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JET WIND TURBINE

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ABSTRACT

Our aim was to build wind turbine which charges a 12 volt battery and runs various 12 volt appliances. By building this project we want drive the attention of peoples towards power generation through renewable sources so as to tackle problem of power in our country which is suffering from power shortages. With the help of such project various sections like residential, industrial, commercial etc. can become independent from supply of power from electricity board unto certain extent.

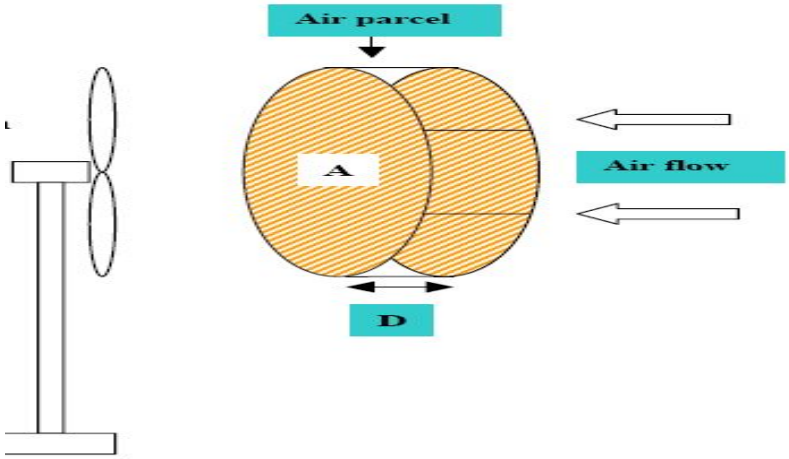
I. INTRODUCTION

Through the next several decades, renewable energy technologies, thanks to their continually improving performance and cost, and growing recognition of their Environmental, economic and social values, will grow increasingly competitive with Traditional energy technologies, so that by the middle of the 21st century, renewable Energy, in its various forms, should be supplying half of the world's energy needs."

The cost of wind-generated electric power has dropped substantially. Since 2004, according to some sources, the price in the United States is now lower than the cost of fuel-generated electric power, even without taking externalities into account. In 2005, wind energy cost one-fifth as much as it did in the late 1990s, and that downward trend is expected to continue as larger multi-megawatt turbines are mass-produced. Wind power is growing quickly, at about 38%, up from 25% growth in 2002. Wind power is the fastest growing form of electricity generation on a percentage basis.

Wind energy conversion systems convert the power in the wind to rotational shaft power and to electricity by coupling a generator to the unit. Wind "turbines" is wind electric power units, and are used throughout the world. Commercial wind turbines range from a few hundred watts to about 20 kilowatts for rural applications. Units designed for grid connection are available in the range of 20 kilowatts to over one megawatt. Where annual average wind speeds exceed about 5 meters per second, residential and village-scale wind turbines can provide electricity at costs competitive with or below those of diesel generators, and can be used in stand-alone applications not requiring a local power distribution system. [3].

II. LITERATURE SURVEY



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WorkingOf Wind Mill

The working of wind mill is very simple as the air comes in the structure the working blades rotates which is connected to main rotor shaft by the supporting arms the main rotor is coupled to a generator from where we can get the output.The power in the wind can be extracted by allowing it to blow past moving wings that exert torque on a rotor. The amount of power transferred is directly proportional to the density of the air, the area swept out by the rotor, and the cube of the wind speed.

The mass flow of air that travels through the swept area of a wind turbine varies with the wind speed and air density. As an example, on a cool 15°C (59°F) day at sea level, air density is about 1.22 kilograms per cubic meter (it gets less dense with higher humidity). An 8 m/s breeze blowing through a 100 meter diameter rotor would move about 76,000 kilograms of air per second through the swept area.

The kinetic energy of a given mass varies with the square of its velocity. Because the mass flow increases linearly with the wind speed, the wind energy available to a wind turbine increases as the cube of the wind speed. The power of the example breeze above through the example rotor would be about 2.5 megawatts. As the wind turbine extracts energy from the air flow, the air is slowed down, which causes it to spread out and diverts it around the wind turbine to some extent.

Advantages and disadvantages

It has many advantages they can be categorizing as:

Economical advantages

- Earns tradable emission credits
- Scalable power cost
- No fuel costs
- Inexpensive
- Local transmission
- Competitive capital costs
- Green pricing

Ecological advantages

Global climate change has become a catalyst for the social and political demand for sustainable energy sources. This combined with the high cost of extending electricity grids to rural areas and the decreasing price of stand-alone power systems is a significant incentive to the rise of locally generated energy.

