

SUGGESTED REFERENCES

- Wylie, Francis E.
Tides and the Pull of the Moon
E.P. Dutton, 1979
- *Tidal Electric Technology*
<http://tidalelectric.com/technology/index.html>
- *U.S. Department of Energy: Tidal Energy*
http://www.eren.doe.gov/RE/ocean_tidal.html
- *Energy Fact Sheet: Tidal Energy*
<http://www.iclei.org/efacts/tidal.htm>
- *How Tidal Power Plants Work*
<http://inventors.about.com/library/inventors/bltidalplants.htm>
- *All About Energy: Teacher Lesson Plans*
<http://www.suelebeau.com/energy.htm>
- *Tidal Wave and Power*
<http://atschool.eduweb.co.uk/dcastle/tidal.html>
- Jenkins, Gerald and Magdalen Bear
Sun, Moon, and Tides: A Collection of Working Models to Cut Out and Glue Together
Parkwest Publications, 1997.

NATIONAL SCIENCE EDUCATION STANDARDS

K - 4
Physical Science
Position and motion of objects

Earth and Space Science
Changes in earth and sky

5 - 8
Physical Science
Transfer of energy

Earth and Space Science
Earth in the solar system;
Structure of the earth system

CREDITS

The producers thank Channel 4 Television Corporation/4 Learning for materials used in this program.

EDUCATOR ADVISORY PANEL

Fred Barch, M.S.
Rosemary Botting, M.S.

Debra A. Murnan, B.A.
John A. Murnan III, M.S.

PRODUCTION CREDITS

WRITER/PRODUCER:
ASSOCIATE PRODUCER:
EDITORS:
NARRATORS:

Deborah Greenspan
Lee Kane
M.B. Chaney & Jon Glassman
Cyrilla Baer & Joshua Forman

SCIENCE SCREEN REPORT FOR KIDS®

Science Brought To Life In The Classroom

SCIENCE SCREEN REPORT FOR KIDS is a proud participant in the Presidential Awards for Excellence in Mathematics and Science Teaching. For more information visit www.nsf.gov/pa

1000 Clint Moore Road, Suite 211, Boca Raton, FL 33487
tel: 1.800.232.2133 email: info@ssrvideo.com
www.ssrvideo.com

COPYRIGHT © 2003 Allegro Productions, Inc. All rights reserved.

SCIENCE SCREEN REPORT FOR KIDS

VOLUME 13 ISSUE 2

POWER FROM THE OCEAN TIDES



Accreditation Board
for Engineering
and
Technology



Presidential Awards
for Excellence in
Mathematics
and
Science Teaching



Junior Engineering
Technical Society
www.jets.org

SYNOPSIS

Gravity from the moon creates ocean tides on earth that go out two times a day, every day of the year. This effect of the moon's gravity on the oceans can be harnessed and turned into power. In fact, people have been using the power of the tides to do work for centuries.

This edition of SCIENCE SCREEN REPORT FOR KIDS explores how tidal power is generated and shows how it works. It illustrates how the tides are created, how watermills once used the tides to grind grain, and how modern power plants use turbines to turn this constant flow of water into electricity. It also discusses how tidal power plants can work without damming estuaries and rivers.

CURRICULUM UNITS

- ASTRONOMY
- ECOLOGY
- ELECTRICITY
- ENGINEERING
- OCEANOGRAPHY

RUNNING TIME

14:23

BACKGROUND

Most of the energy in use today is generated from fossil fuels. Hydroelectric, biomass, and nuclear power plants currently supply about 15 percent of the nation's electricity. Solar, wind, and geothermal power are gaining use as alternative fuel sources. Moon power, power from the tides, is also being used in some areas.

In this edition, we will look at the moon and the earth to see how the gravity of the moon affects our oceans. An animation shows the waters of the ocean "following" the moon, bulging outward and raising the water levels.

For centuries, old water mills trapped the water brought in by high tides and then let it out to turn a wheel. By building a dam across a cove with a gate that opened and closed, the water was held back, then released when the tide went out, and used to grind grain. Today, the power of the tides is used in a similar way to make electricity. The trapped water is released through turbines that are situated under the dam, which create electricity by causing an electro-magnet to spin.

Once the wheels start spinning and electricity starts to flow, the electricity generated is controlled by switches and computers, and transformers change the low voltage of the current to high voltage so it has the "push" to be sent out over long distances.

There are some problems with traditional forms of tidal power. To make enough energy to be useful the power plant requires a large collecting area; and as the size of this "headpond" increases, so do negative environmental impacts. Fortunately, scientists and engineers are developing self-contained tidal generators that can be located off-shore and use the tides without blocking natural waterways. With such technology, this plentiful, non-polluting energy from the moon may one day be widely used.

ADVANCED ORGANIZERS

Prior to showing the program:

1. Brainstorm and discuss various energy resources - fossil fuels, tidal, wind, solar, and geothermal.
2. Have students research the effects of the moon's gravity on the ocean and its tides.
3. Read a book such as, *The Magic School Bus, The Electric Field Trip*, by Joanna Cole, or *Switch on Switch Off* by Melvin Berger. These books will give students a better understanding of how electricity is produced.
4. Using a book such as the *Magic School Bus* as a reference, have students draw a diagram illustrating the process of producing electricity (include the energy resource and type of power plant).

CRITICAL THINKING EXERCISES

1. After viewing the program:
 - a| What are tides and what causes them?
 - b| Why do the ocean's waters pull towards the moon?
 - c| What are the negative environmental impacts of traditional tidal power plants?
2. Discuss why gravity is important. Then, have students write a story about living in a world without gravity.
3. Discuss how energy is generated at a tidal power plant.
4. Discuss how the sun affects the tides, creating Neap Tides and Spring Tides.
5. Have students research renewable sources of energy, such as solar, wind, geothermal and hydroelectric. Choose two of these sources and compare and contrast their pros and cons. Create a chart depicting the differences.
6. What causes the ocean to bulge on the side of the earth opposite the moon?
7. Visit a power plant and see how electricity is generated.
8. Imagine if the moon was 2 times larger than its current size. How would this influence the ocean's tides?

VOCABULARY

- Biomass.** Plant material or garbage that can be converted into fuel
- Estuary.** An arm of the sea at the mouth of a river
- Generator.** A machine that converts mechanical energy into electrical energy
- Geothermal.** Energy that comes from the heat of the earth
- Headpond.** The collecting basin of a power plant that uses water to generate power
- Hydroelectric.** Of or relating to the production of electricity by waterpower
- Nuclear energy.** The energy released by a fission or fusion reaction
- Renewable.** Energy from sources that cannot be used up
- Transformer.** An electromagnetic device that can change the voltage and current
- Turbine.** A rotary power-generating device driven by a moving fluid, such as water, steam, gas, or wind, that converts kinetic energy into mechanical energy

CAREER POSSIBILITIES

- ASTRONOMER
- ELECTRICAL ENGINEER
- MARINE BIOLOGIST
- OCEANOGRAPHER
- STRUCTURAL ENGINEER