INNOVATIVE JOURNAL
OF INTELLIGENT CONTROL AND OPTIMIZATION FOR ELECTRICAL SYSTEM

Vol. 2 (2025) No. 1

Publisher by AITEKS : Aliansi ahlI TEKnologi dan Sains
https://ijcioes.org/index.php/ijcioes

Design and Construction of PLTB for Rice Field Irrigation Water Pump System in Nagari Batu Taba

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***Abstract*— In this research This delve deeper implementation technology generator electricity power wind power (PLTB) as solution For energy renewable in agriculture . With existence study This writer integrating PLTB as source Power energy in agriculture that is very helpful will matter that . The implementation of this PLTB in a way significant support efficiency energy in agriculture , while minimize the impact to environment society . In this PLTB system capable provide source Power very effective and friendly energy environment , creating source power in agriculture that can developed . Analysis of the resulting data in the form of quantitative and qualitative give knowledge deep about performance from PLTB in increase utilization energy renewable in a way sustainable . This is give contribution to understanding We about How technology energy renewable , such as wind power, which can developed more carry on with context energy renewable to agriculture For reach sustainability and efficiency source Power.**

***Keywords*— Wind Power Generation , Renewable Energy , Efficiency Resource.**

Manuscript received 26 May. 2025; revised 29 Mei. 2025; accepted 25 Mar. 2025. Date of publication 30 Jun. 2025.

I. INTRODUCTION

Dry season make a number of land agriculture in Indonesia is dry and in need lots of water so farmer need existence A solution For can pumping water without use machine diesel that needs Lots gas or other fuels. Wind is one of source energy that can utilized as fuel substitute for pumping water.

Use energy wind these are the farmers No confusing problem about material burn that will used for That he did development energy electricity with use wind as generator electricity. PLTB or what is usually known with generator electricity power wind or wind which is very useful especially farmer in irrigation of rice fields with use turbine wind as a medium of delivery and things it is very efficient.

With utilise energy kinetic incoming wind to within the effective area For turn the propeller or turbine wind, then energy turn This forwarded to the generator for to awaken energy electricity. Which area the own speed strong wind in the afternoon day and also Evening day, in the month This speed wind at the location recorded 6 to 17 km/h during the day day and night day recorded 6 to 13 km/h which is very profitable to the generator that will built there.

A. Wind Power Plant (PLTB)

Generator electricity power wind (PLTB) or generator electricity power wind is type generator electricity that changes power kinetic from wind become energy electricity. Change energy done with utilise gust wind For rotating the blade or connected bar with turbine wind. Generator electricity power wind aiming produce energy electricity from power wind with merge a number of a number of blade at a time.

B. Wind Energy

Wind is one of the form energy the oldest that has long been known and used man . As is known , in principle wind happen Because There is difference temperature between air heat and air cold . In every area condition temperature and speed wind

different . The real wind energy abundant in Indonesia apparently Not yet fully utilized as alternative producer electricity , even during This Still viewed as a natural process less usual own mark economical for activity productive public .

C. Wind Turbine

Wind turbine is a part from system generator power wind Where play a role as catcher energy wind For transformed become energy motion For rotating the generator. There are many type from turbine wind according to its form . Among others are propeller type , darrieus , sailwing , fan-type, savious , type vertical and horizontal.

D. Generator

Generator is a a machine that uses magnets to change energy from energy mechanical become energy electricity . The principle of the generator can it is said that voltage induced in the conductor if conductor the moves in a magnetic field so cutting the magnetic lines. The generator is A tool that produces energy electricity from source energy mechanics , with use induction electromagnetic .

E. SCC

Solar Charge Controller is device electronics used in system generator electricity power solar For arrange flow electricity coming in and out from battery storage energy solar . Solar charge controller is used in system power solar For arrange incoming current and voltage from solar panels to battery . Function the main thing is prevent overcharging (charging excessive) and over-discharging (discharging excessive) which can damage battery . The solar charge controller also ensures that battery filled with the most efficient and safe way.

F. Battery

Accumulator (battery) is A tools that can receive , store and issue energy electricity , through a chemical process . There are two types known elements that are source current unidirectional (DC) of the chemical process , namely primary elements and elements secondary . Elements secondary can loaded return repeatedly more known battery . The primary element consists of from element wet and elements dry . Reaction chemistry on elements cause electron flow from electrode negative to electrode positive No can behind Again so need replacement material reactant (element dry).

