the number of machines available, adopt more flexible payment terms, develop strong relationships with key customers, such as the public utilities, and ensure product availability and reduced lead times.

Existing system deficit needs quick generation addition capacity. RPPs could meet the emergency requirement of the electric power system. It is only with time that RPPs would fully establish their credentials as partners in power generation with the Government. Till such time, the RPPs should not be rejected altogether but should be tested and given the opportunity to prove their mettle.

STATUTORY REPORTING ASPECT OF UNIFORM SYSTEM OF ACCOUNTS

By Noman Siddiqui, Financial Analyst / Deputy Director Tariff, NEPRA

Introduction

Section 36 of Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997) empowers the Authority to prescribe a uniform system of accounts as follows:

> “***Authority shall prescribe a uniform system of accounts which shall be followed by licensees of generation, transmission and distribution facilities with such period as may be prescribed***.”

According to the requirements of above mention provision of law, NEPRA is required to prescribe rules and regulations on a uniform system of accounts for its licensees that is-

1. Generation Licensees;
2. Transmission Licensees; and
3. Distribution Licensees.

Uniform system of accounts not only requires licensees to comply with the requirements of regulator through submitting their periodic statements such as annual returns, half yearly, quarterly, fortnightly reports on prescribed formats, but also empowers regulator to specify the standards for the statutory reporting framework for its licensees.

Statutory reporting framework mostly focuses on prescribing specific accounting disclosures of certain items in specific manner including specific accounting policies to be followed and their disclosure in the financial statements, prescribing specific accounting treatments of certain items for specific category(ies) of licensees as well as prescribing a comprehensive financial reporting framework for annual audited accounts and prescribing criteria for the auditors who may carry out the audit of the licensees.

Accounting Policies

It is a recognized accounting principal that accounting policies for the accounting treatments of the similar items should be consistent and this fact should be disclosed prominently in the financial statements, any deviation from prescribed policy can only be allowable if it is justified and approved by the statutory auditor(s).

In the following example of a hypothetical electric distribution company, an attempt has been made to explain for some selected items in the financial statement, how accounting policies may be drafted in a uniform system of accounts and how useful information may be available to all user groups through this system.

Extracts from Accounting Policies Note of a hypothetical Electric Distribution Company

ABC Electric Distribution Company Ltd.

Financial statements
For the Year 20xx-20X1

2.1 **Statement of compliance**

These financial statements are prepared in accordance with the requirements of NEPRA rules for Uniform System of Accounts and fourth/fifth schedule of Companies Ordinance 1984

3. Accounting Policies

3.1 **Provision for bad debts:**

Provision for bad debt is made on the basis of rules prescribed by the NEPRA, which are as follow:

3.1.1 **Against Non-Government Receivable**

a. xx% (say 25%) provision is made against outstanding bills after deducting their security deposits after yy (say 30) days of due date.
b. xx% (say 50%) provision is made against outstanding bills after deducting their security deposits after yy (say 90) days of due date.
c. xx% (say 100%) provision is made against outstanding bills after deducting their security deposits after yy (say 180) days of due date.

3.1.2 **Against Government Receivable:**

No provision is made against the amounts that are adjustable through Finance or other Ministries, however for non adjustable amounts policy 3.1.1 is followed for making provision against doubtful receivables.

3.1.3 No re-connection is allowed until all the previous arrears have been paid or other-wise cleared by the consumer.

3.1.4 Bad Debts are written-off only up to the extent allowed by the NEPRA.

3.2 Transmission and Distribution (T&D) losses

T&D losses are recognized in 2 categories (a) Technical losses and (b) Non Technical losses.

(a) Technical losses are recognized on the basis of identifiable difference of cost of units purchased from NTDC and cost of units billed to the customers due to technical reasons according to guidelines provided by NEPRA and are charged to Cost of Electricity / Service.

(b) Non-technical losses are recognized on the basis of unidentified differences in cost of energy purchased and cost of energy sold during the period within the limits allowed by NEPRA and are charged to Operating and Administrative Expenses.

Please note that the all the above stated polices are indicative in nature and are not any specific recommendation.

Accounting policies for the other items may be prescribed in these lines. Even accounting policies for Transmission and Distribution Licensees may also be prescribed on the similar lines.

