

Fabrication of Water Pumping System using Wind energy

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Abstract

Renewable energy is energy that is generated from natural processes that are continuously replenished. This includes sunlight, geothermal heat, wind, tides, water, and various forms of biomass. This energy cannot be exhausted and is constantly renewed.

Alternative energy is a term used for an energy source that is an alternative to using fossil fuels. Generally, it indicates energies that are non-traditional and have low environmental impact. The term alternative is used to contrast with fossil fuels according to some sources. By most definitions alternative energy doesn't harm the environment, a distinction which separates it from renewable energy which may or may not have significant environmental impact.

Keywords: Renewable energy, geothermal heat, wind, tides.

CHAPTER 01

Introduction

1.1 Demand of Renewable Energy Today

Renewable energy is energy that is generated from natural processes that are continuously replenished. This includes sunlight, geothermal heat, wind, tides, water, and various forms of biomass. This energy cannot be exhausted and is constantly renewed.

Alternative energy is a term used for an energy source that is an alternative to using fossil fuels. Generally, it indicates energies that are non-traditional and have low environmental impact. The term alternative is used to contrast with fossil fuels according to some sources. By most definitions alternative energy doesn't harm the environment, a distinction which separates it from renewable energy which may or may not have significant environmental impact.

Renewable energy is good for customers, the environment and the bottom line of corporations that run their operations with it. In the United States, though, renewables (including solar, wind, hydropower and biomass) account for only about 10 percent of all energy used and 13 percent of total electricity generated – even as corporate contracts for renewable energy nearly tripled from 2014 to 2015. If there are challenges now, when capacity and use are low, what will happen to business models, technology and financing when renewable power penetration reaches 30, 40 or even 50 percent of the U.S. market?

Since there's plenty of corporate demand, the problem is supply, which in turn depends on adequate infrastructure to deliver it. Historically, U.S. utilities have decided what fuels to use to generate electricity, with scant incentive to increase the percentage of renewables in the energy mix or to explore technology to encourage that kind of shift.

We know there's an appetite for many more giga watts of renewable capacity, but it's excessively difficult for large companies in the United States to buy as much renewable energy as they want. While retail customers in many states can arrange to buy solar or wind power from local utilities, companies need a large, sophisticated team to get access to renewable energy options at the scale they need – if those options are available at all. To change this picture, it's time to look to the demand side, where multinational corporations are joining together to make their preference for more renewable power felt. Facebook and Microsoft are among 60 companies and over 50 leading project developers and service providers participating in a new network, the Renewable Energy Buyers Alliance, known as REBA that aims to break down barriers to lower-carbon energy. The alliance aims to see 60 giga watts – the same amount of total generating capacity of Turkey — of renewable energy deployed in the U.S. by 2025. That's a huge jump from the 3 gig watts of renewable power

purchases companies signed in 2015, which was about triple the amount from the previous year.

1.2 Problem Statement

A major hindrance in growth of wind energy is fluctuation in the source of wind. The fabrication of wind mill must be sustainable and environmental friendly and installed in area having proper supply of wind.

1.3 Aims and Objectives

The goal of this project is to build a windmill driven water pump that can pump water from a nearby source to a tank. The purpose is to enable to demonstrate and spread knowledge about wind-powered water pump technique to farmers. As previously mentioned, is interested in building the proposed windmill construction. A windmill would provide good means for showing visitors how wind energy can be used for water harvesting. That is the main reason for building the windmill. The secondary reason is to use it to pump water to a tank for further use in irrigation. And also interested in a solution for an irrigation system connected to the tank. The irrigation system shall be designed, but it shall also be used to demonstrate small-scale irrigation methods to farmers.

CHAPTER 2

2.1 Literature Review

Omar Badran, [1] wind energy pumping systems are more reliable than diesel ones because they do not require frequent maintenance, are safer due to the auto stop features in case of failure, do not consume fuel, and do not pollute the environment. Also from the present study, we can conclude that research and development projects in the field of wind energy are of utmost importance to Jordan, despite the scarce financial resources and the high cost of R&D, because Jordan does not have any source of conventional energy. Research and Development organizations in Jordan should be encouraged to sponsor the development of electrical wind energy conversion systems packages. Availability in the local market, detail of fabrication processes, and available on-site technical assistance. The manufacturing of modern wind pumps locally will generally pump water at lower costs than imported classical multi-bladed windmills, which should be considered in assessing the potential of wind energy for water pumping. Also it can be concluded from the present study that the water supply in Jordan for a man, his cattle and his land could be safeguarded with the help of a windmill installation.

Misrak Girma, Abebayehu Assefa, [2]. In this paper, the feasibility of a wind-powered water pumping system is conducted for three selected sites in Ethiopia. The designed system has a capacity to supply a daily average drinking water of 10, 12 and 15 m³/day for 500, 600 and 1000 peoples in Siyadberand Wayu, Adami Tulu and East Enderta sites, respectively, with average per capital water consumption of 20 liters per day per person. The cost of pumping water is determined as 0.08, 0.05 and

0.036 \$/m³ for Siyadberand Wayu, Adami Tulu and Enderta sites, respectively. The results indicate that replacing the existing expensive Diesel-based systems by wind-powered systems will play a significant role in achieving the country's MDG targets. If there is low and medium wind energy potential (greater than 2.8m/s) which can be applicable for water pumping.

2.2 Global Application:

Total investments fell in 2013 by 14% to \$214 billion worldwide, reflecting cost reductions and the impact of policy uncertainty.

