

# **GENESIS OF POWER CRISES AND IT'S MANAGEMENT IN PAKISTAN**

By

**Engr. Tahir Basharat Cheema**



## **GENESIS OF POWER CRISES AND IT'S MANAGEMENT IN PAKISTAN**

By

**Engr. Tahir Basharat Cheema\***

Pakistan, at present, is facing a severe power crises – considered to be the worst of the four such crises it has faced since 1974-75 onwards. Incidentally, the present crisis which is carrying on since the last twenty-four months is even greater than the one faced by the country during the eighties which gave birth to the concept of the IPPs etc. and which in a way changed the whole complexion of the power sector once and for all. Actually, it used to be only shortage of power during the earlier three crisis periods, while this time around it is energy shortage for twenty-four hours and that too of the highest order. The continuing negatives of the situation have now engulfed the national economy in a stifling embrace. Industrial productivity has gone down and the situation portends badly for exports and the ensuing balance of payments. Although, serious thoughts have been given by the Government for amelioration of the current problem and hopefully the power deficits of today would be contained by 2009-2010, but still the stranglehold of today may have far reaching implications for all of us. As a consequence, the instant study would strive to unlock the mysteries and the genesis of the crises and also detail out both the supply side and demand side measures in the offing as management of the crises.

Power sector, as a rule, has always been finance intensive. It is large investments that make the sector move-over to the next generation of technologies – incidentally a must for any standard system. On the other hand, the returns are also large and many an investment has been returned to investors within the year. The experts are of the opinion that without new investments and heavy outlays on operation and maintenance of power systems, the sector will simply stagnate. Besides, it is of utmost importance that new and needed technologies must be inducted as a necessary tool from time to time. Actually, the transition from one step to the next should be visible for all. A apt example would be the communications sector and its entry into the 3-G technologies since long. Unfortunately, the Pakistani Power Sector comprising of the twelve PEPCO managed companies in the public domain and the KESC in the private hands is seen to have stagnated. This is also the reason for continuing trite operations and the difference seen between the sector under study and the communications sector leading the way in Pakistan. Once in a while, the pundits do try to compare both these sectors, but are unable to draw conclusions.

A little insight into the Pakistani power sector reveals that it was firstly dealt with a severe blow in the late 1980s and mid 1990s when the so-called WB led reform process was taken-up through vertical de-bundling of WAPDA's Power Wing and the lackluster corporatization of the same. The sad process in fact has been the start of the decay and a major cause of the present crises. It has then been neglected over the years and in fact has been deprived of badly needed investment during the last 15 years – actually, the last one decade has been debilitating. The solely legislated Water & Power Development Authority (WAPDA) set-up under the WAPDA Act of 1958 had been relegated to the back-burner, while new entities headed mainly by generalists had been tasked to come-up to the expectations and power requirements of the people. The Private Power & Infrastructure Board (PPIB), Alternate Energy Development Board (AEDB) and such like small and nearly non-professional bodies can be quoted in this context. Strangely, infrastructure building was delegated to the private sector through these bodies leaving WAPDA all dressed up with no way to go. The later had just the

---

\*Member Central Council Institution of Electrical & Electronics Engineers Pakistan

gigantic Tarbela to speak about, which it had completed way back in 1976. Taking no chances, the GoP's one page notification of 1987 sealed Wapda's fate to the effect that all new thermal power would only be set-up by the private sector under the auspices of the so-called one window facilitator known as the PPIB – thus in a de-facto manner denying the Country any chance of enjoying the fruits of competition between the public and the private sector – a necessity in order to contain the run-away profiteering of the private sector and to also ensure supremacy of the auditability and accountability of the public sector. This step alone led to the debacle of today and the tainted proposals of the private sector and the delays in acceptance of the same by NEPRA. WAPDA could work on hydel projects, including those coming under the ambit of hydro generation, and nothing else. As consensus could not be reached by the federating units of Pakistan in this regard, atrophy set and one fine morning it transpired that time had left the once glorious edifice unable to do anything. Instead of correcting the rot, WAPDA was declared beyond local repairs and we saw sprouting-up of new organizations (surely baptized in order to arrange employment for the favourites) with stupendous agendas to fulfill. That one such organization viz the Sind Coal Authority (SCA) is still groping in the dark while another Board (TCEB) is being built is a story needing separate space to dilate upon. However, as the prerequisites to creation of new public sector entities have been conveniently ignored most of the times, the various stakeholders need to sit together and reconsider things – otherwise very soon the things would further rot.