G. MCB DC

MCB is sufficient system simple . The operating mechanism is when happen current more , current more the produce heat on the bimetal, which causes the bimetal to flex and break MCB contact (Trip). MCB DC for usage DC load working For compare use of DC MCBs on AC loads and which ones are the most effective and the circuit given burden until the MCB trips and the amperes and volts in the circuit are measured .

H. DC Pump

The pump is tool For move fluid from place One to the place others who work on base convert energy Mechanic become energy kinetic . The mechanical energy provided tool the used For increase speed , pressure or elevation (height). Water pumps are tools used For absorb at a time push water with help source Power electricity .

II. METHOD

A. Tool Design

Planning tool made For help and make it easier in do tool to be made. Every tool have mutually exclusive functions related so that form a system of tools made .

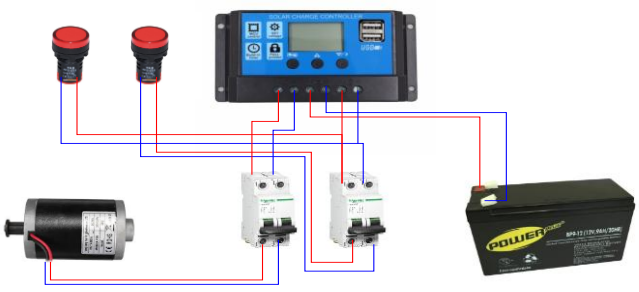

FIGURE 1 Wiring design

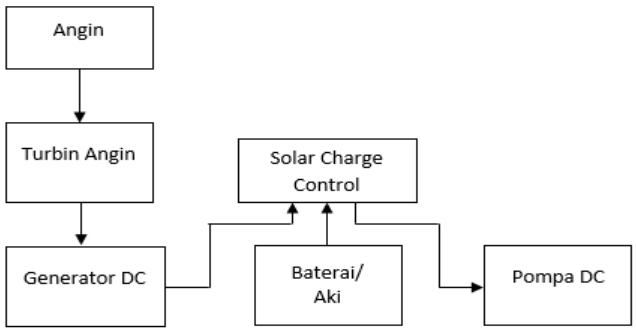

FIGURE 2 Block diagram

B. Block Diagram

Block diagram is one of the matter most important in planning tools , because from this is the block diagram can known method Work series in a way overall . Overall block diagram can seen in the figure 2.

C. Tool Design Flowchart

Stages research that will be done , started from design systems , data collection and testing modeling that has been made .

D. Wind Power Plant Design

PLTB design here only show form blade because the core of everything is the blade that will accept breath from wind .

FIGURE 3. Flowchart

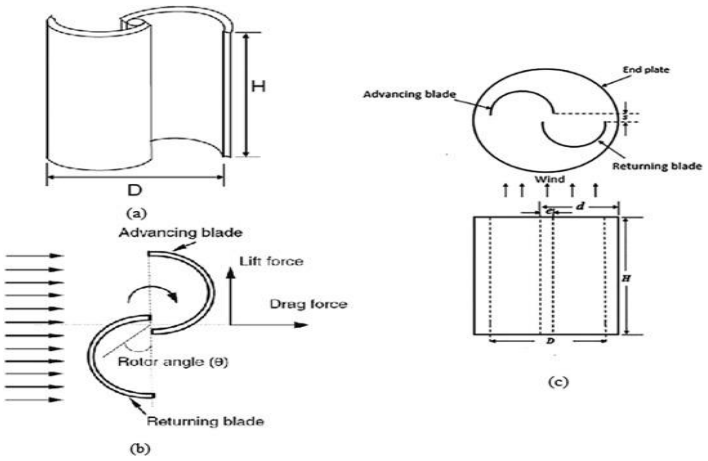

FIGURE 4. Generator design electricity power wind

TABLE I
Tools and materials

NO	TOOL NAME	AMOUNT
1.	Hand Grinder	1 piece
2.	Electric Drill	1 piece
3.	Electric Welding Machine	1 piece
4.	Test Pen	1 piece
5.	Combination Pliers	1 piece
6.	Plus Minus Screwdriver	2 pieces
7.	Meter	1 piece
8.	Multimeter	1 piece
9.	Pointer	1 piece
10.	Ruler	1 piece
11.	Right Angle Ruler	1 piece
12.	Cutting pliers	1 piece
13.	Anemometer	1 piece

E. Working Principle of the Tool

On design get up This Wind Power Plant (PLTB) use turbine savonius . The wind that blows push blade turbine cause turbine rotating , rotation turbine This Then used For drives the generator and produces electricity . The electricity generated by the generator is distributed to the Solar Charge Controller (SCC). SCC here functioning For regulate and control current electricity from PLTB to battery for prevent overcharging and overdischarging . The electricity regulated by the SCC then saved in battery . This battery functioning as storage energy so that electricity can used When only , when gust No Enough big For move turbine or moment need electricity increased . Electrical energy from battery Then distributed For turn on load used like DC water pump and lights indicator.