Specific Accounting Disclosures

Every industry has its own specialization which requires special treatment and extra disclosures of certain items in the audited financial statements. For example, in the financial statements of the banks we found extra disclosures for the treatment of Advances, Deposits, Investments, Provisions against Doubtful Debts etc. to understand their business and performance. Similarly Electric Distribution Companies, Transmission Companies and Generation Companies may be prescribed by to have specific accounting treatments and/or disclosures of specific items in a specific way in their annual audited accounts to make these accounts more useful and meaningful for the users and increase the transparency and consistency in the presentation of financial results of the licensees.

Following is an example of financial statements of a hypothetical Electric Distribution Company whose accounting policies were discussed above, so that one may get the idea that how these accounting policies an disclosures are integrated and how much useful information may be available to all user groups including the regulator.

Extracts from Financial statement of Hypothetical Company prepared under the suggested disclosures

ABC Electric Distribution Company Ltd.

Financial statements
For the Year 20xx-20X1

Notes to the Accounts			**20xx**	**20xy**
			(Rupees in '000)	
4	**Revenue:**			
	From Sale of Electricity	**4.1**	**xxxx**	**yyyy**
4.1	**From Sale of Electricity**			
	Domestic Consumers		xx	yy
	Commercial Consumers		xx	yy
	Industrial Consumers		xx	yy
	Government of Pakistan		xx	yy
	Others		xxxx	yyyy
			xxxx	**yyyy**
5.	**Provision for bad debts:**			
	Against Non-Government Receivable	**5.1**	xx	yy
	Against Government Receivable	**5.2**	xx	yy
			xxxx	**yyyy**
5.1	**Against Non-Government Receivable**			
	Domestic Consumers		xx	yy
	Commercial Consumers		xx	yy
	Industrial Consumers		xx	yy
	Government of Pakistan		xx	yy
	Others		xxxx	yyyy
			xxxx	**yyyy**

5.2	**Against Government Receivable:**			
	Local Government		xx	yy
	Provincial Government		xx	yy
	Federal Government.		xx	yy
			xxxx	**yyyy**
6.	**Transmission and Distribution (T&D) losses**			
	Transmission Losses		xx	yy
	Distribution Losses	**6.1**	xx	yy
			xxxx	**yyyy**
6.1	**Distribution Losses**			
	Technical Losses		xx	yy
	Non Technical Losses		xx	yy
			xxxx	**yyyy**
7.	**Ratio of Technical losses with CAPEX last year**			
	Ratio Distribution Technical Losses with last year CAPEX		xx %	yy %
	Ratio Transmission Losses with last year CAPEX		xx %	yy %

Similar many other disclosures and accounting treatments may be identified and proposed for the Distribution Companies as well as for the Transmission and Generation Companies.

General Guidelines

Following are the general guidelines for the implementation of uniform system of accounts:

1. The system should be designed and implemented in consultation, consensus with inputs from the licensees, consumers, investors, other regulators, legal experts, financial experts, technical experts and other stakeholders.

2. A separate team should be identified and assigned for this task with a target date and with all powers that may be required under the circumstances.

3. The system should be flexible enough to accommodate the future changes in any legislation, reporting requirements and economic and political conditions.

4. It should not be very cumbersome or impractical for licensees.

5. It should be implemented with strict measures such as penalties, and even suspension / cancellation of license in case of non compliance

6. The system should be implemented gradually with some grace periods and target dates rather than implanting the entire system at once.

Conclusion

Through a practical example an attempt has been made that how external reporting aspect may be integrated into a uniform system of accounts with general guidelines for implementing this system. This is more a thinking louder exercise rather than any specific advice. But in my opinion, this system may not only be useful for NEPRA but may also be useful for other stakeholders like investors, potential investors, general public even for other distribution, transmission and generation companies.

HIGHLIGHTS OF STUDY ON CRITICAL FACTORS IN DETERMINING THE SUCCESS OF RENEWABLE ENERGY PROJECTS IN SOUTH ASIA

By Muhammad Pervaz (Program Leader) and Md. Lutfar Rahman (Research Fellow)
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In South Asia, as in other parts of the world, a number of renewable energy projects were started with a great deal of enthusiasm after the oil shock in seventies. Many of these collapsed within a few years of their implementation, either due to the declining oil prices or because of the institutional and other reasons. In the backdrop of rising demand for commercial energy while constrained with shortage in indigenous supply and price volatility of imported fuel coupled with environmental concerns, Renewable Energy (RE) development has become an important issue in energy management and economic development in all the countries of the