Coming back to the past investment in the power sector, we see that the only worthwhile outlays were under the heading of IPPs, when over USD 6.5 billion were invested on arranging for 5728 MW of power during the period 1994–1996 (evident in shape of shining but tainted power stations seen during 1996–1999). It is also a fact that instead of arranging power on the as and when required basis, the whole chunk of nearly 6000 MW of power came on bar in a very short span of 24 months or so. This led to issues of handling the surpluses against the earlier shortages – specially when the IPPs had ostensibly come into being without even a tacit approval of acceptance from WAPDA and its management, which had never planned to handle such a huge chunk of power and that too at higher rates (also not backed-up by compatible tariff increase etc) . As WAPDA was by then under soldierly control, the poor Khakis were at the greatest of loss to utilize the newly inducted generation. They tried to sell-off some of the huge surplus (according to them un-sellable) to India, but couldn't get past the first of the posts. Additionally, they also had to bite the dust by accepting all and sundry of the IPPs as pure and pristine to the core, notwithstanding some squeaks from the NAB (surely a sick person whoever coined the acronym). This management was also responsible for convincing the then President that the actual issue was the sale of surplus power and not any shortage around the corner (probably, one of the reasons for the tardy progress afterwards).

In hindsight, we see that the issue of corruption in IPPs was wrongly tackled during 1997–2001. Instead of being able to catch hold of the corrupt, arrange matters so that there would not be repeats etc and to thereafter use the shade and space created by 5728 MW of power and in the process start projects enabling production of cheap power by 2005–06, the last decade was wasted by simply crying foul and that WAPDA's (non-professional) management could not sell the excess IPP power – that the IPP rates and surpluses were the greatest of negatives to contend with is indeed the truth. However, the experts then and even now consider non-introduction of innovative tariffs and other such solutions to ameliorate the assail of the whole new concept and the inability of the concerned then to have arranged for a better deal as it happened in Bangla Desh, as poor management. All this, besides leading to the crises being faced now, also acted as a means to scare private investment (specially foreign investment) away from the country. That seemingly the negatives seen in the IPPs set-up under the 1994 Power Policy are still evident in the current IPPs is again a wonder to reckon with.

The situation would have not been that problematic and grim, had the Pakistani power customer contained itself to the normal load growth of 2-3% year instead of breaking all barriers and reaching a whopping figure of nearly 14% during 2006-07 (**Table-I**). This unprecedented load growth according to experts was spurred on account of the consumption led growth adopted by the then government against the development / production led structures. The situation was compounded by easy availability of the hitherto unknown consumer finance. So much was the hype that even grade-IV employees of the government ended up with more than one consumer loan and access to home appliances acquired on installments. Unfortunately, because of all this Pakistan became a importing nation, a dumping ground for energy in-efficient goods, a country which changed its life style in quantum terms and the ensuing consumption avarice that burdened the economy beyond relief. The details of seven type of home appliances added to the power system during 2005-06 and 2006-07 are available with this paper as **Table-II & III**. Perusal of the data leads us to the conclusion that all of a sudden the Pakistani living standards artificially improved and up to 40 million appliances may have been added to the power system in the last five years alone. As this affluence was not backed by real economy, the country was hit by a double whammy.

**Table-I  
HISTORICAL PEAK DEMAND / GROWTH RATE (2002-2008)**

Year	WAPDA		KESC		COUNTRY	
	Demand MW	Growth Rate	Demand MW	Growth Rate	Demand MW	Growth Rate
2001-02	10,109	4.02%	1,885	1.34%	11,875	3.59%
2002-03	10,481	3.68%	1,973	4.67%	12,330	3.11%
2003-04	11,078	5.70%	2,073	5.07%	13,021	6.35%
2004-05	12,035	8.64%	2,197	5.98%	14,091	8.22%
2005-06	13,212	9.78%	2,223	1.18%	15,282	8.45%
2006-07	15,138	14.58%	2,349	5.67%	17,314	13.33%
2007-08	16,838	11.23%	2,443	4.00%	19,090	10.26%

