

## **COSI ON WHEELS INVESTIGATING ENERGY Program Description**



**Investigating Energy** is designed to introduce students to the science of energy. The program consists of a 45 minute interactive assembly followed by exciting hands-on activities that engage the students and encourage the development of Science Process Skills.

During the assembly the following science concepts and more will be explored:

- Potential and Kinetic energy
- Energy transformation
- Renewable and Non-renewable resources
- Energy as heat, motion, and electricity
- Energy conservation ideas and practices

The hands-on activities are presented in several 30-45 minute sessions with each session accommodating 62 or fewer students. Hands-on activity session times are scheduled by the person at your school who coordinates the COSI on Wheels event. Students will have the opportunity to explore different renewable and non-renewable energy sources, test the power of wind, learn about energy conservation, as well as work to complete a circuit. In the hands-on sessions students informally interact with the activities, spending as little or as much time as they like at each station. While many students will try all of the activities, some may choose to have a more in-depth experience with only a few.

To prepare you and your students for **Investigating Energy**, we suggest familiarizing yourselves with the Hands-On Activities descriptions and vocabulary list provided. Also, for extension activities go to [www.cosi.org](http://www.cosi.org) and click on 'Extension Activities' under **Investigating Energy**.

**NOTE:** *Students should be reminded to never eat or drink any of their experiments, even when experimenting with food items.*

## **INVESTIGATING ENERGY HANDS-ON ACTIVITIES:**

<b>Breaking Wind:</b>	Students use an anemometer to test wind speed and decide the best position to place a wind turbine.
<b>Bright Ideas:</b>	Students turn a hand-crank generator to light an incandescent or compact fluorescent light bulb.
<b>Good Vibrations:</b>	Students experiment with various items to determine the properties of sound and how sound is used to find crude oil.
<b>Let It Flow:</b>	Students classify several solids and liquids as a good conductor of electrical current, a poor conductor, or not a conductor at all. Then the students will test each item to see if they predicted correctly.
<b>Paddle Power:</b>	Students design their own water turbines by choosing from a variety of blades. They test the power of blades to lift weight as the blades are placed in a circular stream.
<b>Pass the Juice:</b>	Students build circuits by attaching a variety of components to a power supply.
<b>The Domino Effect:</b>	Students use blocks to transfer energy from one point to another while observing the change of potential to kinetic energy.
<b>Scrubber System:</b>	Students will act as smokestack scrubbers with the responsibility to clear out the pollution to conserve our environment.
<b>Up in the Air:</b>	Students map routes along a map to determine the effects that fuel economy has on gasoline used and pollution created.
<b>Watts Up:</b>	Students use the “Watts Up” meter to determine the amount of energy used by various items that might be found in their bedrooms.

## INVESTIGATING ENERGY VOCABULARY

**BIOMASS:** Plant materials and animal waste used as a renewable source of fuel.

**CIRCUIT:** The complete path of an electric current, usually including the source of electric energy.

**COAL:** A non-renewable, solid fossil fuel formed from the remains of decayed plant material with heat and pressure millions of years ago.

**CONDUCTOR:** A material or object that permits an electric current to flow easily.

**CONVERT:** To change from one form of energy to another.

**ELECTRICITY:** Energy produced from the flow of a charge (electrons). It is a secondary source of energy converted from other energy sources such as coal, nuclear or wind.

**ENERGY:** The ability to produce change or to do work.

**FOSSIL FUEL:** Non-renewable fuels such as coal, natural gas and petroleum that are formed from decayed plants and animals (organic material) with heat and pressure millions of years ago.

**GEOTHERMAL:** Renewable energy that comes from the heat within the earth.

**GENERATOR:** A device that turns kinetic energy into electricity usually with a magnet spinning inside copper wires.

**HYDROPOWER:** Renewable energy that comes from the force of moving water.

**KINETIC ENERGY:** The energy possessed by a moving object. The faster an object moves, the more kinetic energy it has.

**NATURAL GAS:** A non-renewable gas fossil fuel formed from the remains of decayed plants and animals (organic material) with heat and pressure millions of years ago.

**NUCLEAR ENERGY:** The non-renewable energy obtained by the splitting of atoms (fission) in the element uranium. This controlled atomic chain reaction produces heat, which is used to make steam and run turbine generators.

**NONRENEWABLE ENERGY SOURCES:** Energy sources (e.g. coal, oil, natural gas, uranium and propane) that are either replenished very slowly or are not replenished at all by natural processes.

**PETROLEUM (OIL):** A non-renewable liquid fossil fuel formed from the remains of decayed plants and animals with heat and pressure millions of years ago.

**POTENTIAL ENERGY:** The energy stored in an object due to its position or the arrangement of its parts. Some forms of potential energy include chemical, gravitational and electric.

**POWER:** The rate at which work is done, expressed as the amount of work per unit time, and commonly measured in units such as watts and horsepower.

**PROPANE:** A non-renewable gas formed from petroleum and natural gas, and liquefied with high pressure and low temperatures. Propane is used in several ways such as to heat homes and operate farm equipment.

**RENEWABLE ENERGY SOURCES:** Energy sources (e.g. moving water, biomass, wind, solar and geothermal) that can be replenished in a short period of time.

**SOLAR:** Solar radiation that reaches the earth in the form of light and heat. This renewable energy can be directly or indirectly converted into other forms of energy such as heat and electricity.

**TURBINE:** A rotary engine moved by a current (water, steam or air) usually made with a series of curved vanes on a central rotating spindle. The spindle is connected to the generator.

**WIND:** The movement of air produced by the uneven heating of the earth's surface by the sun. Wind energy is renewable and can be converted into electrical energy.

## SCIENCE PROCESS SKILLS

On the day of the program students will have the opportunity to participate in a variety of hands-on activities. The activities are intended to create a fun and stimulating environment which encourages the development of Science Process Skills. The skills include:

**OBSERVING:** Using the senses and/or appropriate tools to gather information. Observing may also include the skills of: **Measuring, Comparing** and **Classifying**.

**INFERRING:** Making preliminary conclusions by assessing what is already known. Inferences are what you reason to be true, but have not observed or tested.

**QUESTIONING:** Raising questions about objects, events, or phenomena. This includes recognizing and asking *investigable* questions, often beginning with phrases like 'What causes,' 'How does' or 'What makes.'

**HYPOTHESIZING:** Offering a possible explanation or testable statement. A hypothesis can be a good reference point for further investigation.

**PREDICTING:** Using ideas or evidence to foretell the outcome of a specific future event. Often involves an action and a reaction or an if/then statement.

**PLANNING:** Designing one's own investigation using procedures to obtain reliable data. *Planning is not always formal.*

**INVESTIGATING:** Carrying out a planned experiment based on your hypothesis. Investigation uses many of the previously stated Process Skills.

**INTERPRETING:** Drawing conclusions by assessing the data. Finding patterns or other meaning in the data.

**COMMUNICATING:** Expressing observations, ideas, conclusions, or models by talking, writing, drawing, etc.

**RELATING & APPLYING:** Relating makes parallels to similar concepts, and applying uses the knowledge gained to help solve a challenge.