region in recent years. Each country has initiated actions to formulate RE policy for the country. Bangladesh, India, Pakistan and Sri Lanka have formulated RE policies exclusively or as a part of energy policy for renewable energy development. Some of the countries have specific policies in respect of certain RE resources and have set up institutional arrangements for promotion of renewables. Most of the country policies focus on providing incentives to promote Renewable Energy Technologies (RETs) by way of subsidy or tax concessions. The use of feed-in-tariff to encourage the sale of electricity through the use of RETs is slowly gaining momentum. It is encouraging that all countries are aware of the importance of RET development for energy security and environment protection. In fact, all the countries in the region have, often with technical and financial assistance from external agencies, experimented with many renewable energy technologies, devices and methods of dissemination. Among the projects some in a few countries have proved to be of outstanding success, while, many others launched with high expectations could not deliver as anticipated. Even among the unsuccessful projects some are still languishing as pilot schemes, some have been abandoned. In respect of the successful projects the countries are attempting to replicate these to the best extent possible.

Keeping in view the above facts and importance of renewable energy, the SAARC Energy Centre under its Technology Transfer Program conducted a study on renewable energy projects in SAARC Member States by engaging seven country experts and a regional expert. Country experts prepared reports of their respective countries and the regional expert, Prof. T. L. Sankar from India, synthesized them to prepare the regional report. The Study covers brief energy status, status of RE policies, RE potential and overview of RE Projects in the past 30 years with special emphasis on identification of factors responsible for successes as well failures of RE projects in the region. The study also attempted to identify the scope of technology transfer and sharing of best practices in renewable energy projects especially for rural development. The lessons derived from analyses can contribute greatly to planning and development of renewable energy projects in South Asia. Identification of risk factors will help the policy makers and developers avoid steps that would lead to failure of similar technology projects contemplated to be built now. The study concludes that success of the renewable projects require appropriate policy initiatives, institutional mechanisms, national and international financial support, capacity building, selection of appropriate technology and community participation etc. This paper provides highlights of some selected projects and lessons learnt in general from RE initiatives in the region.

COUNTRYWISE SUCCESSFUL PROJECTS

Bangladesh: Solar Home Systems

Grameen Shakti (GS), sister organization of the pioneering micro financing institution Grameen Bank, has made commendable contributions in popularizing RE especially Solar PV. By 2008, GS has installed nearly 210,000 SHS with installed power capacity of 10.0 MWp. It has emerged as the fastest growing SHS provider with present installation rate is 8,000 units per month. Countrywide network, patronization of micro financing institution and innovative payment mechanism have contributed greatly to the success of Grameen Shakti.

Bhutan: Chendebji at Trongsa Hydel Project

The country has surplus energy in the form of large hydro electric potential and has plans for extending the grid supply to all villages. A micro hydel project, Chendebji at Trongsa commissioned in 2005 has been selected as the successful project, because of the innovative and efficient management. It is community owned and community managed project with a capacity of 70kW.

India: Wind Power Generation Program

Wind power is the most successful of all RE programs in India. Wind power generation by private sector players has grown so rapidly in the last five years that it contributes in 2009 over 8757 MW which is 70% of the total contribution of renewable energy resources to power generation in India. This has been achieved without any "cash subsidy", as in the case of most RE programs. The package of incentives to investments in wind-power generation by private sector included fiscal concessions like, accelerated depreciation, tax holidays, customs duty relief, and liberalized foreign investment procedures.

Maldives: Laamu Atoll PV Project

The most successful project is the Laamu Atoll PV project funded by the Japanese government grant and implemented by a Japanese contractor. Under this project, solar panels of 2.8 KW, 4 in number, were installed to produce about 11 KW power to satisfy the power needs of multi purpose building and the island office. The project was commissioned in 2006 and has been functioning very efficiently. The factors which contributed to the success of the scheme are selection of superior technical design and good implementation. Cost was not an inhibiting factor as it was taken as a pilot research project.

Nepal: Rural Energy Development Program

The most successful renewable energy program is Rural Energy Development Program (REDP) which promotes decentralized energy planning at district level. An establishment of community organization at the village level for the operation of micro Hydel plants is underpinning component. The program relies greatly on community participation in planning and management

of the district energy systems. It has been extended to 15 districts, and is funded by Government of Nepal and UNDP. The factors which contributed to the success of the REDP program in Nepal are: Conceiving the program as part of the overall socio-economic development of geographically and administratively defined area like a district; the development of locally available energy resources like Mini and Micro Hydel which is the core of the development efforts; and generous funding by international aid agencies.

