

CHAPTER ONE

Introduction

1.1 Introduction

The power generation for remote areas requires a different solution from the traditional, conventional forms of electrification. Large part of the world population still lives without any supply of electricity. The power supply of remote places has been commonly provided by thermal power plants, usually diesel generators. The cost of grid extension is probably continue to be, prohibitive and the generation costs increase severely with the remoteness of the location [1].

Hybrid energy system is an excellent solution for an electrification of remote rural areas where the grid extension is difficult and not economical. Such system incorporates a combination of several renewable energy sources such as solar photovoltaic, wind energy and may be conventional generators for backup. A system using a combination of these different sources has the advantage of balance and stability that offers the strengths of each type of source that complement one another [2].

Hybrid power systems, which combine conventional and renewable power conversion systems are the best solution for feeding the mini-grids and isolated loads in remote areas. Properly chosen renewable power sources will considerably reduce the need for fossil fuel leading to an increase in the sustainability of the power supply. Conventional power sources is aid the renewable sources in hard environmental conditions, which improve the reliability of the electrical system [3].

1.2 Problem Statement

The rising rate of consumption and the price of fossil fuel and the environmental problems caused by the conventional power generation draw worldwide attention to renewable energy technologies. In fact, renewable energy systems are pollution free, takes low cost and less generation period, user and social friendly. However, renewable power unit based on single source (wind or solar) may not be effective in terms of cost, efficiency and reliability. A viable alternative solution is combining these different renewable energy sources to form a hybrid energy system [2].

1.3 Objective

The use of renewable energy as part of or as the major contribution of the power supply system can be very attractive for most of the remote places. It has already been demonstrated that hybrid power systems may constitute the most economical solution in many applications and may also provide a more reliable supply of electricity through the combination of several energy sources. The possibility of using local energy resources, that is renewable energy sources (sun, wind, water flow, biomass), which can be found almost everywhere including remote areas, is an appealing solution from the economic and logistic points of view [1].

The main objective is to provide 24 hours demand quality power in remote areas. In order to obtain electricity from a hybrid system reliably and at an economical price, its design must be optimal in terms of operation, control and component selection [2].

1.4 Methodology

The investigation will include the model and characteristic of each system individually (wind, solar and diesel). In order to get the results the MATLAB /SIMULINK software is used to simulate the system.

1.5 Thesis layout

The thesis organization is summarized as follow:

Chapter two deal with a literature review of the hybrid, solar and wind power system power system.

Chapter three introduces mathematical modeling of wind, solar system and diesel generator.

Chapter four presents results of the hybrid system both component wind and solar and discuss these results.

Conclusion and recommendation are drawn in chapter five .