**Table-II  
DETAILS OF HOME APPLIANCES ADDED TO  
POWER SYSTEM (LOCALLY  
MANUFACTURED/IMPORTED) 2005-2006**

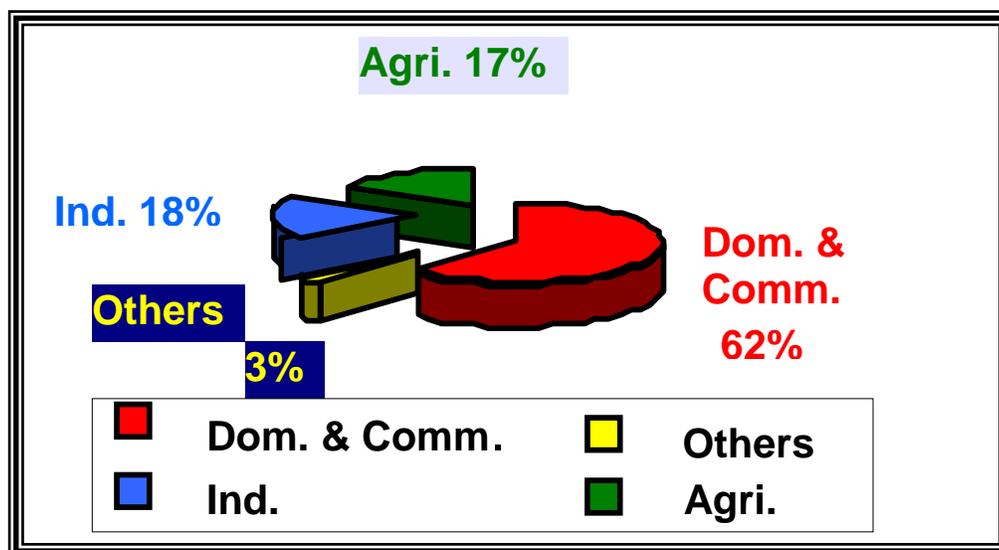
Sr No	Appliance	Numbers	Percentage		Power requirements MW	Expected growth then in sales for 2006-2007. over the figure of 2005-2006.
			Local	Imported		
1.	Refrigerators	1,100,000	90%	10%	110	15%
2.	Deep Freezers	200,000	100%	-	60	15%
3.	Air Conditioners	500,000	60%	40%	1000	20%
4.	Microwaves Ovens	400,000	50%	50%	800	15%
5.	TVs	1,200,000	85%	15%	120	15%
6.	Washing Machines	600,000	94%	6%	180	10-15%
7.	Fans	3,500,000	100%	-	280	15%
<b>Total</b>		<b>7,500,000</b>			<b>2550</b>	

**Table-III  
DETAILS OF HOME APPLIANCES ADDED TO POWER SYSTEM  
(LOCALLY MANUFACTURED/IMPORTED) 2006-2007**

Sr No	Appliance	Numbers	Percentage		Power requirements MW	Expected growth then in sales for 2006-2007. over the figure of 2005-2006.
			Local	Imported		
1.	Refrigerators	12,50,000	90%	10%	125	10% - 15%
2.	Deep Freezers	2,50,000	100%	-	75	25%
3.	Air Conditioners	7,50,000	60%	40%	1500	50%
4.	Microwaves Ovens	5,50,000	50%	50%	1100	35%
5.	TVs	12,00,000	85%	15%	120	-
6.	Washing Machines	7,00,000 to 8,50,000	94%	6%	210 to 250	15% to 30%
7.	Fans	50,00,000	100%	-	400	45%
<b>Total</b>		<b>98.0 to 99.5 lacs</b>				<b>3530 to 3570</b>

Further study revealed that the power consumption in the country was totally skewed towards wasteful use. 62% growth was evident in the domestic and commercial sectors alone, while 18% and 17% of the total growth was seen in the industrial and the agricultural sectors respectively. In other words, growth in power usage for the industrial sector was only one fourth of the increase in usage in the domestic and the commercial sectors. The pie chart depicting the power consumption patterns is available with this paper as **Table-IV**.

**Table-IV  
LOAD GROWTH AS %AGE OF VARIOUS SECTORS**



Not to be left here and as a logical sequel, we see the situation aggravating with the country currently experiencing power shortages of 5000 MW in the summers. To explain the matter, it is seen that no worthwhile investments were being made in the sector (in other words no

generation was added the earlier tally – rather 450 MW of old plants were retired in 2001 – 03), while demand was growing at 14% per year and it was considered enough to once in a while require both PPIB and the AEDB to speed up the things on paper. We would also see a few press items telling us about the fast incoming thousands of mega-wattage of power and the hundreds of LOIs issued by the PPIB and the AEDB. During this period, the situation became bad to worse due to the poor hydrological conditions of the calendar years 2007 and 2008, lesser supply of gas and the constrictions in fuel oil supplies and lastly on account of financial constraints due to huge receivables of the power utilities and high cost of production compared with the sale rate. With this, we saw load shedding firstly in 2002-03 and thence regularly from 2005-06 till date. The yearly / monthly supply and demand position for 2001–02 till today is available with this paper as **Table-V & Table-VI**<sup>5</sup>. It would, however be in the fitness of the things to explain that the public forgets the past quickly and the load shedding of 2006 – though tangible, was easily swept under the carpet to be followed by another such shortage in 2007 and so on.