Pakistan: Agha Khan Rural Support Program

The AKRSP is a non-profit organization, which was established in 1982 by the Aga Khan Foundation of Pakistan. The main purpose of the AKRSP is to reduce poverty in Northern Pakistan. The Chitral Office of the AKRSP manages the micro-hydro program has a staff of about 50 people. The focus is on the communities in the remote areas of the Hindu Kush Mountains that are scattered and isolated, and far away from conventional electricity supplies. They have traditionally used smoky and unreliable pinewood torches and, more recently, costly kerosene lamps for lighting. Many fast flowing rivers of the area, however, make it well suited for the electricity generation through small scale hydro power plants without constructing large dams. The AKRSP has installed over 180 micro hydro power units with capacity 20 to 75 KW. These projects supply electricity to about 175,000 people.

Sri Lanka: Energy Services Development/ Renewable Energy for Rural Economic Development

The most successful renewable energy project that spread through the country to reach over 100,000 households was the Energy Services Development/ Renewable Energy for Rural Economic Development (ESD/RERED) project targeting off-grid electricity supply, from solar home systems and micro hydroelectric systems. In the same project, funding was provided to develop an estimated 126 MW of grid-connected power plants (some of which are still under construction) which may be expected to generate an annual average of 419 GWh. Sustained support from the lending agency, Project Management by private institutions (DFCC Bank and participating credit institutions), matching funds provided by the government through the provincial councils, minimal dependence on "foreign" expertise for the design and implementation of village hydro system, and quick move in by active group of solar industry players to implement the solar home systems on a commercial scale are the important factors that made the project a success.

CRITICAL SUCCESS FACTORS

The critical factors that have contributed to the success of RE projects in South Asia are : (i) The presence of an approved policy for the renewable energy sector as a whole, or sub-sector policies relating to each technology or sub-sector; (ii) Availability of reliable resource assessment data; (iii) Well established, efficient, institutional arrangements for planning and implementation of RE projects/programs; (iv) Incentives: financial, fiscal, and supportive feed-in tariff systems; (v) Participation of the community in management and operation; (vi) Project identification and prioritization with reference to the felt needs of the beneficiaries under the program /project; (vii) Project financing tied up fully in advance for smooth flow of funds for implementation; (viii) Standardization of design, technology and specifications; (ix) Due diligence of the needs, locally available capability, and resources of the area in advance; (x) Identification of training needs and provision of capacity building assistance ahead of launching a program and continuous capacity augmentation support throughout the life of the project; (xi) Availability of efficient consultancy companies and well established and reliable contracting firms; and (xii) Availability of knowledge support from reputed academic or technical institutions.

COUNTRYWISE UNSUCCESSFUL PROJECTS

Bangladesh: Wind Power

The unsuccessful program in Bangladesh is their Wind power program. A few small wind turbines were installed in the late 90s and early 2000s. They all failed within a short time. This appears to be mainly design deficiency and use of non validated wind energy data.

Bhutan: Solar Photovoltaic

Efforts in developing solar PV systems have not been successful. It has not been popularized as a scheme to bridge the time gap between the present situations of non-supply of electricity to a distance date when there will be grid connected electricity supply. The failure to appreciate and address the issue of differential cost between PV based power and Hydel power from large power stations like Tala hydel power project have led to the consumers showing very little interest or enthusiasm for such projects. The lack of trained manpower to provide technical support for maintenance and repair has also contributed to the failure of project.

India: Improved Cooking Systems

The "unsuccessful project" is Improved Cooking Systems in poor households to replace firewood and to reduce the adverse health impact of the indoor pollution. Many enthusiasts of the renewable energy technology might object to the naming of this scheme as a failure. The Improved Cooking Systems (ICS) have led to the introduction of millions of smokeless chulhas in the villages. Still it

is not considered as commercially and convenience-wise preferable to traditional cooking stoves by users. Modern-tech models did not consider the women's socio culture aspect and zero cost of traditional chulhas.

