

THE RE-ENERGY CHALLENGE!

Build a Renewable Energy Model Activity
#ReEnergyEngineer



Electricity is great! It powers our devices, heats up our food and lets us see easily when the sun goes down. We can't live without it! Did you know that the average Canadian home uses **11,135 kilowatt hours of electricity a year?!** When we use electricity for all these great things, there is something important to keep in mind: Greenhouse gasses are produced when electricity is generated from fossil fuels that contribute to climate change.

The good news is that we do not need to rely only on fossil fuels for our energy needs. We have lots of technologies that are always improving, that produce little to no greenhouse gasses, this is called renewable energy! **Did you know that 67% of Canada's electricity needs are generated with renewable energy technologies?**



What is Renewable Energy?

We use energy every day. It surrounds us in different forms, such as light, heat, and electricity. Humans have invented thousands of machines and appliances that use energy to make our work easier, to heat our homes, and to get ourselves from place to place. Some of these machines use electricity, while others, like automobiles, use the energy stored in substances such as gasoline or diesel.

Like the names suggest, renewable energy is technology that harnesses energy that will not deplete, whereas non-renewable energy is a resource that will not replenish itself.

Want to learn a little more about how awesome renewable energy is? Check out these great resources!

Re-Energy Website - As a one stop shop for all your renewable energy construction plan needs!
www.re-energy.ca

People for Energy and Environmental Literacy (PEEL)
<https://www.teachpeel.ca/>

Renewable Energy 101 | National Geographic
<https://www.youtube.com/watch?v=1kUEOBZtTRc>

Re-Energy - Renewable Energy Basics Backgrounder
<http://www.re-energy.ca/docs/renewable-energy-basics-bg.pdf>

Learn About and Build a Renewable Energy Model!

Next, let's learn a little more about each individual source of renewable energy. As you read along keep in mind that you will be building your own renewable energy project! Take note of what interests you. In order to help we have included links to some DIY projects, but don't limit yourself to these suggestions, if you think of other ways to build a renewable energy project at home please share with us how you did it!



Solar energy

The Earth intercepts a very small part of the sun's immense output while orbiting the sun. Solar panels are designed to capture some of the sun's energy and change it from radiation energy into more usable forms such as heat or electricity. In fact, sunlight is an excellent source of heat and electricity, the two most important forms of energy we consume. Aside from producing energy for our electrical grid, solar energy is becoming increasingly popular for remote power needs such as telecommunication towers, agricultural, and in developing countries that are not connected to an electrical grid.

For more information on Solar Energy, download our Solar Energy Backgrounders:

Solar Electricity Backgrounder

<http://www.re-energy.ca/docs/solar-electricity-bg.pdf>

Solar Heat Backgrounder

<http://www.re-energy.ca/docs/solar-heat-bg.pdf>

For construction ideas check these out:

GreenLearning Solar Oven Construction Plan

<http://www.re-energy.ca/solar-oven>

Build a solar oven at home using a pizza box

<https://www.homesciencetools.com/article/how-to-build-a-solar-oven-project/>



Wind Energy

Wind energy is really just another form of solar energy. Sunlight falling on oceans and continents causes air to warm and rise, which in turn generates surface winds. As the wind pushes the blades of a windmill a generator is turned, creating electricity! The wind has been used by humans for thousands of years, first to carry ships across oceans and,

later, to pump water and grind grain. More recently, wind has been harnessed as a clean, safe source of electricity.

For more information on Wind Power, download our Wind Energy Backgrounder

<http://www.re-energy.ca/docs/wind-energy-bg.pdf>

For construction ideas check these out:

GreenLearning Wind Turbine Construction Plan

<http://www.re-energy.ca/wind-turbine>

DIY Simple Wind Turbine Video

<https://www.youtube.com/watch?v=loTYkKuQdJ8>



Biomass Energy

The term "biomass" refers to any form of plant or animal tissue. In the energy industry, biomass refers to wood, straw, biological waste products such as manure, and other natural materials that contain stored energy. The energy stored in biomass can be released by burning the material directly, or by feeding it to micro-organisms that use it to make biogas, a form of natural gas. Energy from biomass is used around the world, for everything from cooking and heating to generating electricity.

GreenLearning Biogas Generator Construction Plan

<http://www.re-energy.ca/biogas-generator>

Free Gas: How to Make Mini Biogas Digester Plant Video

<https://www.youtube.com/watch?v=omLoemHSKao>



Hydroelectric

Humans have used water power to supply energy for almost as long as we've used wind. Archaeologists have discovered descriptions of water wheels used for grinding grain that date back to more than 3,000 years ago. Similar to wind energy, the energy of falling water is used mainly to drive electrical generators at hydroelectric dams. As long as snow and rainfall can fill the streams and rivers, moving water can be a renewable source of energy.

