Third Party Evaluator's Opinion on
KELANITISSA COMBINED CYCLE POWER PLANT PROJECT

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Efficiency

The efficiency of Kelanitissa Combined Cycle Plant (KCCP) can be best evaluated by comparing its performance with other similar plants. In terms of power generation, KCCP has supplied 855, 1107, and 1007 GWh of electricity to the grid in 2003, 2004 and 2005, respectively, which is more than double the supply of electricity each year to the grid by the privately owned and operated AES Kelanitissa Combined Cycle power plant (AES), a comparable plant in terms of capacity and age. Whether this was due to any difference of plant availability of KCCP as compared to AES, needs investigation[1].

The average energy charge[2] to CEB on power purchased from AES has been Rs 12.52 per kWh during the first 8 months of 2006, while the KCCP's average fuel cost over the same period has been Rs 11.82 per kWh when operated using diesel, and Rs 10.42 per kWh when operated using Naphtha[3]. Therefore, on fuel cost alone, the "avoided cost" to CEB would be a minimum of Rs 700 Mn and a maximum of Rs 2100 Mn a year, depending on the relative share of each fuel used for generation at KCCP. Even the lower side estimate of this saving would be sufficient to add approximately 10 MW of new generation capacity to the system.

On the other hand, the Plant Factors of both Gas and Steam Turbines of KCCP, have been significantly lower than their availability levels[4], possibly indicating low load factors of operation. The choice of a single 110 MW Gas Turbine, instead of two units of 50 MW each, would then call for much deeper analysis of comparative economics, as the latter would offer the flexibility of switching off a turbine when the demand was less. This would permit the rest to operate under full load, improving the overall energy efficiency of the plant.

The investment made on the installed capacity of KCCP averages to more than USD 800 per kW. Had it been possible to construct the plant at a lesser investment per installed capacity[5], the efficiency of this plant, indicated by its capital productivity, would have been greater.

Sustainability

The sustainability of benefits accrued to the society of a power plant will depend on its technical viability in the long run. Though it may be too early to comment, a few alarming signs could be noticed with the steadily declining availability of the KCCP plant since its commissioning[6]. If

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[1] This difference might not be solely due to availability difference, but due to necessity-based buying of electricity from AES as well. However, indirect estimates show that there has also been a difference in availability in 2005 with AES plant's figure having been around 60% while that of KCCP exceeding 80%

[2] Among the available cost items, the "Energy Charge" of AES and the "Fuel Cost" of KCCP appear to be the closest comparables, though these may not be exact equivalences of each other. The average total cost to CEB of a kWh purchased from AES over the first 8 months of 2006 has been Rs 15.22.

[3] Source : Monthly Review of System Control and Operations – Aug 2006, Ceylon Electricity Board.

[4] Average Plant Factors and Availability of Gas Turbine have been 80% and 90% (in 2004), and 74% and 86% (in 2005), while that of Steam Turbine have been 71% and 80% (in 2004) and 63% and 81% (in 2005), respectively.

[5] The Northwest Power Planning Council, USA, in 2002, had estimated approximately USD 600 per kW for a 500MW Combined Cycle Power plant. How justifiable the 30% more capital cost on KCCP ?

[6] Between 2003 and 2006, the availability of KCCP's Gas Turbine dropped from 90% to 77%, and its Steam Turbine from 80% to 72%.

this decline was due to unplanned outages stemming from technical problems then the trend would be an issue for concern.

With regard to the environmental sustainability, it would have been much more educative had the Post-evaluation exercise measured the quality of stack emissions rather than measuring the ambient air quality. Such would have established, beyond doubt, whether the emissions by the plant were within the expected levels[7]. However, it has been reported that the in-built flue-gas quality monitoring mechanism was not functioning; but the real cause for this appears to be a technical failure of the said equipment, rather than non-recruitment of a "manager". The fact that the CEB has not yet been able to put the equipment to working order could raise concerns not only on the environmental sustainability, but also of long-term technical sustainability of the plant's machinery and equipment.

[7] KCCP's flue gas emissions, as per the report no. SS7990 of the Industrial Technology Institute dated 15/09/2006 contains : Particulate matter: < 5 mg/Std m^3; SOx : < 5 mg/ Std m^3; NOx : 87 mg/ Std m^3