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A Review of Renewable Energy Source for Solar and Wind Energy

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ABSTRACT
Nowadays, the share of electricity produced by Renewable Energy Sources (RES) is rapidly growing, However, a further expansion of wind and solar power plants is going to become more and more challenging in the future, as one of the main drawbacks of solar and wind sources is their intermittent and variable nature, which can cause frequency misbalances and serious problems in grid management. A promising option for sustainable power generation is the integration of different solar power plants, such as photovoltaic systems (PV) and concentrating solar power (CSP) plants. The solar-wind-based system mainly composed of a photovoltaic array, a wind turbine and a battery bank. In this paper we present the study of various renewable sources of energy, in future we plan to design and implement a hybrid system or model which improve the performance of system and remove all drawback and issues for the present system.

Keywords: - Wind Energy, Solar Energy, photovoltaic systems (PV) and concentrating solar power (CSP).

INTRODUCYION
As the demand for renewable energy emerges individuals are looking into the Earth's natural resources to benefit themselves and our future. Researchers have looked into solar power to harness energy, tidal currents in the oceans, but one of our most abundant natural resources is wind. With wind driven turbines we can harness the power of the wind and reapply that power to our homes. There are over 128 million homes in the United States alone that could be running off a source of renewable energy saving millions of dollars on the bills. In this project we plan to design a practical windmill for residential use to harness energy and reapply it to your house or even your electric car. Introduction of wind and solar powers to electricity grids is accelerating in recent years due to advancements in technology as well as to public policies such as feed-in-tariff and Renewable Portfolio Standard. While renewable energies are promising solutions for global climate change, they also introduce a new challenge: a rapid output fluctuation, which may affect the stability of electricity grids [2].

It is therefore vital to go for eco-friendly energy sources for the betterment of the future world [10]. Considering renewable energy sources such as solar energy, wind energy, hydropower and geo- thermal, is critically important in this sense as they are eco- friendly [10]. Solar energy is the most readily available source of energy. It is free. It is also the most important of the non-conventional sources of energy because it is non-polluting. Fuel cells, magneto hydrodynamic systems, and devices based on thermoelectric, thermo ionic and solar-electric conversion is all potentially useful nonconventional electricity sources [7].

There are various applications of solar energy since it is freely available with low damage to environment. Solar energy is now applied for heating of buildings, cooling of buildings, heat generation for industries, food refrigeration, heating of water, distillation, drying, cooking, power generation and other various processes. Many combined energy power systems by using various power electronic converters or control strategies have been put forward. Among them, [3] presents a neural network based control system to coordinate between the components of a PV-Wind hybrid system. Proposed a power control mechanism that can manage a combined photovoltaic (PV)/wind/fuel cell (FC) generation system including an ultra-capacitor bank. Introduced a

novel strategy for the control of power conditioning units to minimize the disturbance on the output power from the hybrid system which integrated with PV and wind turbine [3]. Wind power systems convert the kinetic energy of the wind into other forms of energy such as electricity. Although wind energy conversion is relatively simple in concept, turbine design can be quite complex. Most commercially available wind turbine uses a horizontal – axis configuration with two or three blades, a drive train including a gearbox and a generator and a tower to support the rotor. Typical sizes for a wind turbine range from 200-750 KW, and electricity produce within a specific range of wind speed [7].

The renewable energy systems can be used to supply power either directly to a utility grid or to an isolated load [1].The wind energy system generates power in the form of AC with different voltage and frequency levels in case of variable speed operation. Solar energy system generates power in the form of dc voltage, the level of which varies depending on temperature and irradiation levels. Both these systems require power electronic interface for inter-connection with the grid [1]. A number of documented researches have demonstrated that hybrid energy systems are more suitable than single source energy systems in terms of economic feasibility and reliability. In fact, renewable hybrid energy systems have been a topic of investigation in many contemporary works. For example, a Biomass gasification/PV hybrid energy system was modeled and validated. For power supply to a decentralized section of a renewable energy research building in Congo for which the optimum size and cost of the power plant units were determined. The results indicated that hybrid energy system as an isolated unit is feasible to satisfy the power demand of an independent research center in Congo [6].

There have been few studies on hybrid renewable energy–desalination systems that considered both a prediction model and techno economic model to enable the integration of renewable energy sources into the desalination fresh water production systems. To obtain the maximum utilization of energy sources in view of the approaching fresh water scarcity, a suitable energy desalination coupling arrangement should be further investigated for water production using pollution free and cost-effective electrical energy production methods [8].

The rest of this paper is organized as follows in section II we describe a need of reversible computing techniques for arithmetic and logic unit in short, in section III we discuss about the rich literature survey for the existing reversible computing in ALU. In section IV we discuss about the problem formulation and statement as we getting from the rich literature survey, finally in section V we conclude the about our paper which is based on the literature survey.

II OVERVIEW OF TURBINES

In 5000 B.C. wind was harnessed to propel boats down the Nile River and in 200 B.C. windmills pumped water in China and ground food in Persia. Through modern times wind turbines have evolved and in 2008 they generated 52 billion kWh or about 1.3% of the total U.S. electricity. Now there are several different designs of wind turbines which can be scaled for residential use. The two most common designs are the vertical axis and horizontal axis turbines which are pictured in Figure 1. These two designs both use blades to collect the kinetic energy of the wind. The blades are set at different angles or pitch depending on the turbine, and as the wind flows over them creating lift and causing them to turn. The blades are connected to a drive shaft which turns the generator as the blades turn.

III RELATED WORK

[1] This paper describes the Simulation and analysis of hybrid energy system consisting of wind and solar PV system. The wind and solar PV system are connected to the common load through DCIDC Boost converter. Generally, in low radiation PV array system inverter gives the lower voltage than the rated voltage which affects the power quality. It is overcome by using Battery Energy Storage System. In the stand-alone mode the converter needs to maintain constant voltage and frequency regardless of load imbalance or the quality of the current, which can be highly distorted, if the load is nonlinear.

