

*The Study and Research of Wind Energy for Electricity Generator in Chana District,
Songkhla THAILAND*

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Abstract

This article is aimed to study and research about the wind energy for the electricity generator around Chana District, Songkhla province (Southern of Thailand), Thailand. The experiment used three vertical wind turbines, 12 volts 200 watts electric current, charger control, 1,500 watts battery, and 525 watts inverter. This study revealed that the wind energy can generate the electricity for electric equipments at least 3 hours a day. It is concluded that the wind energy is an alternative power which can save the limited resources for the electricity generator.

Keywords: Wind, Electricity, Energy

1. Introduction

Environmental problems are national and global problems, mainly due to population increasing [1] and the kinds of new technology that destroy environment. While the basic needs of the population living, the resources are in a constant state, some are decreased and some are extinct or disappeared. In the past and also in a present time, human use of natural resources is very wasteful with the use of chemicals. This problem causes a crisis environment that affects human life [2]. In 2010, southern part of Thailand was affected by depression, there was flood, homes were damaged and no electricity [3]. And in 2011, [4] it was a torrent and flood that affected the people who live in many areas.

Moreover, the cause of environmental problems also is the growth of industrial cities that uses more electric power and many other kinds of power. So, the renewable energy such as wind energy and solar energy by clean technology or environmentally friendly technology is the interesting option to reduce the power using [2].

The wind energy for the primary energy to produce electricity research by using wind turbine is an environmentally friendly technology that is a worthwhile investment in lowering the cost of electricity in the household. Songkhla province has a high potential for wind energy [5] because it has a long coast and it is windy areas that appropriate to bring wind power into energy to produce electricity. So that, this paper studied the wind turbine to produce electricity at Chana Technical Collage, Chana district, Songkhla province in order to meet energy saving and environmentally friendly.

2. Types of Wind Turbine

A wind turbine is a device that converts the kinetic energy from the wind into the mechanical energy for the electricity production system [7]. A wind turbine for generating electricity has 2 types. It is considered from the rotation axis about either a vertical or horizontal axis shown in figure 1 and figure 2 respectively. Their difference is the end of the spindle rotor but they all have the same materials for electricity production such as the rotor blades, the nacelles, the generator sets, and the towers[6].



Figure 1. Vertical axis wind turbine



Figure 2. Horizontal axis wind turbine

3. The Components of the Wind Turbine for Electricity Generation

In [8], The wind turbine is composed of the main components that shown in Fig.3.

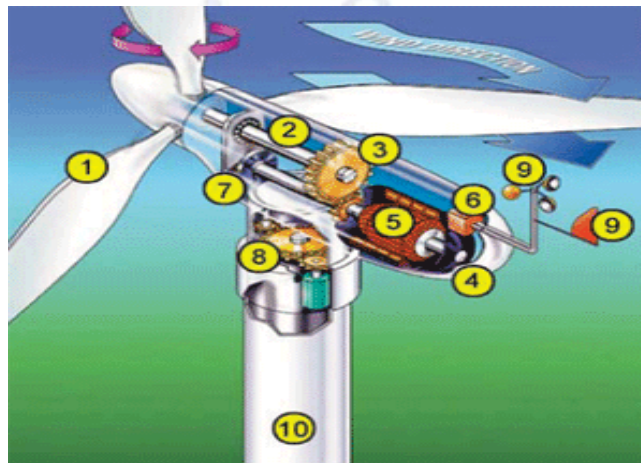


Figure 3. The wind turbine for electricity generator components

No.1 Blades: They are holed by a rotor hub, the power from the rotor hub is transmitted to a rotor blade and converts the wind energy into the mechanical energy.

No.2 Rotor blade: It gets the power from the rotor axis and transmitted by a system capacity to spin the generator.

No.3 Gearbox: It modifies and controls the speed of rotor blade and generator axle rotation.

No.4 Nacelle: It is a packaging system of the wind turbine that composed of gear system, generator, brake system, and controlling system.

No.5 Generator: It transmits the mechanical energy to the electricity energy.

No.6 Controlling System: It is an operation and power supply control system which is controlled by a computer system.

No.7 Brake system: It is used to control and stop the blades and rotor blade rotation during the maintenance when the wind speed is more than its carrying capacity.

No.8 Yaw drive: It is the nacelle rotation control to take the blades to the wind direction by electronic system.

No.9 Anemometer and wind vane: They connect a cable into a computer system. There are the wind speed and direction indicator that make the computer to control other mechanisms.

No.10 Tower: It bears all the components that are on its top.

4. The Wind Turbine for Electricity Generation Design

Figure 4 shows the wind turbine for electricity generator diagram that composed of 4 parts. The wind turbine generates the electricity for the wind turbine rotating when the wind is blowing and the dynamo that turns the mechanical energy into the electrical energy. The battery charger, its duty is to control the battery charging for a stable charging that generate the 12 volts 125 amps 1,500 watts DC voltage. And the 12 volts DC battery that is the source of energy which the DC voltage is transmitted to an inverter. The converter transmits the DC voltage to be 220 volts AC voltage and then supplies the power to the electrical equipments.