The windmill communities large and small, to generate electricity without emitting greenhouse gases of any kind or impacting the local marine environment. Unlike conventional barrage systems, the windmill relies on ocean currents rather than air amplitude to generate electricity. The array of slow moving turbines allows air and fish to flow freely and safely through the structure. Larger marine mammals will be prevented from contact with the rotary foils by a protective fence, and further protected by a backup auto-breaking system controlled by sonar sensors. [2].

Disadvantages

There are less disadvantages as compared to advantages one of the disadvantage is that for its installation high current zone is required then its initial cost is high about 3 to 3.5 crore. There are chances of breaking of mill during severe weather conditions like in case of tsunami.

Types

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Windmills can be classified same like windmills they can be classified on the basis of axis of rotation they are: -

Horizontal axis wind mill

Vertical axis wind mill

Horizontal axis wind mill

Its design consist of a main rotor shaft which is driven by hydrofoil blades which rotate due to incoming air in turbine duct then this rotor shaft is coupled to generator in an coupling chamber .the generator is kept above air level in an machinery enclosure from there we can get the output the & utilize it for various purpose.

All existing HAWTs (or Horizontal Axis Wind Turbine) have the main rotor shaft and generator at the top of a tower, and must be pointed into the wind by some means. Small turbines are pointed by a simple wind vane, while large turbines generally use a wind sensor coupled with a servomotor. Most have a gearbox too, which turns the slow rotation of the blades into a quicker rotation that is more suitable for generating electricity. Since a tower produces turbulence behind it, the turbine is usually pointed upwind of the tower. Turbine blades are made stiff to prevent the blades from being pushed into the tower by high winds. Additionally, the blades are placed a considerable distance in front of the tower and are sometimes tilted up a small amount.

Downwind machines have been built, despite the problem of turbulence, because they don't need an additional mechanism for keeping them in line with the wind, and because in high winds, the blades can be allowed to bend which reduces their swept area and thus their wind resistance. Because turbulence leads to fatigue failures and reliability is so important, most HAWTs are upwind machines.

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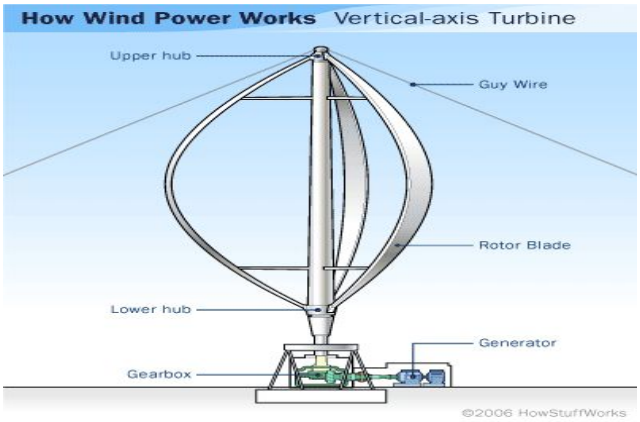
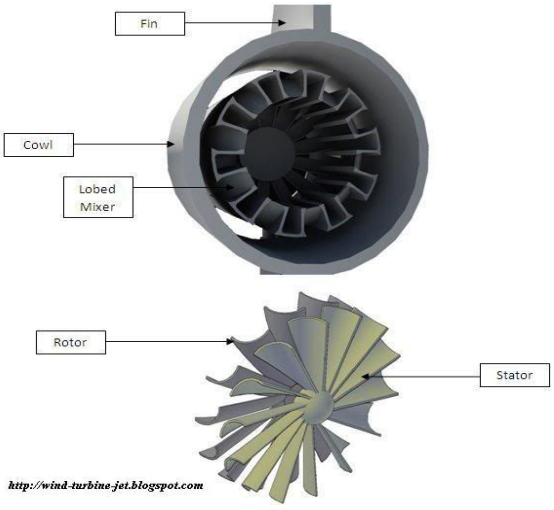
Vertical axis wind mill



The vertical axis windmill consists of twin axial flow rotors of 15m to 20m in diameter, each driving a generator via a gearbox much like a hydroelectric turbine or a wind turbine. The twin power units of each system are mounted on wing-like extensions either side of a tubular steel monopile some 3m in diameter, which is set into a hole, drilled into the seabed.
Vertical axis turbines (or VAWTs) have the main rotor shaft running vertically. The main advantages of this arrangement are that the generator and/or gearbox can be placed at the bottom, on or near the ground, so the tower doesn't need to support it, and the fact that the turbine doesn't need to be pointed into the wind.