**Table-V**  
**LOAD SHEDING A PERENIAL PHENOMINA**

YEAR	WAPDA/PEPCO SYSTEM		
	Supply	Computed Peak Demand*	Surplus/ Shortfall
2001-02	10894	10459	435
2002-03	10958	11044	-86
2003-04	11834	11598	236
2004-05	12792	12595	197
2005-06	12600	13847	-1247
2006-07	13292	15838	-2546
2007-08	12442	17398	-4956

\* Figures include load shedding and export to KESC

**Table-VI**  
**MONTH-WISE DEMAND & SUPPLY POSITION (MW) 2007–2008**

MONTH	PEAK DEMAND *	CORRESPONDING SUPPLY	SURPLUS/DEFICIT
Sep-07	16056	13644	-2412
Oct-07	13737	14092	355
Nov-07	12401	11590	-811
Dec-07	12154	9679	-2475
Jan-08	12255	9104	-3151
Feb-08	12123	10122	-2001
Mar-08	13682	9845	-3837
Apr-08	15124	11568	-3556
May-08	16649	11195	-5454
Jun-08	17398	12442	-4956
Jul-08	17715	12822	-4893
Aug-08	17272	12751	-4521
Sep-08	17852	13637	-4215
Oct-08	14231	10174	-4057
Nov-08	11098	10057	-1042
Dec – 08	11069	9188	-1881

What is the way out? How can the situation be managed. According to experts, we would have to undertake both supply side and demand side measures as soon as possible. The supply

side measures would include installation of rental power plants in private sector (able to join in six to nine months against three years for a traditional thermal power plant), expeditious installation of IPPs already contracted by the PPIB and struck-up in the myriad in-competencies of that organization, (at least it was so then), installation of new power plants in public sector, induction of fast-track generation capacity by PPIB, rehabilitation of GENCOs existing plants and utilization of redundant capacity of captive power plants. The public sector would have to re-position itself and come into competition with the private investors to ensure affordability of power tariff etc. The demand side measures include reduction of demand through energy conservation and load management, as a MW saved is, in fact, better than a MW generated. For this too massive awareness campaign has to be funded and more so, because the cost to the nation for non-supply of electricity is up to ten time of the cost of one unit of power.

The present government has taken up provision of new generation very seriously with six rental power plants totaling 1002 MW planned for Faisalabad, Guddu, Sialkot, Multan and Quetta planned to start producing power by June 2009 (**Table-VII**). Similarly, an addition of 502 MW of hydro power to the system is seen by 2011 (**Table-VIII**). So as to further improve upon the ante, 22 IPPs with a grand total of 4608 MW are on the anvil for joining in by June 2012 (**Tables-IX**).<sup>6</sup>

**Table-VII  
POWER GENERATION ADDITION RENTAL PLANTS**

<b>Sr No</b>	<b>Name of Project</b>	<b>Fuel</b>	<b>Capacity (MW)</b>	<b>Expected COD</b>
1.	Rental Power Plant, Faisalabad	Oil	150	Mar 2009
2.	Rental Power Plant, Guddu	Gas	110	Mar 2009
3.	Rental Power Plant, Sahuwala, Sialkot	Oil	150	Mar 2009
4.	Rental Power Plant, Multan	Oil	192	Apr 2009
5.	Rental Power Plant, Satiana Road, Faisalabad	Oil	200	May 2009
6.	Rental Power Plant, Sheikh Manda, Quetta	Oil	200	Jun 2009
<b>Total</b>			<b>1002</b>	

**Table-VIII  
POWER GENERATION ADDITION WAPDA HYDRO PROJECTS**

<b>Sr No</b>	<b>Name of Project</b>	<b>Type</b>	<b>Capacity (MW)</b>	<b>Expected COD</b>
1.	Khan Khwar	Hydro	72	Sep 2009
2.	Jinnah Hydro	Hydro	96	Feb 2010
3.	Allai Khwar	Hydro	121	Sep 2010
4.	Duber Khwar	Hydro	130	Oct 2010
5.	Kurram Tangi	Hydro	83	Sep 2011
<b>Total</b>			<b>502</b>	

**Table-IX**  
**POWER GENERATION ADDITION IPP PROJECTS**

A.