F. Component Design

Planning component generator electricity power wind required for the results testing in accordance with what is desired and get optimal results. The tools and components used in the power plant electricity power wind can seen in the table following. Table 1 tools and materials to be used used, namely

III. RESULT AND DISCUSSION

A. Tool Description

PLTB Working System Started with gust the wind that will to rotate turbine . Wind that will be push blade as distributor going to turbine integrated savonius with generator. Blowing wind cause turbine rotating , producing movement rotation . Rotational movement This direct driving a generator which is also connected with turbine . The generator converts movement rotation become energy electricity . Current electricity generated Then flow through cable output to the solar charge controller (SCC)

current / voltage . after it is saved to in battery . Solar charge controller works For arrange flow current from DC generator to battery , make sure safe charging without overcharging, and protect battery from overdischarge In addition , the tool This manage distribution Power between the DC generator, battery , and load , increasing efficiency system For keep the output current and voltage electricity still stable and controlled , preventing fluctuation excess that can damage equipment .

B. Measurement results

FIGURE 5. Picture of PLTB

TABLE II
Measurement results

No.	Anemometer (m/s)	Generator (VDC)	Voltage battery
1.	2.1	23.17	11.57
2.	2.5	20.44	11.56
3.	2.0	19.74	11.59
4.	2.2	15.69	11.56
5.	2.6	19.17	11.55

At the stage This done measurement speed wind using an anemometer, measurement voltage released by the backup energy that is battery / accumulator and the last one measurement output voltage from the generator that will enter to system safety namely DC MCB.

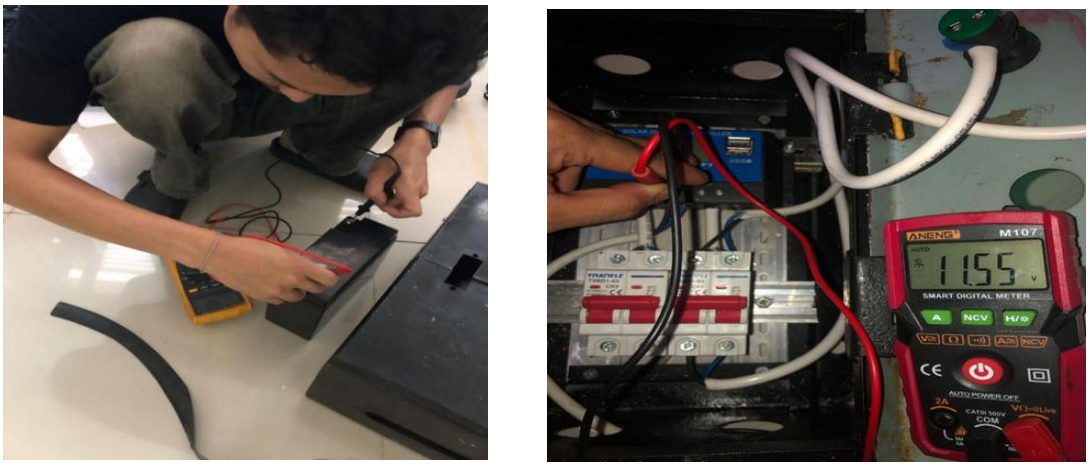

FIGURE 6. Checking Battery dan Voltage data collection battery

IV. CONCLUSION

On design construction of PLTB is carried out election turbine Savonius Because capable operate with Good even at speed wind low . This turbine own Power catch big wind , suitable used in agricultural areas . Selection strategic location will help turbine work optimally, so that energy electricity generated can used For system irrigation irrigation in a way efficient. PLTB is energy renewable , effective and friendly environment , can work optimally with the right turbine like Savonius , even in the wind slow , so still capable produce electricity For irrigation although weather not enough support. Speed wind measured using an anemometer to find out the average wind at the location . Measurement results show that PLTB can works optimally at speed wind said , with an average voltage electricity generated reach mark certain (V). This data show that PLTB is effective used in the area and supports use energy renewable friendly environment.

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