

BREEZING ALONG ADVENTURE JOURNAL

TAKING ON THE
WORLD, ONE
ENGINEERING
CHALLENGE AT A TIME

PROPERTY OF THE FUTURE ENGINEER,



Breezing Along



Hi, GEERlings! My parents and I are still in Nigeria where they are working on the issue of deforestation. We're staying in a remote village right on the coast. The ocean view is beautiful, and the wind from the sea is so refreshing!

In this remote location, there is no electricity though, which makes life more challenging. I met a friend here who could really use a little electricity. His little sister is afraid of the dark, so he wants to power a lightbulb to help her sleep better.

I think my GEERling friends can help me with that! I posted some videos online with more details. Take a look and let me see your engineering intuition!

Good luck,

Flynn

Pre Quest Setup

Breezing Along



This quest requires a flat surface like a table or counter and access to an electrical outlet so that you can plug in a fan and a hot glue gun. Make sure an adult helps with those!

Good luck!

Instructions for GEERlings

Segment 1— Breezing Along



Here are the materials Boma and I gathered from around the village.

The Supply Sack has materials that represent the objects Flynn has with her. She and Boma gathered up these materials in the Nigerian coastal village where Boma lives. Here's what you have to work with:

Material:

What it Represents:

Large paper cups (4)	⇒	Coconut shells
Small paper cups (2)	⇒	Seaweed pods
Popsicle sticks (8)	⇒	Small branches
LED light bulb (1)	⇒	From Flynn's reading lamp
Construction paper (4 sheets)	⇒	Driftwood planks
Straws (6)	⇒	Reeds
Tape (no limit)	⇒	From Flynn's house
Hobby motor (1)	⇒	From Boma's toy car

You may also use a **hot glue gun** with the help of an adult. **Scissors** will be provided so that you can make changes to these materials in any way you need to. Plan ahead though because there are no extra materials! Have fun!



You've heard of Hollywood, but what about Nollywood? That's a nickname for Nigeria's film industry. It's one of the biggest producers of films in the world!

Your Challenge

Segment 1—Breezing Along



Flynn needs to find a way to produce enough electricity to power a small light bulb using the natural resources around her. Your design needs to keep the light bulb on for 15 seconds without interruption.

You may only use the materials in your Supply Sack. Use your creativity to create a unique design. Good luck, GEERlings!

Before you start working, use the space below to plan out your solution.

My solution will look like this, and I will use these materials:

- Large paper cups
- Small paper cups
- Popsicle sticks
- LED light bulb
- Construction paper
- Straws
- Tape

Let's Engineer It!

Segment 2—Breezing Along



Flynn needs to use natural resources to power a light bulb, and her engineering intuition is telling her that she needs to build a wind turbine. Your job today is to answer the questions below about wind energy. Powering a nightlight for Flynn's friends will really brighten up their day—I mean their night!

You can use the resource links online to find out more about wind energy engineering.

One of my favorite things about Nigeria is the butterflies! There are over 1,828 species of butterflies here.



Take notes while you research, but only write notes that make sense to you. Don't write something that you don't understand or can't explain in your own words. If it helps you, you can also draw pictures about the things you learn.

1. What is energy?

2. What is kinetic energy?



3. What are some examples of kinetic energy?

4. What is wind energy?



5. Why is wind energy important?

6. Flynn wants to use wind energy on a small scale. How could we use it on a large scale?



7. What are the parts of a wind turbine?

8. How does a wind turbine work?



9. What is a generator and what does it do?

10. What factors can affect how well a wind turbine works?

11. Imagine you are a wind energy engineer and you have any resources you need to design a wind turbine. What do you imagine the perfect wind turbine would look like? What features would it have?



Now that you've researched and learned more about wind energy, try to use your new knowledge to generate electricity for a nightlight. Draw a picture to help you plan what you will build.



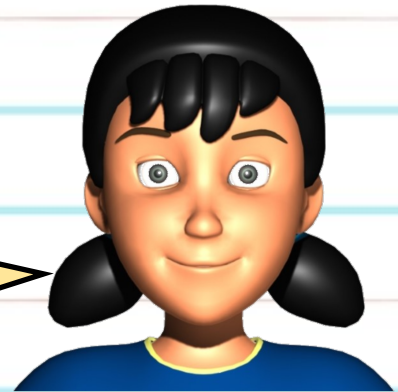
Let's Put It All Together!