Maldives: Landfill Gas Project at Thilafushi

In 2004 a project was undertaken with UNDP assistance to explore the possibility of utilizing the gases produced from landfill for power generation in Thilafushi Island. This island receives waste from Male, Villigili and other surrounding tourist resorts. However, on commissioning the project, it was found that the burning of the waste in open fire produced foul smell, which was spreading to the neighboring islands. The contamination of sea and air triggered strong objections from environmentalists. Very poor project investigation, selection of ineffective technologies, lack of critical evaluation of the appropriateness of the selection of project parameters with reference to local conditions and the failure to visualize the adverse environmental impacts have made the project a non-starter from the beginning.

Nepal: 10 KW Wind Turbine at Kagbeni

The first effort to harness the wind energy potential in Nepal was the installation of a 10 KW wind turbine in the Kagbeni by Nepal Electricity Authority (NEA) in 1989. The feasibility study of wind power plants in Mustang and Myagdi districts in 1985 estimated the wind speed in Kagbeni to be about 10 m/s during the day time. However, improper dimensioning the turbine vis-à-vis the wind speed at that location resulted in the breakdown of the plant after two months of the installation. Lack of sufficient wind data and rugged topography resulting in variations in the wind speeds within a region, has posed a significant challenge in harnessing the wind energy resource in Nepal.

Pakistan: Solar Photovoltaic

In early 1980s, Directorate General of New and Renewable Energy Resources (DGNRER) installed eighteen imported PV systems with an installed capacity of nearly 440 KW in different parts of the country for the village electrification. The project was unsuccessful due to: lack of technical know-how and inadequate follow up since the package of project development did not include capacity building (both for working team and the beneficiaries); non-sustainable methodology, high cost and without community cost sharing.

Sri Lanka: Pattiyapola Project

In Sri Lanka, an example of a failed project is one of the earliest attempts to promote a village energy system integrating several resources to demonstrate that all the village energy needs could be met from local renewable energy resources. The project, along with two others established in Africa and Latin America was intended to serve as models for the rest of the world. This project Pattiyapola Rural Energy Centre was financed and implemented by UN Agency for Habitation. It must be emphasized that the project though classified as a failure, as it was unsustainable, had some positive outcomes as well. For example, it was able to demonstrate the workings of new technology to Sri Lankan professionals, to understand its capabilities and limitations.

Lessons Learnt

A number of very useful lessons regarding the design and implementation of RE policies, programs and projects are learnt from the analyses of the factors leading to the successful and the not-so-successful experiments and large RE programs /projects in South Asian countries. The Major lessons learnt are: (i) Each country small or large should set up an agency to deal exclusively with RE resources; (ii) The RE development agency should first organize a well designed and time bound program for the scientific assessment of the RE resource potential of the country; (iii) The agency should draft an appropriate comprehensive renewable energy policy for the country and work towards obtaining enthusiastic support and cooperation from all concerned agencies in implementing the policy; (iv) For each RE resource like wind power, solar and small hydro-power generation etc. at least one pilot plant should be established in the public or private sector using the-stateof-art technology and through reliable contractors; (v) These model projects should be used to induce external development aid agencies bilateral and multilateral and philanthropic organizations to take large programs of RET applications in each country; (vi) Procedures for identifying project locations, obtaining licenses and permissions and clearances by investors in RE projects should be simplified and quickened; (vii) Fund flow to RE projects in public and private sector, whether it be grant or loan should be smooth and timely; (viii) Academic and technical Institutions should be incentivized to take up research on all aspects of RETs, its adoption on a wide scale in the respective countries; (ix) Encouragement should be given for setting up efficient energy consulting organizations and large number of contracting firms to support implementation efforts in RE sector.; and (x) Nationwide campaigns should be launched to educate civil society on the need and benefits of adopting RE using equipment and energy conservation technology.

This article was originally published in the SAARC Energy Newsletter, Volume 3, Issue 2, June 2009.

DIVISIONAL ACTIVITIES

REGISTRAR OFFICE

During the quarter July to September 2009, following activities w.r.t grant of licences, tariff petitions, power acquisition requests and other were carried out in the office of the Registrar:

Generation Licences Issued:	05 Nos.
Distribution Licences Issued:	01 No.
Admission of Generation Licence Applications:	05 Nos.
Power Acquisition Requests Processed:	03 Nos.
Tariff Petitions Admitted:	09 Nos.
Tariff Determinations Issued:	10 Nos.
Tariff Adjustments Issued:	55 Nos.