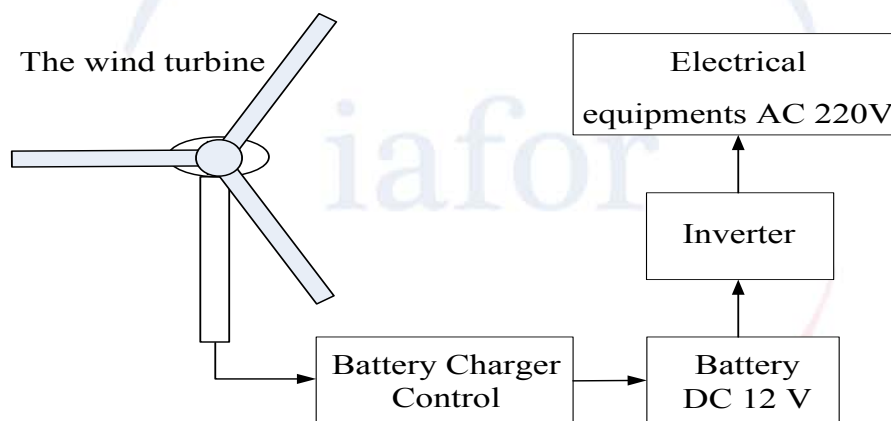


Figure 4. Block diagram of the wind turbine for electricity generator components



Figure 5. The Automatic wind generator charger controller (front side)



Figure 6. The Automatic wind generator charger controller (back side)



Figure 7. Battery



Figure 8. Inverter

Figure 9 shows the wind turbine installation at the 5th floor ceiling of an electronic department building, Chana Technical Collage, Songkhla Thailand. The wind turbine was connected with the battery charger control (shown in Fig.5 and Fig.6 respectively) and the battery (shown in Fig.7) in the operating room by the electric cord. And Fig.10 shows the functional testing that the battery charger control, the battery, the inverter and the electrical equipment were connected, respectively.

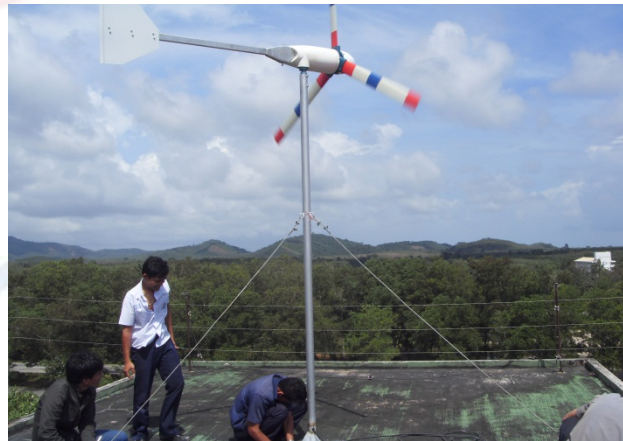


Figure 9. The wind turbine for electricity generator



Figure 10. Functional testing

5. The Results

The research of wind energy for electricity generation was studied at Chana Technical Collage, Chana, Songkhla, Thailand. The wind speeds were collected in the monsoon between November 2010 to October 2011) as shown in table 1. The study revealed that the highest average wind speed was in April at 6.35 meters per second and the lowest was in November at 3.87 meters per second.

Table 1. The averages of wind speed between November 2010 to October 2011

Years	Months	The averages of wind speed (meters/second)
2010	November	3.87
	December	5.97
2011	January	4.50
	February	5.60
	March	5.20
	April	6.35
	May	5.03
	June	4.95
	July	5.10
	August	4.90
	September	4.40
	October	4.25

Table 2 shows the electricity that generated by the wind energy. It was revealed that the battery charging in November, the lowest average wind speed month, was the longest charging which took 24 days to generate 1,500 watts (63 watts per day). On the other hand, the battery charging in April, the highest average wind speed month, was the shortest charging which took 9 days to generate 1,500 watts (167 watts per day).

Table 2. The averages battery charging per day

Years	Months	Period of 1,500 watts charging (days)	The averages of electricity per day (watts)
2010	November	24	63
	December	12	125
2011	January	20	75
	February	14	107
	March	16	94
	April	9	167
	May	17	88
	June	17	88
	July	17	88
	August	17	88
	September	18	83
	October	18	83

6. Conclusion

The study and research of wind energy for electricity generation at Chana Technical Collage, Chana, Songkhla that composed of 3 blades vertical axis wind turbines, 12 volts 200 watts dynamo, battery charger, and 1,500 watts battery concluded that it generated electricity the highest and the lowest in April, 2011 and November, 2010, respectively. It generated the electricity for the electrical equipments at least 2 hours per day. Therefore, the wind energy is an alternative energy that is not only save the limited resources but also be friendly to environment.

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