

Wind with Miller

Introduction

U.S. wind energy installations produce enough electricity on a typical day to power the equivalent of more than 9.7 million homes. It is estimated that wind power in America will eliminate an estimated 62 million tons of carbon dioxide annually. This is the equivalent to taking 10.5 million cars off the road. Wind energy will conserve approximately 20 billion gallons of water annually, which would otherwise be consumed for steam or cooling in conventional power plants.

In this activity you will learn how wind energy is generated and how a wind turbine works using the website Wind with Miller.



Equipment

- Engineering notebook
- Pencil
- Computer with Internet access

Procedure

Login as a Guest in the Wind with Miller website <http://smarturl.it/windwithmiller> to answer the following questions. Start with the Crash Course and continue working through additional screens.

1. List the five parts of a wind turbine.

2. How does a wind turbine generate electricity?

3. What are the six parts which make up the tower? Briefly describe the function of each part.
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.

4. How tall is a wind turbine tower?
5. What are the twelve parts which make up the nacelle?
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
 - i.
 - j.
 - k.
 - l.

Investigate how the parts of the wind turbine work. Answer the following questions as you view "How Does it Work – Nacelle." Be sure to click the forward arrow at the top of the page.

6. It's important that the rotor is firmly secured with lots of _____.
7. The gearbox changes the turning force so that it has to go _____ with less _____ in every revolution.
8. The two types of brakes on a wind turbine are the _____ and the _____.
9. A wind turbine generator is similar to a _____ on a bicycle.
10. True or False – The wind turbine is controlled by one computer, called the controller.
11. At what speed is the wind turbine stopped so that damage does not occur?
12. What turns the nacelle at the wind vane's indication of wind direction?
13. Do yaw bearings' teeth point outward or inward?

14. What are the two ways that a generator can be cooled?

15. How long is a rotor blade?

Answer the following questions as you view “How Does it Work – Rotor.” Be sure to click the forward arrow at the top of the page.

16. What is the name of the force pulling the plane up?

17. The rotor blades of a wind turbine are like the wings of a _____.

18. What makes the glass fiber hard?

19. Why do the shells have to be very smooth?

Answer the following question as you view “How Does it Work – Gear.” Be sure to click the forward arrow at the top of the page.

20. What analogy is used to describe the gear system?

21. Answer the following questions as you view “How Does it Work – Generator.” Be sure to click the forward arrow at the top of the page.

22. Why is there only one wire on a dynamo lamp?

23. What is electrical induction?

Answer the following questions as you view “How Does it Work – Tower.” Be sure to click the forward arrow at the top of the page.

24. Why is it important that the rotor is as high up in the sky as possible?

25. What is used to weld the sheets of the tower?

Answer the following question as you view “How Does it Work – Siting.” Be sure to click the forward arrow at the top of the page.

26. Where is the wind strongest?

27. How does wind behave when it meets a steep slope?

Answer the following questions as you view “How Does it Work – Install a Turbine.” Be sure to click the forward arrow at the top of the page.

28. In what is the foundation cast?

29. What is the purpose of the copper wire with no insulation?

30. What are the components of concrete?

31. How long can a wind turbine generate electricity?

Conclusion

1. What are the two causes of wind?