Sr. No	Name of Project	Fuel	Capacity (MW)	Expected COD
1.	Attock Power Project	Oil	165	Jan 2009
2.	Atlas Shirazi Project	Oil	225	Mar 2009
3.	Orient Thermal C.C.(Balloki)	Dual	225	Apr 2009
4.	Muridke Power Project	Dual	225	Jul 2009
5.	Fauji Mari Power Project	Gas	202	Sep 2009

B.

Sr No	Name of Project	Fuel	Capacity (MW)	Expected COD
6.	Engro Power Project	Gas	227	Dec 2009
7.	Sahiwal Power Project	Gas	225	Feb 2010
8.	HUBCO Narowal	Oil	225	Mar 2010
9.	Associated Technical Project	Oil	200	Jun 2010
10.	Nishat Chunian Project	Oil	200	Dec 2010
11.	Japan Expansion Project	Oil	101	Dec 2010
12.	Green Power Project	Gas	205	Dec 2010
13.	Bhikki Power Project	Dual	225	Dec 2010
14.	Liberty Power	Oil	200	Dec 2010
15.	PIE AmPower Project	Oil	390	Dec 2010
16.	Star Thermal Project	Gas	134	Feb 2011
17.	Bestway	Oil	200	Mar 2011
18.	Gulistan Project	Oil	200	Jun 2011
19.	New Bong Escape HPP	Hydel	84	Dec 2011
20.	UCH-2 ICB Power Project	Gas	450	Dec 2011
21.	Shahkot Power Project	Oil	200	Dec 2011
22.	Kotli HPP	Hydel	100	Jun 2012
<b>Total</b>			<b>4608</b>	

As power demand is growing at a fast pace viz 10.26% annually, which may be down from the high 14% of last financial year but still remains amongst the highest in the world, the government has further decided to take-up fast track projects through the PPIB. This concept is borrowed from the business plans conjured by leaders in power generation for Africa, which requires availability of power quickly and for small periods of use and does not possess an integrated power system like Pakistan. It is also in fashion for huge construction and other development projects which require quick power for limited time periods. These totaling 1366 MW include Walters Rental Project Karachi, Karkey Rental Project Karachi, Cavalier Energy Project Port Qasim (OC) Karachi, Progas Energy Limited Port Qasim (OC) Karachi, Ruba Energy Project (CC) Karachi and Progas Energy Ltd Port Qasim (CC) Karachi (**Table-X**).

**Table-X**  
**POWER GENERATION ADDITION PPIB FAST TRACK PROJECTS**

Sr. No	Name of Project	Fuel	Capacity (MW)	Expected COD
1.	Walters Rental Project, Karachi	RFO/HSD	205	Feb 2009
2.	Karkey Rental Project, Karach	RFO	232	Feb 2009
3.	Cavalier Energy Project, Port Qasim (OC)	LPG/HSD	156	Aug 2009
4.	Progas Energy Limited, Port Qasim (OC)	LPG	210	Aug 2009
5.	Ruba Energy Project (OC)	RFO	107	Dec 2009
6.	Cavalier Energy Project, Port Qasim (CC)	LPG/HSD	314	Apr 2010
7.	Ruba Energy Project (CC)	RFO	47	Dec 2010
8.	Progas Energy Limited, Port Qasim (CC)	LPG	95	Dec 2010
<b>Total</b>			<b>1366</b>	

In order to ensure that all possible facets of power generation are tapped, Pakistan Electric Power Company (PEPCO) mainly and to some extent the KESC have also added captive power to their generation capabilities. This has beefed up the present supplies by about 250 MW of badly needed power, while a potential of 1500 MW remains to be tapped. However, further additions will depend upon the provision of high pressure boilers along with corresponding turbines and generators at the various sugar mills of Pakistan<sup>7</sup> (Table-XI). It would also need the enactment of a law / policy allowing special benefits for such additions / investments – specially when the private sector has to be incentivized before it under takes any new venture.

