
SYNOPSIS:

Before the world's supply of fossil fuels diminishes any further, it is important to develop renewable sources of energy from solar, wind, geothermal power, and other sources. Scientists believe that some future energy can come from hot dry rocks, huge granite bodies lying two to three miles beneath the surface could possibly be used for geothermal power production.

This program explores how hot dry rocks were formed billions of years ago, the techniques scientists use to locate them, and the technology that will allow them to be mined for heat and provide future generations with an abundant source of clean, renewable power.

CURRICULUM UNITS:

Cartography
Earth Science
Environmental Science
Geology
Physical Science

CAREER OPPORTUNITIES:

Cartographer
Earth Scientist
Engineer
Environmentalist
Geologist
Land/Resources Manager
Mining Engineer
Seismologist

PROGRAM OVERVIEW:

Surrounding the core of the earth is the mantle, a hot stew about 2,900 kilometers thick. The mantle's magma rises toward the surface, carrying heat towards the earth's crust. This magma heats rocks and rainwater that has seeped into the crust.

Some of this water travels back to the surface in the form of geysers. The rest is stored in geothermal reservoirs beneath the surface. Scientists are trying to figure out a safe and efficient way to extract the heat trapped under the surface in rocks and water, in order to produce power. However, before this can happen, cracks in the surface must be widened in order to easily access the heat. Hot dry rock was tested in New Mexico where, after 17 years, it was determined to be inefficient because the granite there fractured vertically instead of horizontally, and the amount of energy needed to bring the water and steam above ground was too costly.

ISSUES AND CRITICAL THINKING:

1. After viewing this program:
Why do we need to find renewable sources of power?
How do we know that the interior of the earth is hot?
What are geothermal reservoirs and how are they created?
What are hot dry rocks and how were they created?
How do scientists locate hot dry rocks?
2. Have students talk about magma, lava, and volcanoes.
3. Discuss the comforts of civilization and the corresponding cost in energy.
4. Discuss turbines and how they generate energy.
5. Have students research other renewable energy sources (solar, wind, hydro-electric) and discuss the pros and cons of each.
6. Arrange a visit to a nearby power plant to see electricity being made.

GLOSSARY:

BIOMASS- plant material or animal waste used as a source of fuel.

DENSITY- being close, thick or compact; the ratio of mass quantity of matter to an objects bulk or volume.

ELEMENT- a substance that is not separable by ordinary chemical means.

FUSION REACTION- the union of automatic nuclei that causes the release of huge quantities of energy.

GEOTHERMAL- relating to the internal heat of the earth.

GEYSER- a natural hot spring that ejects a column of water and steam into the air.

GRANITE- a hard igneous rock.

HYDROELCTRICITY- the production of electricity from waterpower.

IGNITE- to set on fire or catch fire.

INEFFICIENT- not producing the desired effect; wasteful.

INTERSTELLAR- located or taking place among the stars.

MAGMA- molten rock under the earth's crust.

MINERAL- naturally occurring substances usually obtained from the ground; ore.

NETWORK- an interconnected chain, group, or system.

PRESSURE- the application of force by direct contact with something else.

RADIOACTIVITY- the property of some elements to give off energy, caused by the breakdown of nuclei or core.

RENEWABLE- able to be made new, fresh, or strong again.

RESERVOIR- a place where something is kept for use when wanted.

SOLAR SYSTEM- a system of planets or other celestial bodies orbiting another star.

THEORY- a statement or principle that explains an accepted group of facts.

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The Wonders of Earth Science



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ENERGY FROM EARTH'S INTERIOR

