Why “Green” Energy?

Green energy is a term people use for energy sources that don’t cause a lot of pollution. By “energy sources” we mean anything that can power our homes, factories and vehicles.

Why is this so important? There are a few reasons. Most of our energy today comes from fossil fuels, like gasoline, oil and coal. Fossil fuels formed many millions of years ago, from dead prehistoric plants. When we burn them, they release energy, which is very useful. But they also release chemicals that can make us sick. The chemicals get into the rain and kill trees and plants and pollute lakes and rivers.

Digging and drilling for fossil fuels can harm the environment. And as we use fossil fuels up, people have to pay more and more for what’s left.

Most recently, scientists have discovered that gases produced by burning fossil fuels heat up the earth. It’s only a tiny bit—just a couple of degrees worldwide—but even temperature changes that seem small can have a big effect on the planet. Places that once got enough rain for farming may become deserts. Ocean levels will rise so much that coastal cities will have to move inland—which is very expensive. And many areas will get more severe weather—more wind, rain and snow.

For all these reasons, many people think it’s very important to reduce our use of fossil fuels and replace them with “green” energy sources, like solar and wind power.

So What?

You might wonder what all this has to do with you. What can a kid do about it?

Well, when your parents were going to school, no one worried about energy. So they didn’t learn about green energy power in school. But by the time you grow up, everyone will need to know about it. There will be a lot of jobs for people who know about green energy. And everyone will have to vote on important energy laws, so everyone will have to understand energy, especially these new green sources.

Spark Club will give you a head start. In high school and college, you can learn even more. You might want to get a job working with green energy. But even if you don’t, you’ll know enough to make smart decisions when it comes to energy.
You might be surprised to learn that almost every moving thing on earth gets its energy from the sun—not to mention most things that are warm, that light up, or that make a noise. The sun generates huge amounts of energy constantly—energy that shoots out into space as radiation, both visible and invisible. One skinny shaft of that light hits our planet—and nearly every moving and warm thing on our planet relies on that sliver of energy!

The wind? It moves because energy from the sun heats earth’s atmosphere unevenly, so that some parcels of air warm up more than others. They expand and rise over the cooler air, and this causes wind.

The ocean? Waves are caused by wind blowing over the water.

Even rivers move because of solar energy. The water of a river moves because the sun evaporated water, giving it so much energy it could rise up into the sky, form clouds, and then fall as rain and snow on mountains and hills. That energy is released as the water rushes toward the ocean.

Plants grow by capturing solar energy with their leaves and storing it in chemical bonds. This is called photosynthesis, or building with light.

Animals grow and move by eating plants and capturing that energy (or eating other animals that ate the plants).

Even cars, trucks and airplanes move because of solar energy. They burn fossil fuels—like oil and gas—and release the energy stored inside them. Where did the fossil fuels get that energy? Well, oil, gas and coal are made from prehistoric plants that lived hundreds of millions of years ago. Just as plants do today, they stored solar energy. That’s the energy the cars and planes use when they burn fuel.

Even atoms and molecules are warmed by the sun, and that makes them move.

So when you see something move, it’s almost a sure thing that it’s moving thanks to energy that came from the sun. If the sun were to go out, almost everything on earth would soon stop moving, and everything would become extremely cold. Life would not be possible.

Luckily, the Sun has enough fuel to last billions of years!

Journal Entry #2
Nothing can move without energy. And energy has to come from somewhere. List five things that move and where you think these things get their energy.

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<th>Things That Move</th>
<th>Energy Source</th>
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Journal Entry #3
See if you can show that the five things you listed got their energy from the sun.

1.               
2.               
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Wind Turbines
Solar Panels
The Right Light

Did you know that some sounds are so high pitched that you can’t hear them—but dogs and bats can? There are also sounds so low that you can’t hear them—lower than the lowest bass track on a song. The scientific name for the pitch of a note is “frequency.”

Light is the same. There are some frequencies of light that people can see, ranging from red—which is low frequency—to violet, which is high frequency. You can see the range of visible light, from red to violet, in a rainbow, or by using a “prism.”

And just as there are frequencies of sounds that are too high or too low to hear, there are frequencies of light too high or too low to see. They are invisible, but they are still there.

Light that is just a little too high frequency to see is called “ultraviolet,” or “UV.” This is the light that causes us to tan and also causes skin cancer and cataracts (cloudiness in the lens of your eye that can lead to blindness). The earth’s upper atmosphere protects us from some of the sun’s ultraviolet radiation, but some still gets through.

Journal Entry #4
Using your glass prism and sunlight, make a rainbow. Then draw the colors of the rainbow here, just as you see them. Then label the colors.
Journal Entry #5
UV beads change color in the presence of ultraviolet light. So you can use them as UV detectors!

Take three plastic bags and put three UV beads into each one. On one bag, write “None.” On the second, write “SPF #15” and on the third write “SPF #30.” Cover the second bag with SPF #15 sunblock, and the third with SPF #30. Take them into the sun.

Below, draw and color what the three bags of beads look like after sun exposure.

NONE SPF 15 SPF 30

Explain what happened.

Now you have learned about two kinds of light that are invisible to the naked eye: infrared (a little lower frequency than red) and ultraviolet (a little higher frequency than violet). There are many other kinds of invisible light both lower and higher than them, including microwaves and radio waves (lower frequency) and x rays and gamma rays (higher frequency).

Journal Entry #6
Eye Clops Night Vision Goggles consist of an Infrared flashlight (the round thing in the front) that sends out a beam of IR light, and two IR light sensors, one for each eye. Take your Infrared Night Vision scope into a dark place, like a closet and use it to look around. How do you think it works?

Warm objects, like animals, give off, or “radiate” a lower frequency of IR light than your goggles can see. But some snakes are able to sense that kind of IR. Why might this be helpful to them?

The Electromagnetic Spectrum

- Spans a range of wavelengths
- Visible is just a narrow range
- Radiowaves span a large range – from under 1mm to several meters