Segment 3—Breezing Along



With your new knowledge of wind energy, you and your team will design and build a wind turbine that will generate electricity. Think about what you've learned from your research and use your own creative ideas to design a wind turbine that will light up a small light bulb. Your design will be successful if it is at least 18 inches tall and keeps the light bulb on for 15 seconds.

Think about what you built in the first session. What worked well? What didn't? Draw a picture to help you plan your design. Label the picture to show how you will use the different materials from the supply sack.



I think I can build the wind turbine like this, using these materials:

- Large paper cups
- Small paper cups
- Popsicle sticks
- LED light bulb
- Construction paper
- Straws
- Tape

Test for Success

Breezing Along



It's time to see what your designs can do! Follow these steps to test your solutions and check the requirements below to see if your wind turbine is successful.

To test:

Use an electric fan to create wind.

Use a stopwatch, clock with a second hand, or timing app to accurately count 15 seconds.

Requirements:

1. Solution must use wind energy
2. Solution must light up a light bulb
3. Solution must be at least 18 inches tall
4. Light bulb must stay on for 15 seconds without turning off

GEERling Vocabulary List

Breezing Along



"Naija" is a nickname that Nigerians sometimes use for a person from Nigeria or Nigeria. In writing, it sometimes appears as "9JA."



Deforestation: The removal of forests

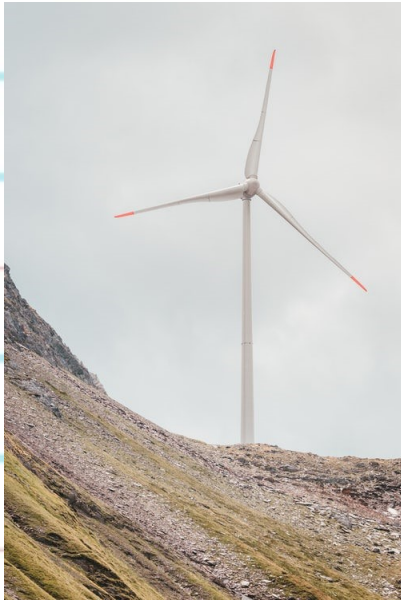


Desertification: The process that occurs when land with good soil changes into desert

Energy: The ability to do work. For example, heat, light, and motion are a few types of energy

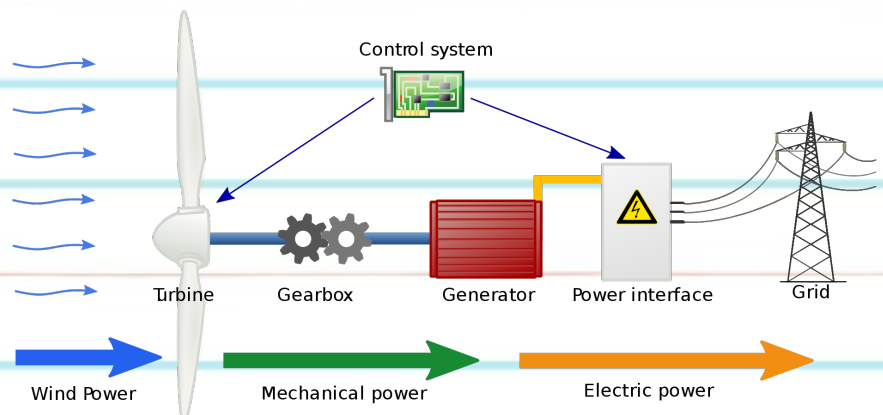


Kinetic energy: The energy of motion. An example of kinetic energy is the energy involved in figure skating.



Turbine: A device that uses the wind's kinetic energy to produce electricity

Generator: A device that converts kinetic energy into electricity



https://commons.wikimedia.org/wiki/File:Wind_turbine_schematic.svg

Wind Farm: Large sites that contain many wind turbines and produce large amounts of electricity

