



# A Coal Story

Students will demonstrate the flow of energy to produce electricity using props. Depending on the audience, signs with the different forms of energy can be used by the students to identify the energy transformations. This activity can also be used to demonstrate other energy flows, like biodiesel, ethanol, natural gas, etc.

<b>Sun</b>		Nuclear fusion—in the sun produces vast amounts of energy.
	Prop & Action	Yellow ball
<b>Radiant Energy</b>		Nuclear energy in the sun is transformed to radiant energy and travels through space to Earth. Radiant energy travels in WAVES.
	Prop & Action	Long pieces of yellow ribbon, several students wave in the air
<b>Chemical Energy</b>		Radiant energy is absorbed by green plants and through photosynthesis converts radiant energy to chemical energy.
	Prop & Action	Green plants or silk plants, students bring up from floor
<b>Stored Chemical Energy</b>		Green plants die and are compressed under extreme pressure over a LONG period of TIME and become COAL. Chemical energy is stored in the coal.
	Prop & Action	Green plants or silk plants, students step on leaves
<b>Coal</b>		Coal is mined and taken to a power plant. (Additional details may be added if desired.)
	Prop & Action	Pieces of coal OR wads of black construction paper, students pick up coal from ground
<b>Thermal Energy</b>		Coal is burned in the furnace. Stored chemical energy produces thermal energy.
	Prop & Action	Empty box, coal is put into "furnace" box
<b>Thermal Energy</b>		The thermal energy heats the water. Water becomes steam.
	Prop & Action	Hot pot or bottled water, student lifts up hot pot
<b>Steam</b>		Steam travels down pipes (plastic tubing) to the turbine.
	Prop & Action	Plastic hose or tubing, connect tube to hot pot used above
<b>Motion/Mechanical Energy</b>		Steam causes the turbine blades to spin.
	Prop & Action	Student arms, student stands with arms outstretched and bent upwards at the elbow, student spins as steam touches them
<b>Electrical Energy</b>		The turbine is connected to the generator causing the magnets to spin around the copper coils producing electrical energy.
	Prop & Action	Bar magnets, copper ribbons, three students hold bar magnets, one student is 'wrapped' in copper colored ribbon or wire, students with magnets 'spin' around copper wire
<b>Electrical Energy</b>		Electrical energy travels down the power lines to our homes.
	Prop & Action	Twisted rope, start with twisted rope then pull away the smaller pieces to designate the low voltage lines that come into our homes
<b>Electrical Energy</b>		Electrical energy powers our homes.
	Prop & Action	'Magic' light bulb, and extension cord, student pulls chain on light bulb or switches it on
<i>Variations</i>		<i>Other energy flows can be demonstrated, substituting other sources for the coal (corn to ethanol; soybeans to biodiesel; decomposing garbage to methane, etc.)</i>



## A Coal Story

A long, long time ago before even the dinosaurs roamed the Earth, the sun shone in the sky and giant plants grew in swampy forests. Like all living things, these plants died.

And more plants grew and died. This happened over and over for millions of years—plants grew and died and fell into the swamp.

The plants on the bottom got squished—really, really squished. After millions of years of being really squished those plants turned into COAL.

Now the coal is buried in the ground. Big machines—giant bulldozers and steam shovels— dig it up.

The machines load the coal onto trains and barges to take it to the power plant.

Inside the power plant there is a giant tub of water with a big furnace in the middle. The coal is put into the big furnace and burned.

The smoke from the fire is cleaned with big scrubbers before it goes up the smokestack and into the air.

Inside the furnace it gets really hot. So hot, the water in the tub boils and turns into steam. The oven is called a boiler because it boils the water and turns it into steam.

That steam comes roaring through a big pipe and turns a giant machine, called a turbine.

The turbine is attached to a generator that has coils of wire and big magnets. When the magnets spin around the wire, it makes electricity. That is amazing!

Now, we can't go down to the power plant to buy a bag of electricity. So, the electricity comes to us.

A wire from the turbine runs out of the power plant and up a tall, tall pole. The electricity flows up the wire to the top of the pole. It flows through high-power lines from pole to pole until it gets to our town.

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Then it flows into lots of small wires to our houses. Inside our houses—hidden in the walls—are lots of wires. They go to all the switches and all the outlets all over our house and the electricity flows through them.

When we flip on a light switch, the electricity flows into the light bulb and makes light. When we plug a phone into an outlet, it is charged. The electricity flows through the cord to make it work. Electricity runs our washers and dryers, TVs, and video games.

Lots of the electricity in our country is made by burning coal. The energy in the coal came from the sun.