

# ENERGY CRISIS

By

**Engr. Amjad Agha\***

The country is presently facing a huge electricity crisis. The crisis appears insurmountable in the near or even long term future, unless proper understanding and correct implementation is undertaken on priority basis. The whole country is undergoing extended load shedding; in the large cities for 5 – 6 hours every day and much longer in the other parts. The question which crops up is that last year with the same supply level, load shedding was much less, why it has suddenly increased so much. Although for the last 8 – 10 years the Government paid very little attention for increasing the electricity generation capacity but this present crisis is mainly due to very high increase in the price of oil as explained below.

At present the total power production capacity in the country is about 19500 MW out of which Hydel Power is 6,500 MW and the balance of 13000 MW is thermal using Natural Gas or Furnace Oil. Small capacity of 450 MW is nuclear and only 150 MW is through coal. Although Gas is to be provided for 5800 MW to various thermal plants, but in actual fact much less gas is being made available. The deficiency is to be filled through furnace oil. It is estimated that in the recent past 9000 MW of generation was dependent on Furnace Oil.

It is very important to understand the consequence of the prevailing situation. Current price of furnace oil is about Rs. 50,000 per ton. At an average, one Kg of furnace oil produces 4 kWh of electricity. Thus the cost of furnace oil for generating one unit of electricity is about Rs. 12.5. On top of this the fixed cost of thermal plant and after adding the transmission and distribution costs including losses, the total price of electricity produced through Furnace Oil work out to be over Rs. 20/- per kWh. WAPDA is selling electricity at Rs. 6-7 per kWh. If WAPDA is to balance its books, it would require an annual subsidy of Rs. 300 Billion. This subsidy is somewhat reduced due to cheap power produced through hydel energy and natural gas, but the deficit cannot change substantially unless bulk of electricity is produced through hydel energy and natural gas. Obviously the current deficit is not sustainable. The Government has no resources to pay such huge subsidy, it is also not possible to increase power tariff so much. Therefore the power crisis is much greater than what is being perceived. In the absence of extremely heavy subsidy, WAPDA is delaying payments to IPPs and also to the oil companies which provide oil to WAPDA's own thermal plants. The result is that IPPs as well as WAPDA's own thermal plants are now producing much less electricity than their capacity. The oil prices have come down somewhat, in fact some forecast indicate that they may increase again. Therefore it should be obvious to any planners that the country cannot afford electricity produced through oil. Indigenous fuels like coal, gas and atomic will have to be developed and developed fast. The development of hydroelectric renewable energy should be back-bone of all future planning.

It should however be understood that hydel power is maximum in wet season and less in winter. For instance in our system the maximum hydropower is about 6500 MW and in the winter it goes down to about 1850 MW. Therefore the gap of 4600 MW will have to be picked up by thermal plants in the winter season and the required capacity will have to be supplemented through thermal plant. . As far as the energy is concerned hydropower still produces about 32 billion kWh which is about 36% of the total energy produced in the country. This percentage can increase substantially if more hydropower plants are installed. The construction of large dams has been stalled due to narrow minded bickering for the last decades, and now their costs have become enormous. I am told that recent estimate of Basha Dam has reached a level of about 12 - 14 billion dollars. Obviously to find funding for such a huge amount will not be so easy.

---

\*President, Associated Consulting Engineers – ACE

Way Forward: It is obvious that affordable electricity cannot be produced in the short term. The shortages have to be somewhat managed. The immediate action which can give some relief is the conservation of electricity. The Government has announced certain measures but very little action has been seen in implementing those measures. In order to implement the conservation measure the Nazims and Deputy Nazims should visit the areas and try to convince and negotiate with people, shops etc., and request them to cooperate in the overall interest. Bill boards and hordings are still blazing at night, shops use excessive lights which can be conveniently reduced. A suggestion that cities be divided in zones, and markets on these zones be closed on different days can save peak time energy usage.

At present the IPPs and WAPDA owned thermal plants are averaging about 40 - 50% plant factor. The reason for IPPs low plant factor is that PEPCO is not paying them for the oil which is a pass through item. WAPDA's owned plant factor is low because most of their plants are old and inefficient with an average efficiency of 33% and thus waste large percentage of the costly fuels. Most of these plants were designed and manufactured according to the outdated technology that was developed when fossil fuels were very cheap and WAPDA preferred inefficient cheaper plants. For the purpose of reducing the cost of thermal electricity it is necessary to replace the old inefficient plants with gas fired combined cycle power plants capable of achieving 60% efficiency. For example Units 1 – 4 of Guddu Thermal power station are conventional gas fired steam turbine generators which were commissioned between 1974 – 1985. These units had a combined installed capacity of 640 MW which is now reduced to 430 MW. Their efficiency has dropped below 30% and they have become fuel guzzlers and the worst emitters of greenhouse gases. Their peak performance was in the year 2005 when they burned over 42 billion cubic ft. gas and generated only 3 billion kWh of electricity. If these plants are replaced with the efficient combined cycle plants then with the same quantity of natural gas they will start producing 6 billion kWh of electricity and their MW capacity will also go to 800 MW. Similarly other old and inefficient power plants in PEPCO system where gas supply is being made available, should be replaced with most efficient combined cycle plants. It is anticipated that by replacing existing plants with combined cycle, PEPCO can double its capacity and energy production. It is very important that Government should give more attention in replacing the old inefficient gas fired units with more modern combined cycle plants rather than setting up new thermal plants in the private sector which will use furnace oil as their fuel and thus will be very expensive to run.

Mid and long Term: All efforts are needed to stay away from oil. For thermal plants only coal and natural gas should be used. Vast deposits of coal exist at Thar but it is unconceivable why the mining of this coal has not yet started. There are number of new gas fields discovered but their development has been put on a back burner. The existing gas fields require additional pressure and better transmission, the work on that sector should be started immediately. The gas purchase agreement with Iran be finalized immediately even without India. In addition agreement with Kazakistan be persued diligently for import of gas.

Currently the country loses 29 billion units of electricity annually due to heavy losses in the system. All efforts must be applied to reduce these losses since these losses also have a substantial pilferage element.

For hydroelectric projects the large ones can be built on Indus river, where not only hydroelectricity can be produced, highly needed water storage can also a be-product. Some legitimate objections on the environment and social impact of large dams are valid, but the solution of such objections can be satisfactorily found. The will of government leaders is needed and the matter can be resolved. Experts from various Provinces can get together and put forward the solution for mitigating the objections. Such proposals should be discussed in the Provincial Assemblies to satisfy the elected representatives explaining that objections can be satisfactorily mitigated.

There are number of other attractive run of the river hydel projects which are being offered to the private sector. None of these projects have yet started because the tariff is still not finalized. With high financial losses being accumulated in the thermal plants, it is strange that the hydel projects in the private sector are not being encouraged. In the present circumstances, a rational and market oriented policy is to be adopted, hopefully the present government will immediately look into this.

A major factor for the current electricity crisis is the very high oil price and the country has to prepare itself atleast for the next several years to somehow cope with this crisis. It has been a big set back that new hydel projects have not been undertaken. The policy orientation needs drastic modifications and indigenous resources like hydel energy production as well as development of coal mining and new gas fields should be the top priority.