THE STUDY OF ECONOMICS OF POWER GENERATION

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ABSTRACT

This paper presents a study on operating cost of thermal power generation. The study include Economic Load Dispatch (ELD) concept, in a power system by using MATLAB software package. Comparison in total cost for increases total loss case was made in order to determine the difference on the total generation cost and identify advantage for the total loss minimization. The proposed technique is tested on IEEE 9-bus power system network. Hybrid Optimization Model for Electric Renewable (HOMER) is software used to analyze generation cost of thermal power generation and net present cost (NPC) to choose the best operation system for different fuel which is coal and natural gas either in stand alone application or combined operation. The study identifies how to find minimum cost for this type generation systems and identify the solution to minimize the total loss.

Keywords:

Economics of Power Generation, Economic Load Dispatch (ELD), Economic Dispatch (ED), Optimal Power Flow (OPF), Thermal Plant, Combined Cycle.

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CHAPTER 1

INTRODUCTION

1.1 Background

Power has become an inevitable ingredient in every day human life and a universal input for economic growth [1]. With steadily growing population, increasing urbanization and rapid diversification of the economies, the demand for electrical power has been increasing every year. Electricity is the only form of energy which has to produce, transport, use and control. Thermal power plants generate more than 80% of the total electricity produced in the world. Fossil fuel, viz. coal, fuel oil and natural gas are the energy source, and steam is the working fluid. Steam is also required in many industries for process heat. To meet the dual need of power and process heat, cogeneration are often installed [2].

There are many factors involved in the successful operation of a power system. The system is expected to have power instantaneously and continuously available to meet consumers' demands. It is also expected that the voltage supplied to the consumers will be maintained at or near the nominal rated value [1].

In a large plant and certainly over an entire power system many generators may cooperate in meeting the power needs of all the connected loads. Often these generators are installed over a period years as the plant or power system expands to meet the growing needs of consumers. As a result many generators have fuel-rate conversion characteristics that can be significantly different, which means that some generators are capable of producing more electrical output per unit of heat energy than others [2].

In operating the system for the any load condition the contribution from each plant and from each unit within a plant must be determined so that the cost of delivered is minimum. An early method of attempting to minimize the cost of delivered power called