LICENSING DIVISION

During the quarter July to September 2009, the Licensing Division carried out broad range activities relating to several licensing matters including the processing of New Applications for Generation, Transmission and Distribution Licences as well as the modification of already granted Licences.

Licensing Division facilitated Registrar office in the processing of seven (07) new filed Generation Licence applications including Pehur Hydro Project for Sarhad Hydel Development Organization (SHYDO), RYK Mills Limited, Chenab Energy (Pvt) Limited (CEPL), Ejaz Spinning Mills Limited, Sheikhoo Sugar Mills Limited, Davis Energen Private Limited (DEPL) and Hamza Sugar Mills Limited. The Licensing Division recommended the admission of all the above new application except these of CEPL and DEPL which were found deficient in information.

During this period, Licensing Division completed the processing of applications for Engro Chemicals Pakistan Limited (for Distribution Licence) Energy, Brother Sugar Mills, Al-Noor Suger Mills, SUNEC Wind Power Generation (Private) Limited and Shadman Textile Mills Ltd (for Generation Licences) and all these Licenes were issued.

Similarly for the period under consideration, the Licensing Division arranged the Public hearing for First Tri Star Modarba Limited, a Natural Gas based Combined Cycle Power Plant being set near Hawaksbay, Karachi and that AES Pakistan (Private) Limited, an imported Coal based Power Plant being set near Gadani, Baluchistan.

Licensing Division completed all the necessary formalities for cases pertaining to the grant of Generation Licences for AGAR Textile Mills (Private) Limited, UCH-II Power (Private) Limited, Ejaz Spinning Mills Limited, RYK Mills Limited, International Industries Limited-I , International Industries Limited-II and Sheikhoo Sugar Mills Limited and cases for the grant of Generation Licence were submitted to Authority for approval. Similarly, Licensing Division also processed the cancellation of Generation Licence for Jubilee Energy Limited and Bestway Power Limited. Apart from this, the request of Enar Petroleum Refining Limited for allowing it to be a Bulk Power Consumer of Anoud Power Generation Limited was also processed. Also, the cases for the LPMs of Karachi Electric Supply Company Limited (KESCL) and Northern Power Generation Limited were processed and the same were in advance stage of processing.

Licensing Division submitted a detailed report on the status of the application of KESCL for its Transmission Licence. The Licensing Division recommended the Authority to consider the application for a transmission Licence instead of Special Purpose Transmission Licnece as was being considered earlier and accordingly a revised Notice of Admission was published for the information and seeking comments from different stakeholders.

Licensing Division also submitted a detailed report alongwith recommendations in the matter of supply of power to Housing Colonies and accordingly a draft policy in the matter was submitted for approval of the Authority which will be placed on the website on NEPRA for seeking comments from stakeholders. As part of the Monitoring activities, the Licensing Division issued reminder letters to the sponsors of those applications which were not being pursed despite a lapse of considerable period of time.

TARIFF DIVISION

Tariff Division assisted the Authority in determining Generation, Transmission and Distribution tariff in accordance with the Tariff Standards and Procedure Rules 1998. During July - September 2009, the tariff division assisted the Authority in deciding tariff petitions for the following:

i) Orient Power Company Ltd. (OPCL)
ii) Sapphire Electric Company Ltd. (SECL)
iii) Laraib Energy Limited
iv) Gujranwala Electric Power Company (GEPCO)
v) Islamabad Electric Supply Company (IESCO)
vi) Lahore Electric Supply Company (LESCO)
vii) Faisalabad Electric Supply Company (FESCO)
viii) Hyderabad Electric Supply Company (HESCO)
ix) Quetta Electric Supply Company (QESCO)
x) Peshawar Electric Supply Company (PESCO)
xi) Multan Electric Power Company (MEPCO)
xii) Uch-II (Pvt.) Ltd.
xiii) AES (Pvt.) Ltd.
xiv) CPI, Tax, Fuel price variation and PPP adjustments

Hearing in the matter of KESC was also in Karachi held during this period.