[2] This paper considers a hybrid wind-solar thermal plant, where the output from the wind turbine is smoothed by bypassing through the thermal plant. They propose a chance-constrained MPC-based control method that optimally decides the ratio of the wind output that is bypassed through the thermal plant so that the rapid fluctuation of output is suppressed while the direct power output is maximized. The controller's parameters are designed in a way that result in a Pareto-optimal performance.

[3] This paper introduces a standalone hybrid power generation system consisting of solar and wind power sources and a DC load. A supervisory control unit, designed to execute maximum power point tracking (MPPT), is introduced to maximize the simultaneous energy harvesting from overall power generation under different climatic conditions. Two contingencies are considered and categorized according to the power

generation from each energy source, and the load requirement.

[4] The objective of the present paper is to conduct a thorough technical–economic evaluation for the construction of small wind turbines in six areas within Ardabil province of Iran using the Hybrid Optimization of Multiple Energy Resources software, and also to rank these areas by a hybrid approach composed of Data Envelopment Analysis, Balanced Scorecard, and Game Theory methodologies. Higher accuracy of the proposed hybrid approach and its ability to properly detect the relationships between the decision-making components make it preferable over the simple Data Envelopment Analysis method. Technical–economic feasibility study is conducted by analyzing wind speed data for period from 2008 to 2014 using Hybrid Optimization of Multiple Energy Resources software. In the next step, the type of equipment used in the design, benefit, costs, total net costs, depreciation and amount of generated electricity are obtained separately for each location.

[5] This paper is concerned with Operating Modes in hybrid renewable energy-based power plants with hydrogen as the intermediate energy storage medium. Six operation modes are defined according to plant topology and the possibility of operating electrolyzer and fuel cell at steady-power or partial load. A methodology for the evaluation of plant performance is presented throughout this paper. The approach includes a set of simulations over a fully validated model, which are run in order to compare the proposed operation modes in various weather conditions.

[6] This paper presented an economic feasibility analysis of a single standalone house operating with a hybrid power plant consisting of a fixed capacity producer gas generator (2 kWe) and other renewable energy sources (Photovoltaic and wind). The National Renewable Energy Laboratory's Hybrid Optimization Model for Electric Renewable (HOMER) was employed which evaluated techno-economic analysis based on the criteria of net present cost and levelized cost of electricity. Taking the site specific daily average solar radiation, average wind speed and load data into account, renewable hybrid model consisting of Bio/PV (Photovoltaic)/wind/battery/capacitor was found feasible giving 19,866 kWh/yr. of energy with a levelized cost of electricity of 0.306 kWh/yr. While comparing the hybrid system with a diesel or, natural gas generator alone, the maximum savings from CO2 emissions worth 22,626 kg/yr. was achieved..

[8] This study evaluated the operations of seven different (off-grid) power systems (wind-photovoltaic-diesel-battery) used to satisfy the electrical energy demand of a small-scale reverse osmosis system with a capacity of 1 m3/h used on Bozcaada Island, Turkey. The hybrid optimization model for electric renewable (HOMER) software was selected to perform techno-economic analyses of the systems. On the other hand, the reverse osmosis system analysis model (ROSA) was used to determine the energy requirement of the reverse osmosis system examined in this study.

[9] In this study, a three parameter photovoltaic (PV) model operates under tropical weather conditions is developed and characterized. The performance of the PV system model is also assessed. Malaysia weather conditions selected in this case study as a test bed. A mathematical PV model of a small-scale PV system is established. The proposed PV model reliance on, both, the simplicity and accuracy, which based on real data. The potential results obtained based on the designed simulation. The average PV performance based on the comparison of the calculated and actual PV performances was 65.8%. The average inverter performance based on the calculated and actual inverter efficiencies was 97.58%. The accuracy of proposed model verified by using different evaluation criteria and compared with various models from the legacy works.

[10] This paper discusses about the need of solar industry with its fundamental concepts, worlds energy scenario, highlights of researches done to upgrade solar industry, its potential applications and barriers for better solar industry in future in order to resolve energy crisis. Solar energy, among other renewable sources of energy, is a promising and freely available energy source for managing long term issues in energy crisis. Solar industry is developing steadily all over the world because of the high demand for energy while major energy source, fossil fuel, is limited and other sources are expensive. It has become a tool to develop economic status of developing countries and to sustain the lives of many underprivileged people as it is now cost effective after a long aggressive researches done to expedite its development.

IV PROBLEM FROMULATION

In today’s world the use for windmills is becoming greater and greater. You are starting to see windmills here and there, and in other locations you might find a whole wind farm but what about for the practical home owner. This is why we are looking to design a practical windmill for residential use that can harness energy, store it, and last applied to a house hold to reduce energy consumption or even supplement your electric

bill. We will need to gather background information on every aspect of the project from the different types of windmills to the average household energy consumption. Our average energy consumption will be are base to work off of as this is the criteria we are trying to meet to supplement the cost of an average electric bill. We will also consider the geographical location of where the windmill will be installed along with legal regulations and zoning laws. Cost analysis will need to be made to determine the cost efficiency of buying your own residential windmill along with maintenance. With all of the proper research we will design a practical residential windmill.

V CONCLUSION AND FUTURE WORK

In recent years solar and wind energy technologies have seen much progress and countries have often turned to one of these two energies (whichever that is most efficient for their geography). This tendency is so that in some parts of the world, a large percentage of required electricity is supplied by these energies. Moreover, global developments in the field of environmental protection and the perishable nature of fossil resources have accelerated the tendency to develop and use renewable energies

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