



## Energy Exploration Workbook



This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/>.

# Energy Exploration

Shining New Ways of Sustainable Power

## Introduction

---

In this session of energy exploration, you will be exploring the types of energy, some basic electrical vocabulary, and energy consumption. But before we go any further, let me explain what energy is to you. Things have energy, and you can feel the energy, but you can't necessarily hold it. You should be able to see or feel what it does. And with that knowledge, you should know what type of energy it is. You also need to know that energy can't be destroyed or created. It can only transfer from one energy to another type of energy. To get a deeper understanding of what energy is, go to the videos page.

### Keywords

- **Current**-An electric current is a stream of charged particles, such as electrons or ions, moving through an electrical conductor or space.
- **Voltage**-a unit of electric resistance through wire or other conductive material
- **Power**-amount of energy supplied or taken over a period of time
- **Energy consumption**- amount of energy need to make something work
- **Renewable**-Energy from a source that is not depleted when used, such as wind or solar power.
- **Clean energy** - Energy production methods that do not produce carbon dioxide (CO<sub>2</sub>)
- **Fossil fuels**-a natural fuel such as coal or gas, formed in the geological past from the remains of living organisms.

## Website Navigation

### Videos

Under the videos tab, there are a series of videos meant to help you understand the concepts of Energy consumption, How energy can change, what energy is, among other things. Each video has a set of discussion questions for you to answer down below.

## Games

Under this tab you will be able to put your knowledge to the test in these four video games. So just go to each game and just press the play button and have fun. Also If you wish to know if a game correlates to a video you can look at the chart down below.

Game	Videos
Energy consumption -	How much land does it take to power the world
Get Charged	How much electricity does it take to power the world & Where Energy comes from & Can 100% renewable energy power the world?
Energy on earth -	A guide to the energy of the Earth
Save The World-	None

# Activity

Under this tab, there are two different activities. Both will demonstrate and help you understand and identify concepts of potential & Kinetic energy. So click on the underlined title page. From there, you can read the activity instruction, or you may flip to the next page to see the printed version of the directions, the activities

**Stretch your Potential**- Here in this activity you will be working with the First Law of Thermodynamics or the Law of Conservation of Energy. By stretching the rubber band on the toy differently, you will explore the effects of potential energy on kinetic energy. Below will be a material list that should be checked off first and separated from the material box for this activity.

## Materials Needed for Stretch Your Potential-

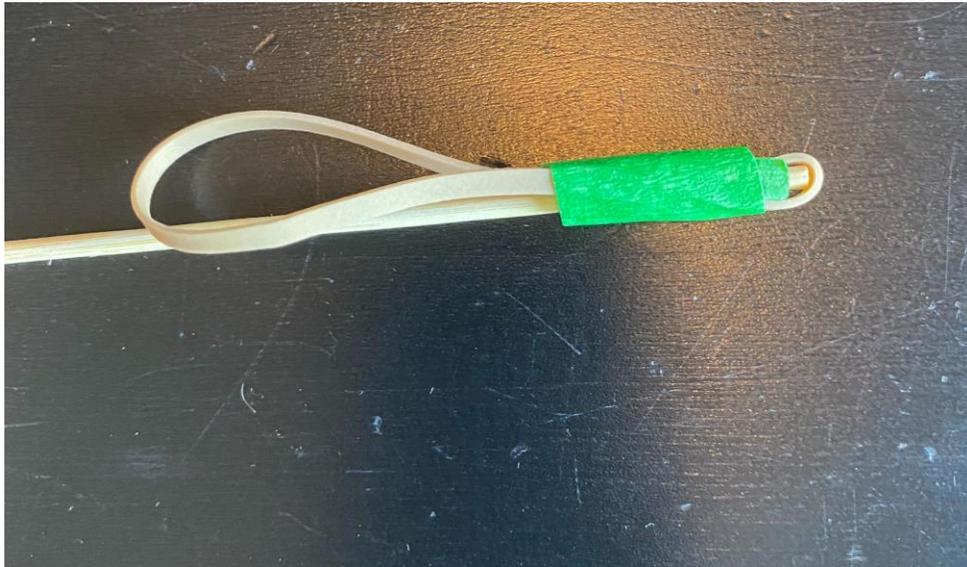
- 1 Bamboo skewer or 1/8" wooden dowel cut to about 12 inches
- 1 scissor
- some roll of tape (make sure not to use all of it for some can be used for the next activity)
- 1 Rubber bands
- 1 Drinking straw



Directions for stretch your potential- Here a extra video to help-

<https://youtu.be/DRcmYP2Jo9c>

1. First use the scissors provided and only cut off the sharp tip of the skewer making both sides flat.



2. Tape the rubber band so that it's flat laying on the one side of the skewer like see in the photos below. Note: try cutting the tape before placing it. It's a little finicky but with enough tries you'll get it

3. Cut  
half.  
take



4. Then  
one of the  
pieces of

straw and put the not taped side of the skewer through the straw to the taped end as seen below.

5. Then tape the straw to the rubber band as seen below



6. Then hold the skewer in any angle you want to release it at. The hold the end with nothing on it on the table. Pull back the straw piece pretty firmly and let go to have your thing fly. Here you've built potential energy by pulling down the straw and releasing it to make it into kinetic energy when letting go of the straw.
7. Video of us doing it- <https://youtu.be/XepNSVhgNCs>

### **Building Roller Coasters-**

In this activity you will get the chance to to design and build your very own roller coaster. In building this awesome coaster of yours, you will apply concepts of potential and kinetic energy.

### **Materials Needed for Building Your Roller Coaster-**

- 1 Marble
- 2ft-3ft of pipe insulation tubes cut in half
- String
- Cups



- Leftover straws

### Directions for Building Your Roller Coaster-

1. This activity is more about experimenting with what works and what doesn't. Therefore, these directions are just helpful hints to build a successful roller coaster but please try to be creative and try anything you think of in building the roller coaster. It's of course yours to design. Also don't feel like you have to use all the materials. Just use what you need for your vision. The only Goal is making the marble end in a cup at the end.
2. So the one thing you need is for your pipe to start from a higher place. If you don't start somewhere with a lot of potential energy your marble won't be able to go too far.
3. Loops, cup tunnels and ramps are encouraged. Try putting your tube through decorations while still having the marble travel from one end to the cup.
4. The link will bring you to the roller coaster we built. You can copy it if you like but if you have an idea of what you wanna build, Go for it! The only limit here is your creativity. Link- <https://youtu.be/8lr5GIFUIG4>



*Materials were developed using grant funding from the CMS Energy Corporation and the Michigan Space Grant Consortium.*

**Acknowledgement Statement** – Materials developed in part by funding provided by the National Aeronautics and Space Administration (NASA), under award number **80NSSC20M0124**, Michigan Space Grant Consortium (MSGC).