

The Sampur Saga - I

The insanity of adding any more Coal Power Plants

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There has been a fervent appeal by many, over the years to implement the proposed Sampur Coal Power plant, with warning of dire consequences of power shortages due to any delay in this project. This call has been renewed in the recent weeks and the latest appeared in the Ceylon Today with a warning by the CEB Engineers union of the need for a new fuel source by 2017. The specter of power shortage by 2019 is trotted out in an attempt to garner public support. These warnings are based on the assumption that the increasing demand for electricity will out strip the generation capacity of both CEB and the private producers.

However, it is important to take a closer look at this demand forecast and the reasons for same, before committing the country to any of these proposals, which will saddle all future generations to further dependence on imported fossil fuels, on which we have absolutely no control, and the largely ignored environmental degradation. In addition the large capital expenditure on the project will have to be paid back with interest in Dollars. The mill stone of already committed capital expenditure will make it most difficult to move away from the use of coal in the coming years, even at increased and no longer affordable prices. There is no question that the prices will increase and the cost on rupee terms will be even worse with the pressure on the rupee, with the resulting increased foreign exchange expenditure.

The Electricity Demand Pattern

The changes in the demand pattern for electricity in the recent years have drastically modified the likely demand growth rates to be expected in the coming years, which is a great window of opportunity for us to develop our own indigenous sources of energy, without the present dangerous dependence on imported fossil fuels. The CEB itself has downgraded the rate of increase in demand from the previous 7% in their long term generation plans. The increase over the past few years has been less than 4%, in spite of the addition of many households with the government's efforts to reach 100% grid coverage. This is now over 95 % and would not add to the demand on the grid in the future as the balance households in the more remote areas are scheduled to be served with off grid solutions. In addition the consumers are conscious of the importance of energy efficiency and the saving potential which also contributes to the reduction in demand growth.

The particular problem faced by the CEB is how to meet the increasing demand during the daily peak hours 6.30 to 9.30 PM. As shown below.

Table 1. Parameters Applicable for Solar PV.

Current Cost of Solar PV - F E Component	\$/kW	800
Average generation per day	kWh/kwp	4
Solar PV Output Capacity Factor	percent	18%
Annual Generation from 1 KW panel	kWh	1576.8
Life of Solar PV Installation	years	25
Generation reduction per year		1%
Total generation over life 25 years	kWh/kWp	35033
Target Capacity	MW	250
No of units		250,000
Installations added per year	MW	50

Table 2 – parameters applicable for Coal Power

Coal Power			Reference
Specific Coal Consumption	kg/kWh (t/MWh)	0.44	CEB Statistics
Price of Coal	\$/Ton	126.99	CEB Statistics
Price escalation of coal per year		2%	See Chart below
Current parity rate	Rs/\$	140	
Average Depreciation	%	3.34	
Plant Capacity	MW	250	
Plant Life	Years	25	
Plant Factor	%	80%	
Annual Generation	MWh	1,752,000	
Generation over 25 Years	MWh	43,800,000	
Fuel Consumption per year	Tons	770,880	
Capital Cost	\$ Million	346	Sampur Estimates
Capital Cost in Rs	Rs Million	84,739	
Annual O & M Cost @ 4%	Rs Million	3,389.56	
FE Cost of O & M cost taken as 50%	Rs Million	1,694.78	

Based on the above and a discount factor of 10%, the levelized Energy cost of the electricity for the two options are given below in Table 3

Variable Electricity Cost Levelized Over 25 years (Economic Costs) Energy Cost Only	Units	Coal Variable Cost	Solar PV Cost
With 3.34% currency depreciation and 2% real coal price increase	LKR/kWh	13.23	8.15
With 3.34% currency depreciation and 0% coal price increase	LKR/kWh	12.85	10.08
With 0% currency depreciation and 2% coal price increase	LKR/kWh	9.96	10.05
With 0% currency depreciation and 0% coal price increase	LKR/kWh	8.64	10.05
Long term average: With 3.33% currency depreciation and 2% coal price increase	LKR/kWh	13.23	10.07

The projected growth pattern expects this skewed nature of the daily demand curve to remain unaltered in the foreseeable future. It is seen that over the past few years there has hardly been any increase in the peak demand.

However, the present installed capacity of the national grid of over 4000 MW is significantly higher than the maximum demand recorded of 2073 MW (on 23rd May 2015) , which has been met comfortably by the CEB. Therefore the efforts should be to flatten this peak further to avoid the need to install any more power plants, just to meet the demand during this short period daily. The CEB is also faced with the problem of its inability to run the 900 MW (in fact only 855 MW) Lak Vijaya coal power plant at Norochcolai at full capacity, particularly in the morning hours, when the demand drops below the capacity of this one power plant. The PUCSL records in recent times indicate that all three units have never been operated together. This indicates that there is a full 300 MW of capacity lying idle to be used, even if there is an increase in the peak demand over the coming years.

A coal power plant cannot be shut down at will on a daily basis or even to run at a reduced capacity beyond a point, and are not designed to serve the peak demands unlike the hydro power plants. This fact was rudely demonstrated on the 27th of September 2015, when the whole country was plunged into darkness, when as the CEB claims that there was a sudden drop in demand around midnight. The CEB engineers' attempt to blame the generation mix with renewable for this black out is laughable at best, and does underline the unpreparedness of the CEB system control to manage variable loads, hamstrung as they are with large single generation units which are as cumbersome and as maneuverable as a 100,000 ton super tanker at sea. Based on the PUCSL records the single coal plant accounted for more than 33% of the load at the time of the blackout.

Thus, the proposals to install any more coal power plants, under the present circumstances would be laughable if not for the tragic consequences such a move would impose on the country. It has also become apparent that the carrot of cheap electricity from coal is rather worm infested, as the proper analysis would show. While many numbers have been quoted as the cost of electricity from coal, the following data for comparison of the foreign exchange cost of coal power as compared to solar, which is considered the most expensive at the moment is quite revealing.

This analysis has been done on the basis that only the cost of generation is considered with the capital cost of the coal power plants not included. However the foreign exchange component of the capital cost of the Solar PV is included in the respective levelized cost as solar is non firm and equivalent amount for reserve capacity is claimed to be required. The size of plant considered is 250 MW as proposed for a single unit at Sampur. The equivalent amount of energy is proposed to be generated with a large number of roof top solar systems, installed by the consumers, with no cost to the state and fully developed over a period of five years. Considering that a full 300 MW coal plant is idling at Norochcolai the equivalent standby capacity of 250 MW is already available.

The utopian assumption of blue skies with no escalation of coal costs and no depreciation of rupee has been included for comparison. No doubt there would be some who would claim that with the reduced price of oil the coal prices also would be less than the past values

used in the analysis. But who would be ready to guarantee such prices even for the next two years let alone the life of the power plant? On the other hand in Sri Lanka the price paid for the coal has no bearing on the prevailing world market prices as we have seen in the past. So let us be cautious to assume the worst.

Also, the other hidden costs of coal power due to the so called externalities is not considered in the above analysis, as what is the true cost of such environmental and health costs are being debated, with the CEB playing it down quoting outdated reports. The world except Sri Lanka has accepted the enormity of such costs and the gravity of the impacts and is actively moving away from coal. More on this aspect is discussed later on.

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(Part II will appear tomorrow)