**Table-XI**  
**MEASURES TO MITIGATE SHORTAGES**  
**Supply Side Measures - Captive Power MW**

Sr No	ITEM	Textile Mills	Sugar Mills	Total
1.	Connected and supplying power	127	14	131
2.	Contracted/Pipeline	31	57	88
3.	Potential	185	167	352
<b>Total</b>		<b>343</b>	<b>238</b>	<b>581</b>
<b>Potential (if high pressure boilers alongwith corresponding turbines &amp; generators are installed)</b>			<b>1000 MW</b>	

However, in order to mitigate the present power shortages, PEPCO and KESC seriously need to take up demand side management and conservation, massive public awareness campaign through electronic and print media, closure of shopping centers / plazas after sunset, staggering of industrial holidays, interaction with industries for reduction of load during peak hours especially steel furnaces, induction of energy saver lamps(CFLs) to replace incandescent bulbs

and tube lights, loss reduction by DISCOs through implementation of ELR Projects and by administrative measures, other conservation measures, switching of bill boards and alternate street light points and switching of unnecessary lights and appliances at peak hours voluntarily by the general public. All in all, the power utilities would have to take up the DSMs and specially conservation activity on a pro-active manner. These, incidentally are the only solution till new generation comes up and for the days to come when no one could think of wasting power. This is the way through which the country can breath at least while it awaits new generation.

Unfortunately, the above supply side measures though auguring well for the country, also contain certain inherent risks. These include the undue dependence of new generation on imported oil, the logistics nightmare in the making for feeding the tens of small IPPs/new plants, the likelihood of tariff increase in the immediate future, the possibility of break-downs in the small size IPPs and danger to the power system as a whole because the scheme of things does not cater for many a contingency. As a consequence, the following is suggested to be taken up as a necessary requirement. It would be to the effect that WAPDA be fully re-positioned and then utilized for development of both water and power projects (being the only legislated body for the purpose) and this should be by giving it the original autonomous status. PPIB and AEDB be then merged with WAPDA and the later can thereafter arrange PPPs / JVs – both national and international. WAPDA can put up new generation through bridge finance and then arrange for subsequent disinvestment / IPOs. The IPP size should be extended to a minimum of 2000 MW for economy of scale etc. Incidentally, our neighbouring India facing an equally daunting challenge to contain it's runaway power deficits has upped the IPP ante to mega-projects of 4000 MW and above. In their case, the investors have to arrange for their own fuel viz cheap coal and gas with the infra-structure being built by the government / public sector. On the other hand, all newly created entities then need to be disbanded with the Thar Coal generation being handed over to WAPDA, while mining of the coal may be tackled by the Sindh Mines & Minerals Department and the PMDC – incidentally, the later is also dressed up with no where to go. Experts consider this as the only option, in case Pakistan wishes to utilize its own vast coal reserves of 184 billion tons. It is also considered that after the SOS has been heard and the present Supply and DSMs are taken up, we need to revert back to the earlier system of implementing planning strategies put forth by the Planning Commission of Pakistan on the five yearly planned basis. Additionally, the National Power Plan of 1995 needs to be updated and then followed as the bible for all new power additions.

As indigenization of fuel for power generation is of prime importance – also a part of any good energy security plan, the Country would have to work on conversion of existing generation from oil and gas to local coal. Alternate sources of fuel viz. wind and sun on the basis of an integrated energy plan would also have to be taken in to quick consideration. As this needs separate space, it is being left for a separate article.

In the end, it would be appropriated to suggest and also state that the above supply side measures are basically of immediate and short term nature that have to be necessarily followed by the medium and the long term projects, which basically would comprise of the two hydel projects underway viz the 970 MW Neelum Jehlum HPP and the 4500 MW Diamer – Basha HPP, the host of others in the pipe line, the Nuclear power plants being undertaken by the PAEC and possible gas and electricity imports from Iran (IPI), Turkmanistan (TAPI) and Iran (1100 MW of gas power) etc, notwithstanding the possibility of eventual blackmail as undertaken by Russia currently or by local LPG producers. Alternate energy through wind, bio-mass, solar and coal would also be supplementing the power acquisitions during the medium and long terms. As the potential of such power is phenomenal, the future should be bright provided we remain on the right track and that detractors of alternate energy too remain at bay.

**BIBLIOGRAPHY**

1. PPIB Web Site / WAPDA Planning Department's information.
2. WAPDA – GM Planning (Power)
3. Information received from the manufacturers and Importers of Domestic Appliances / Associations e.g. PFMA and the Bureau of Statistics.
4. WAPDA Book of Statistics for 2007-08.
5. WAPDA – GM (Planning) Power / Director General EM & C Division PEPCO.
6. PPIB Web Site / WAPDA Planning Department.
7. WAPDA Planning Department.
8. Governor State Bank's statement reported in the daily "DAWN".