Drawbacks are usually the pulsating torque produced during each revolution, and the difficulty of mounting vertical axis turbines on towers. This means they must operate in the slower, more turbulent air flow near the ground, with lower energy extraction efficiency.

III. COMPONENT&MATERIAL SELECTION



Jet wind turbine

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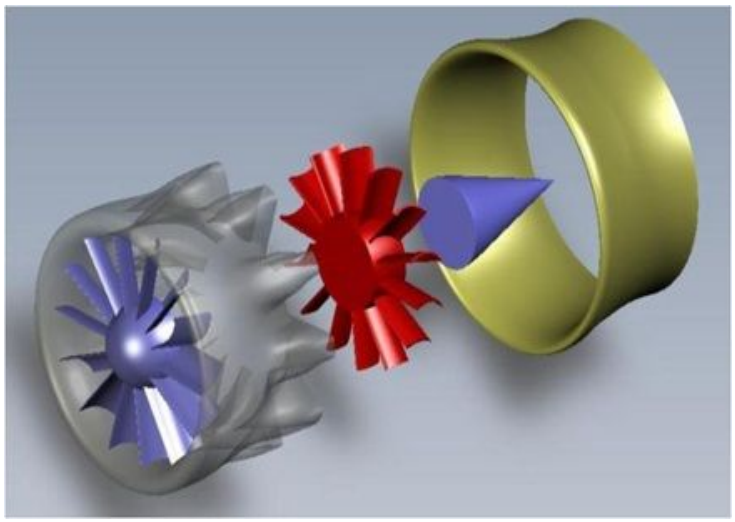
Assembly of jet wind turbine



Assembly of jet wind turbine

Wind Turbine Jet

In order to extract energy from a larger area of the approaching wind, smaller, sturdier, and faster blades can be used. We try to design a new idea about the shape of fin, cowl, lobed mixer, rotor and stator. There are some of important parts in this new design of wind turbine jet.
The new design of our wind turbine can be smaller than conventional turbine but can generate more power. Based on the concept of the jet engine's turbine, our wind turbine's component can be divided into:
1. Rotor
2. Cowl
3.Lobed Mixer

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4.Blades
5. Stator
jet engine shaped wind turbine is designed to be an amazingly 3 to 4 times more efficient than standard wind turbines. Present day wind turbines only capture 50% of the air flow, cannot stand high winds, have high building standards, require many trucks to deliver parts for 1 turbine and have to be built tall and away from habitable areas. Due to their large size, the large turbines force air around it instead of through it and during high winds they are usually turned off or break due to their huge slow spinning blades.

wind jet turbine is designed to be made simple and small, giving it the ability to handle high wind velocities due to its effectiveness to handle off axis flow and turbulence. Slow air on the inside flares out while the fast air on the outside is deflected in. When the two flows meet at different angles they create a rapid mixing vortex. A "fin" placed on top of the wind jet turbine has the ability to automatically align to wind direction. In addition, it can be disassembled to fit in one truck vs the traditional wind turbines which will need several trucks to just deliver parts to 1. With the costs estimated to be 25-35% less and the added ability to place these turbines closer together.

IV. CONCLUSION

During working on this project we came to know about the various renewable sources of energy and there importance in power production in the world. We came to know that importance of the power through wind mills. In future, further development in the direction of wind energy will make the power cheaper. India stands fifth in rank of power produced by wind energy.

The building of this project has helped us to develop good amount of confidence as we were able to tackle very interesting problems like,

1. Transmission system for converting the wind force in to rotational speed of shaft.
2. Mechanism to rotate the head assembly so as to access the use of wind from any direction, which increases the efficiency of the system.

It also gave us opportunity to realize ourselves as we were subjected to different problems and were compelled to take self decisions which really develops our problem tackling skills.

REFERENCES

1. *ink.springer.com/article/10.1007%2FBF00121961*
2. *people.eng.unimelb.edu*
3. *www.electrochem.org/e2s*
4. *www.earth-syst-dynam.net.*
5. *https://en.wikipedia.org/wiki/High-altitude.*
6. *www.hindawi.com/journals/jre/2013/839319/*
7. *www.google.com*
8. Joseph P. Stoltman - 2011 - Science
9. S Shun - 2012
10. LM Miller - 2011
11. U Högström - 1984
12. David E. Newton Ph.D. - 2014 - Science