# Green Building Lesson Plan: 5th Grade

****

**Overview:** 5th grade students will learn about sustainable building, and alternative energy generation.

**Objective/Purpose:** To help students learn about energy and also to learn about the importance energy efficiency (solar panels, wind turbines etc.)

**Materials:**

* PowerPoint presentation

 For Activity (Per Group):

* One 6V-12V (Preferably 12V and about 1/2” in diameter x 1/2” in length) DC hobby motor (lower voltage are harder to make work).
* One 3V, 5mm LED diode bulb with two terminals.
* Four popsicle sticks.
* Hot glue gun.
* Drill with a drill bit that matches motor’s drive shaft diameter.
* One 3 oz. paper Dixie cup (Blades).
* One 5 oz. paper Dixie cup (Base).
* Scissors.
* Fan.
* Multi-meter (optional, if you would like to show how many volts/ amps their wind turbine is producing).

**Discussion:** Following the PowerPoint presentation, discuss sustainable energy & building. There are video links throughout the PowerPoint presentation.

There are videos embedded in the power point that will only work if there is an internet connection.

The first video is slide 3, but it is hidden. This video is about the greenhouse effect, if the teacher chooses to show it and discuss the greenhouse effect the slide will need to be unhidden.

**Activity:**  Break students up into groups of 3-4. Have one student from each group come and gather the materials for building a wind turbine.

Use slides 18-22 to guide students through the building process. The groups should follow along.

Link for step-by-step activity instructional: <https://www.exploratorium.edu/video/light-wind-science-snacks-exploratorium>

\*\*The teacher should build one before class beforehand to be familiar with the process\*\*

**Conclusion Discussion:** Show slide 23 and talk about and use the questions to have a discussion about what they have learned, and challenges facing sustainable building.

**Assessment:** Students will be assessed by their participation in the discussion as well as their participation in making the turbine.

**Curriculum:**

Science Standard 4: Students will understand features of static and current electricity.

**Green Building Lesson Script**

**Link for step-by-step activity instructional:**

<https://www.exploratorium.edu/video/light-wind-science-snacks-exploratorium>

*Introduction (slide 2)*

* Begin with a short introduction on yourself: Name, hometown, schooling background, career background, etc.
* Introduce the topic of “sustainable energy & building”

*Slide #3 – Greenhouse Effect video*

* This video is optional if the teacher would like to discuss carbon emissions and climate change.
* This slide is “hidden” in the presentation as will not show up unless it is “unhidden”

*Slide #4- What is Sustainable Energy*

* Ask the question and allow students to answer and discuss. The answers on the slide are animated.
* Allow the students a moment to read the answers before moving on.

\*\*\*Encourage all answers and discussion, if you do not on this slide you will have a hard time getting it later.\*\*\*\*

*Slide #5- What Does Home Building Have to do with Sustainable Energy*

* Ask the question and allow students to answer and discuss.
* Allow the students a moment to read the answers before moving on.

*Slide #6- Net-Zero*

* Ask the question and allow students to answer and discuss. The answers on the slide are animated.
* Allow the students a moment to read the answers before moving on.

*Slide #7- What Does a Builder do to Produce a Net-Zero Home*

* Ask the question and allow students to answer and discuss. The answers on the slide are animated.
* Allow the students a moment to read the answers before moving on.

*Slide #8- What Does a Builder do to Produce a Net-Zero Home*

* Explain that today you are going to discuss three strategies to make homes more sustainable and perhaps even net-zero.

*Slide #9- Energy Beneath our Feet*

* Explain the concept of geothermal heat pumps and ask students why we are able to draw heat from underneath the ground.

*Slide #10- geothermal diagram*

* Use the image to help the student understand how a geothermal system works.

*Slide #11- Energy Above Us Too*

* Discuss the vocabulary, make sure the student know PV means photovoltaic.

*Slide #12- pv array diagram*

* Use the image to help the student understand how a PV system works.

*Slide #13- PV video*

* Show the Bill Nye video about PV systems.

*Slide #14- Energy is blowing past us*

* Discuss the vocabulary, make sure the student know PV means photovoltaic.

*Slide #15- wind turbine diagram*

* Use the image to help the student understand how a wind turbine works.
* Explain that gears are used to make one big revolution of the blades into many more revolutions

*Slide #16- wind turbine video*

* Show the wind turbine video

*Slide #17- Lets build our own (Wind Turbine Experiment: Attached at the bottom of the lesson plan)*

* Group sizes dependent on class size and material quantity.

*Slide #18-22- Pictures and Directions on How to Construct Their Very Own Wind Turbine*

* These pictures and directions may be used at your discretion- you can also take stills of the attached activity explanation video and use those for your directions or construct your own and attach your personalized set of instructions.

As groups complete their turbines have them light their LEDs up and circulate the room with the multi meter showing how they can generate more or less electricity depending on how fast the shaft spins.

*Slide #23- Sustainable building*

Ask the questions on the slide and lead a discussion with the students. Emphasize opportunities to work with these technologies in home building and what you love about homebuilding.