For more information on Hydroelectric Energy, download our Hydro Backgrounders:

<http://www.re-energy.ca/docs/water-power-bg.pdf>



For construction ideas check these out:

GreenLearning HydroElectric Construction Plan
<http://www.re-energy.ca/hydro-generator>

How to Generate Electricity from Water flow ||
Hydropower
<https://www.youtube.com/watch?v=CAiZJrFYQ8Y>



Electric Vehicle (EV)

Electric vehicles have zero tailpipe emissions, because well, there is no tailpipe! EV's are increasing in popularity as their technology becomes more accessible. As the presence of renewable energy grows, EV's become more and more environmentally friendly. Did you know that EV's average 20 moving parts compared to the 2000 moving parts that internal combustion engines (gasoline powered cars) typically have!

www.greenlearning.ca/electricvehicles

For construction ideas check these out:

<http://www.greenlearning.ca/electricvehicles/electric-vehicle-model-construction-plan.php>



Energy Storage

Renewable energy is fantastic, but it does have one challenge! Without energy storage it can be less reliable. When the wind isn't blowing and the sun isn't shining we still need access to the energy that we created earlier, and we can do that by using batteries! We use batteries every day in order to keep our tablets, phones and laptops running,

electric cars are no different. Explore how you can make your own battery at home using things you can find around the house!

www.greenlearning.ca/energystorage

For construction ideas check these out:

Build a Penny Battery
<http://www.greenlearning.ca/energystorage/build-a-penny-battery-construction-plan.php>

Build a Flywheel Model

<http://www.greenlearning.ca/energystorage/build-a-flywheel-construction-plan.php>

What Next?

Now that you are a renewable energy expert, it's time to put your engineer hat on and build your own! Will you choose a technology cheap and easy to build? Will you choose a technology that will upgrade your home? Will you choose a technology that will work best in your climate?

Guess what? These are all questions real engineers need to ask themselves before starting a project!

RE-ENERGY ENGINEER DESIGN PACKAGE

Before You Build

Which Re-Energy Project did you decide to build?

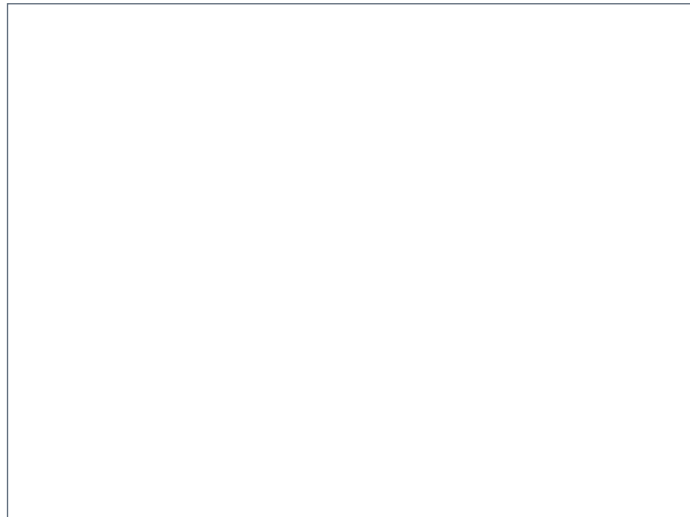
- Electric Vehicle
- Energy Storage
- Solar Oven
- Wind Turbine
- Biogas Generator
- Hydroelectric

Why did you choose the project? What interested you about it?

What materials do you need to make it?

Hint: Use the construction plan linked above.
Can you find any recycled materials in your house to build this project?

Most engineers sketch out their project before they build it. Sketch your design below. Remember, the construction plans are only a starting point, get creative with your design!



What makes your Re-Energy project original?
What neat features can you incorporate that makes your project unique?

RE-ENERGY ENGINEER DESIGN PACKAGE

What things must you consider in order for your project to be successful? For example, think of the weather for your solar oven, or weight for your electric vehicle.

Can you think of another technology from the list to create a small unit of renewable energy systems powering your house? How do you see the different systems working together?

After You Build

How did the project work out!? Write down all the things that went well (e.g. if you built a solar oven, did it cook your chosen recipe?)

Was there anything you would do differently if you were to make the project again?

Get your parent's permission and snap a picture of your re-energy project, or better yet send us a video of it in action!



The Big Reveal!

Congratulations on completing your renewable energy project! Now that you've built your super awesome model of a renewable energy, and learned how cool and important renewable energy is, it's time to tell your community about it! Send us your picture by tagging us on social media @GreenLearning and #ReEnergyEngineer!

We'd love to hear about your favorite type of renewable energy and how it helps reduce our environmental impact!