

Energy Transfers

Changing Energy Lessons

Web links

[Energy Bike Programs](http://www.ohioenergy.org/bike.html)

Information on the energy bike program which uses pedal power to generate electricity.
(<http://www.ohioenergy.org/bike.html>)

[Energy Information Administration: Kids Page](http://www.eia.doe.gov/kids/)

An excellent site for students to explore independently to learn more about energy.
(<http://www.eia.doe.gov/kids/>)

[Energy Quest](http://www.energyquest.ca.gov/index.html)

This kid-friendly site from the California Energy Commission provides great information on energy.
(<http://www.energyquest.ca.gov/index.html>)

[Energy Story](http://www.energyquest.ca.gov/story/chapter01.html)

Explains the concept of energy at an appropriate level for upper elementary students. The section on “Food Energy” uses an ear of corn to explain how energy changes form in the food chain.
(<http://www.energyquest.ca.gov/story/chapter01.html>)

[What is Energy?](http://www.uwsp.edu/cnr/wcee/keep/Mod1/Whatis/energyforms.htm)

This site contains a nice breakdown of the forms of energy with detailed explanations of each form.
(<http://www.uwsp.edu/cnr/wcee/keep/Mod1/Whatis/energyforms.htm>)

Changing Energy Lessons

Books

Energy Makes Things Happen

By Kimberly Brubaker Bradley and Paul Meisel. (2002, Harper Trophy)

This book for early elementary readers uses familiar examples and a clear focus to introduce forms of energy.

Full of Energy

By Sally Hewitt. (1998, Scholastic Library Publishing)

This book for early elementary readers introduces the concept of energy and highlights familiar sources of energy such as food, the sun, wind, water, and other sources.

The Nature and Science of Energy

By Jane Burton and Kim Taylor. (1998, Gareth Stevens)

This book for upper elementary and middle school readers describes different kinds of energy, explores some properties of energy, and gives information about some of the different forms of energy.

How Do We Know Energy Exists?

By Terry Jennings and Ronnie C. Tyler. (2000, Raintree Steck-Vaughn)

This age-appropriate book explores energy and provides students with insights into ways they can tell that energy exists in the world around them. Although this book is out of print, you may be able to find it in your local library.

The Wind at Work: An Activity Guide to Windmills

By Gretchen Woelfle. (1997, Chicago Review Press)

Focusing on the use of wind as a source of power, this age appropriate book provides wonderful historical accounts of ancient windmills as well as information about the modern wind turbine.

Windmills

By Laura Brooks. (2003, Metro Books)

A beautiful compilation of dramatic and intriguing views of windmills. Students can explore a windmill's form, function, and style through diagrams and photographs.

Light Energy Lessons

Web links

[How We See – Light & Mirror Game – Science Activities for Kids](http://www.sciencekids.co.nz/gamesactivities/howweseesee.html)

Children experiment with light & mirrors in this fun science game for kids. They can manipulate the angles of the mirrors to see which way they reflect the light.

(<http://www.sciencekids.co.nz/gamesactivities/howweseesee.html>)

[Optics for Kids \(The Science and Engineering Behind It\)](http://www.opticalres.com/kidoptx_f.html)

Children can learn some fun and interesting things about optics on this website.

(http://www.opticalres.com/kidoptx_f.html)

[Exploring the Science of Light](http://www.opticsforteens.org/)

This web site is devoted to everything optics! Children will find ultra cool activities combining Jell-O and laser pointers, definitions of terms like acousto-optics and retroreflection, profiles of optics celebs who are changing our world and an optics timeline stretching from prehistory to the present. Don't forget to check out the tutorials featuring some optical illusions!

(<http://www.opticsforteens.org/>)

[Bob Miller's Light Walk- Making a Pinhole Camera](http://www.exploratorium.edu/sln/light_walk/camera_todo.html)

Provides detailed instructions for how to make a pinhole camera at home with readily accessible materials.

(http://www.exploratorium.edu/sln/light_walk/camera_todo.html)

[Apollo 17- Whole Moon View](http://www.exploratorium.edu/sln/light_walk/camera_todo.html)

Provides downloadable pictures of the moon to use in the Further Science Exploration for the Light Bounces lesson when the children consider how sunlight reflects off the moon.