Following cases are under process in Tariff Division:

i) XWDISCOs petitions for determination of consumer-end tariff for 1st quarter, July-September of FY 2009-10
ii) Grange Power Ltd. motion for leave for review
iii) Blue Star Energy Limited. Petition for determination of generation tariff for one MW hydel power project.
iv) 110 MW Guddu rental power project.
v) Sahuwal and Summundri Rental Powr Project
vi) KESC petition for increase in base tariff
vii) AES (Pvt.) Ltd. petition for determination of Generation Tariff for coal

STANDARDS DIVISION

During the reporting period, activities related to notification of Generation Performance Standards Rules 2009, Monitoring of Transmission and Distribution Performance Standards, Compliance of Grid/Distribution Code, Grid Code Review with regard to Renewable Energy (with a focus on wind energy application), draft Rules on Power Acquisition (Standards and Procedures) - 2009 moved steadily. The details are as under:-

Performance Standards (Generation)

After approval of the NEPRA Authority, final Performance Standards (Generation) Rules were sent to Cabinet Division on 17th June, 2009 for notification by the Government of Pakistan in the official Gazette. On 13th August 2009, a letter was sent to the Cabinet Division from Registrar NEPRA to intimate the latest status and early notification of these Rules. Another reminder is being sent to the Cabinet Division in October 2009.

Upon the directions of the Authority, Standards Division asked public sector generation companies (GENCOs) to provide technical / operational data of their plants on a monthly basis along with rationale for prolonged unplanned outages affecting availability of their units; the matter was taken up with the GENCOs, and the data is being received on a regular basis from these. The submitted data is under analysis and review by Standards Division.

Monitoring of Performance Standards (Distribution)

During the reported period, several meetings were held at NEPRA Offices with all distribution companies (DISCOs) Officials.

All distribution companies including KESC have submitted their revised Annual Performance Reports (APRs) for the

previous years including 2007-08.

Moreover, QESCO, GEPCO and FESCO have also submitted their APRs for the year 2008-09, which are being analyzed by Standards Division at this stage.

An Authority meeting was held on 6th August, 2009 for Review / Evaluation of APRs submitted by the distribution companies and KESC to deliberate upon a composite Report prepared by the Standards Division based on three years APRs (reported data) submitted by the distribution companies under the requirements of Performance Standards (Distribution) Rules 2005. As per the decision of the Authority, Report was rechecked and re-submitted to the Authority for Meeting. An Authority meeting shall be held shortly to decide upon the future course of action. Monitoring of the Performance Standards (Distribution) , as per the instructions of the Authority is being initiated with HESCO being the first one to be visited.

Monitoring of Performance Standards (Transmission)

NTDC was asked to submit the revised report for the year 2008-09 after catering for NEPRA observations on 7th July 2009, and reminders were sent on 31st August, 2009 and 14th September, 2009 respectively. NTDC has submitted the revised Report on 1st October, 2009, which is under review by the Standards Division. However, a few deficiencies still persist in the submission and are being addressed with NTDC at this stage.

Grid Code and its Applicability to Wind Energy Projects

NEPRA's Authority approved the Grid Code Addendum and it was sent to Grid Code Review Panel on 27th August 2009. A meeting was held at Lahore to discuss the changes proposed by NEPRA in the Addendum on 8th October 2009. Final document is expected to be submitted by NTDC soon for Authority's approval.

Grid/Distribution Code Implementation

NTDC has setup a "Grid Code Implementation Cell" to monitor compliance with various Provisions of Grid Code, as the Grid Code was approved by NEPRA in June 2005 as an "applicable document". 4th meeting of NTDC Grid Code Implementation Cell (NGCIC) was held on 15th September, 2009 at WAPDA House, Lahore. The next meeting is expected to be held on 15th October, 2009. NTDC is actively pursuing the administration/enforcement of various provisions of the Grid Code and keeps NEPRA informed of its activities in this regard.

Rules on Power Acquisition Standards & Procedures

An Authority meeting was held on 9th October to discuss the draft Rules on Power Acquisition (Standards & Procedures)-2009 developed by the DG (Standards). Authority decided to get comments from other Professionals of NEPRA and concerned stakeholders; it shall be submitted to the Authority within one month's timeframe for approval after incorporating the relevant comments.

Rules on Investment Standards & Procedures

Draft Rules on Investment Standards & Procedures, were submitted to Member (Standards) on 24th May 2009. The draft Rules are currently under review by the Authority.