- ☐ Solar PV, in particular, improved its cost-competitiveness: some 39GW were installed, up from 31GW in 2012, for fewer dollars invested.
- ☐ The number of markets that can compete without subsidies is increasing.
- ☐ Renewables excluding large hydro account for 43.6% of 2013's newly-installed generating capacity.
- ☐ Wind investments remained roughly the same, while solar PV outlays dropped 20% despite a record amount installed.

- ☐ In 2013, China for the first time invested more in renewable energy than Europe.
- ☐ Renewable energy investment in Japan increased by 80 % during the last year.

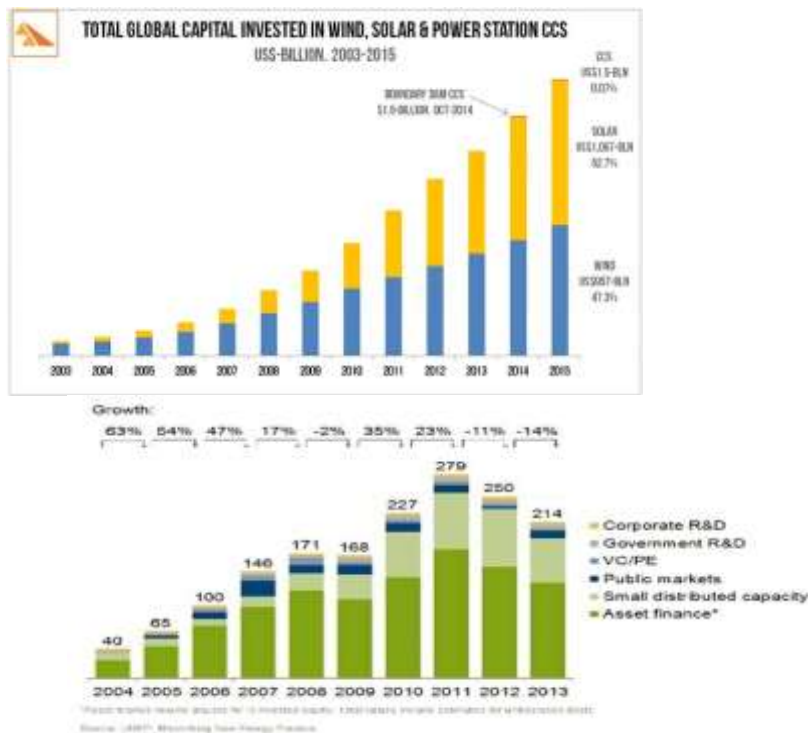


Fig: Total Global Invested in Wind, Solar and Power Station CCS

2.3 Components used

- ☐ Blades * Centrifugal pump
- ☐ Cycle rim * Rods
- ☐ Shaft * Belt & Pulley
- ☐ Bearings

CHAPTER 03

WORKING MODEL



Fig: Working Model

Windmill:

A windmill is a structure that converts wind power into revolving energy by means of vanes called blades to mill grain, but it extended to wind pumps, wind turbines, and other applications.

3.1 WORKING PRINCIPLE:

In our project blades are attached to wind shafts. The wind force is used to rotate the blades. By falling air on the blade, it starts rotating automatically. The shaft also rotates as the blade rotates, which converts rotational motion into linear motion. Therefore, due to the centrifugal action, creating a vacuum and absorbing water and sending it to the delivery pipe. This process is repeated, and water is sent out.

3.2 Advantages of windmills:

- It is a clean fuel source.
- It contains zero carbon emission which is associated with the operation of wind turbines.
- The loss for farmers or any living beings doesn't occur that is why wind turbines use only a fraction of land.
- It depends on the combustion of fossil fuels.

- Windmill doesn't pollute the air like a power plant.
- Wind energy is free.

3.3 Disadvantages of windmills:

- It is not a continual energy source.
- It produces noise pollution.
- It also produces visual pollution.
- Birds have been killed by flying into rotational turbine blades.
- The travel and maintenance cost of turbines increases.
- It is time-consuming.

3.4 Applications of Windmill

- Pumping water.
- Saw-milling of Timber.
- Milling grains.
- Drainage-pumping.
- Oil extraction from seeds.
- Machining.

CONCLUSION

Our work is to show that the vertical axis wind energy conversion system are practical and potentially very contributive. Thus we have used our new design of wind turbine to pump out water. This will provide liters of water for drinking purpose. At the low wind velocity in the range below 3 m/s, the discharge is not so much effective, however with increased speed of wind energy considerably enhanced to the rate of velocity, therefore discharge becomes high.

By considering the various parameters of wind energy and wind water pumps it is noted that performance by combining both will get more advantage. As the pumping water can be stored in tanks, used for later purpose. If necessary any one mode can be used for pumping the water or production of electricity, so overflowing of water and current can be controlled. The global environment is changing day by day and becoming more polluted, by using renewable energy we can reduce it. So, people and companies must focus on renewable energy rather than non-renewable energy. Since the wind is a major part of this system, converting this into a hybrid method will enhance its efficiency (i.e.) by combining wind and solar energy. Solar energy is the best source of renewable energy and it can be used to produce power.

Scope for future work:

- Efficiency or power output of pump can be improved by optimizing blade parameters such as blade thickness, blade length, blade profile, number of blades etc.
- By keeping solar panels to rotate the wind mill we can pump easily where no power consumption is required to pump the water.

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