CHAPTER III

ENGINEERING ECONOMIC ANALYSIS

This chapter presents the economic analysis of the proposed 500 MW Coal-Fired Power Plant in Brgy. Lumaniag, Lian, Batangas. The analysis includes the project costing, depreciation, return of investment, sensitivity analysis and other computations involved in the economic aspects of the proposed power plant.

**Key Assumptions**

A steam power plant is used to generate electricity by the use of several components such as steam turbine, boiler, condenser and feedwater heater. This electricity is distributed to chosen utilities for further distribution in some municipalities. For the proposed power plant, several assumptions were made to calculate the economic analysis of the design.

Coal has the largest percentage of source of fuel for power plants having 42.8% of the total percentage. This is the reason why the chosen fuel of the proposed power plant is coal since it also has a cheaper price compared to oil. Many coal-fired power plants have a life span of 30 years. For the proposed power plant, it is assumed to have a 25-year operating life with maintenance and repair annually. It is also assumed that the proposed power plant will operate for 365 days except for some problems that may be encountered in the operation. The assumed discount rate is 5% which is used to calculate the capital recovery factor. For the capacity factor of steam power plants, it is assumed to be 54.6% based on the performance of coal fired power plants operating actively. For the economic analysis, the capital expenditures is calculated by getting the total of the equipment cost, miscellaneous cost, building cost, electrical cost, excavation and foundation cost, land cost and instrumentation and control cost. For the annual operating expenditures, it is assumed to include the fuel cost, labor, maintenance and repair, supervision, supplies and operating taxes. The service facilities cost is the sum of maintenance and repair cost and supplies. The equipment cost of equipment varies in every design since the number of closed feedwater heater is increasing. Case 3 which is the most efficient design has 7 closed feedwater heater. From this, Case 3 became the basis of the costing for the economic analysis of the proposed power plant.

Furthermore, the rate of return which is the profit on an investment over the assumed operating life of 25 years is assumed to be 33.90% based on the assumptions and calculations made. An analysis was also made to assume and understand the effect of construction delay, reduce of power generation by 10%, increase and drop of fuel price by 10% to the internal rate of return. It is calculated from the assumed data that the average effect of the independent variables to dependent variables is 3%. Moreover, the expected length of time to recover the initial investment was calculated by dividing the amount of cash outlay at the assumed year of 2022 by the net cash inflow which is assumed to be the same every year. The assumed payback period of the proposed power plant is 4 2/5 years or 4 years and 5 months. Likewise, assumptions were made in order to forecast the future performance of the proposed coal-fired power plant.