CONSUMER AFFAIRS DIVISION

Complaint of the Quarter:

Metro Cash & Carry, Islamabad filed a complaint with NEPRA against IESCO regarding grant of permanent power connection. In the complaint, it was stated that M/s Metro Cash & Carry Pakistan (Private) Limited filed an application with IESCO for grant of permanent power connection of 1335 KW on 07-02-2008, alongwith temporary connection. IESCO sanctioned the temporary connection however no action was taken for sanction of permanent connection. The load of temporary connection was enhanced from 120 KW to 800KW (on 11KV feeder) but no demand notice was served for grant of permanent connection. They requested that till the time, their dedicated 11 KV feeder was laid, the temporary connection be converted into permanent connection.

Report was sought from IESCO. IESCO reported that:

- The application for provision of temporary connection having load of 120KW was entertained from existing 11KV

feeder and sanctioned on 23-02-2008. On request of the applicant, the load was extended to 470 KW and further to 800 KW on 13-03-2008 and 27-03-2008 respectively. The temporary connection was extended from time to time .

- They applied for load of 1335 KW through new 11 KV independent feeder emanating from 132 KV H-11 Grid Station Islamabad. The matter is delayed on the part of applicant instead of IESCO because documents for clearance of right of way were not provided by the applicant. As and when the same are provided, the case would be processed further for approval for permanent connection.

To resolve the issue, a meeting was also held on September 11, 2008 at NEPRA Head Office. On intervention of NEPRA, permanent connection of Metro Cash and Carry was sanctioned on August 07, 2008 for 1335 KW load and demand notice was issued. Consumer deposited the demand notice on August 11, 2008. Although their permanent connection was sanctioned but they were not allowed the same with the reason that their dedicated feeder is under construction and IESCO continued charging consumer on temporary tariff.

As per NEPRA Performance Standards (Distribution) Rules- 2005, 106 days are required for provision of connection on 11/33 KV for load above 500 KW but not exceeding 5000 KW. IESCO failed to provide the connection to Metro Cash and Carry within the given time period of 106 days. After taking approval from the Member concerned, IESCO was directed vide this office letter dated December 03, 2008 to immediately convert the temporary connection of Metro Cash and Carry into permanent connection. IESCO implemented the decision and temporary connection of Metro Cash and carry was converted into permanent one with effect from December 03, 2008.

The complainant filed review petition against decision of NEPRA regarding the date of conversion of temporary connection into permanent connection. The review petition filed by the complainant was admitted by the Authority. Both the parties were heard by the Authority and the Authority decided that "IESCO be directed to revise the date of conversion of temporary connection of Metro Cash & Carry into permanent connection by calculating the time period of 106 days [as specified at Rule 4(C)(4) of NEPRA Performance Standards (Distribution) Rules, 2005] from the date of registration of application for permanent connection i.e. February 08, 2008, which came out to be May 25, 2008"

The decision of the Authority was conveyed to IESCO for its implementation. In response, IESCO filed review petition against the decision of the Authority. Review petition filed by IESCO was not admitted by the Authority and IESCO was directed to implement the decision of the Authority without further delay. IESCO implemented the decision of the Authority and converted the temporary connection of Metro Cash & Carry into permanent connection as per the directions of the Authority

Complaints Status (Complaints handling during January - September, 2009)

DISCO	Complaints sent to DISCO/POIs for redressal	Complaints redressed	Under Process
PESCO	32	25	07
IESCO	41	32	09
GEPCO	21	17	04
FESCO	14	12	02
LESCO	41	29	12
MEPCO	40	29	11
HESCO	166	120	46
QESCO	02	00	02
KESC	40	33	07
Total	**397**	**297**	**100**

COORDINATION DIVISION

Regulatory/Discussion Meetings held during July - September 2009:

Month	Authority meetings held	Discussion meetings held
July 09	38	05
August 09	41	02
September 09	32	01
Total	**111**	**08**

Detail of Discussion Meetings held during July - September, 2009:

Sr. No.	Date	Subject
1	01-07-09	Determination of Peshawar Electricity Supply Company Ltd.
2	15-07-09	RFO Pricing Mechanism, Procurement and Related Issues - efforts to reduce RFO used in Thermal Generation.
3	17-07-09	Current Status and Future Strategy with respect to ERP System in NEPRA
4	17-07-09	Comparative Statement of DISCOs' O&M and DM for 2008
5	24-07-09	Hiring of Lawyers for KESC
6	03-08-09	Presentation to the Authority on proposed tariff Methodology
7	10-08-09	USAID Capacity Building - Presentation on Tariff Methodology
8	09-09-09	Presentation on Tariff Methodology

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

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