(http://www.exploratorium.edu/sln/light_walk/camera_todo.html)

[NASA Optics: Light, Color, and Their Uses](http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Optics.Guide.html)

This site provides an online packet of activities developed by NASA for children in grades K-12. Explores light and color in conjunction with science and mathematics. Many topics go into more depth than needed for 3rd grade, but still a good resource site for the teacher.

(<http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Optics.Guide.html>)

[Science Hobbyist- Misconceptions Page](#)

This site is a compilation of misconceptions that children have about a variety of physical science concepts, including light.

(<http://www.eskimo.com/~billb/miscon/opphys.html>)

[Light Tour- Discover Light's Mysteries](#)

This site, developed by the Center for Science Education at the Space Sciences Lab, takes you on a tour to explore wavelengths of light, types of light, how astronomers use different wavelengths, and what they see. A good resource site for the teacher, but too technical for the children.

(http://cse.ssl.berkeley.edu/light/light_tour.html)

[The Woman Astronomer](#)

This site details the accomplishments of women astronomers in the past, including Caroline Herschel and Maria Mitchell, whose discoveries advanced the science of light.

(http://www.womanastronomer.com/women_astronomers.htm)

[Pioneers in Optics](#)

This site contains details information about scientists who advanced the study of light and optics. Be sure to click on the “student activities” link for a wealth of activities on light and optics, including those on lenses, mirrors, shadows, microscopes, eyeglasses, and animal vision.

(<http://micro.magnet.fsu.edu/optics/timeline/people/swan.html>)

[Animal Vision](#)

This site provides information on animal vision, with specific exploration into birds and bats. A good site for enrichment activities for children who are curious about how animals see compared to humans.

(<http://micro.magnet.fsu.edu/optics/activities/teachers/animalvision.html>)

[How We See- The First Steps of Human Vision](#)

This reference site provides the teacher with detailed information on how we see. Specific processes that occur with the eye and brain are detailed in a comprehensible way, and historical information on the understanding of vision is also integrated into the text.

(http://www.accessexcellence.org/AE/AEC/CC/vision_background.php)

[Light Links](#)

This site, sponsored by the Annenberg/CPB Channel, provides a collection of links related to light. An excellent resource site for teachers.

(<http://www.learner.org/workshops/sheddinglight/lightlinks/>)

Light: A Teaching Unit

Created by General Electric, this Unit deals with light from a scientific, mathematical, technological, and historical perspective. Hands-on activities and experiments are included. (<http://www.gelighting.com/LightingWeb/na/consumer/>)

Color Vision

Children can make a whole rainbow by mixing red, green, and blue light on this interactive website.

(<http://phet.colorado.edu/en/simulation/color-vision>)

Light Energy Lessons

Books

Celebrations of Light : A Year of Holidays Around the World

By Nancy Luenn; illustrated by Mark Bender. (1998, Atheneum)

An excellent social studies resource, this book explores the ways in which cultures from around the world celebrate light, including Bon Matsuri in Japan, Luciadagen in Sweden, and Christmas in the United States.

Day Light, Night Light: Where Light Comes From

By Franklyn M. Branley; illustrated by Stacey Schuett. (1998, Collins)

This book, from the Let's-Read-and-Find-Out series, explores natural and man-made sources of light and how we see objects from reflected light.

Experiments with Light: A True Book

By Salvatore Tocci. (2002, Children's Press)

This source contains activities with good explanations on reflecting light, refracting light, how the eye works, and lenses.

Exploring Light

By Ed Catherall. (1991, Hodder Wayland)

This book, for more advanced readers, contains excellent information about light in conjunction with activities for children to apply their understanding. The book is very well presented and illustrated.

Eyewitness Light

By David Burnie. (1999, DK Publishing Inc.)

From the Eyewitness series, this serves as an excellent resource book for children to use in the Science Center. Although the text may not be age appropriate for some children, the detailed pictures will be engaging to all. Includes a table of contents, glossary, and index.

Light

By Terry Jennings; illustrated by Peter Smith & Catherine Ward.

(1998, Heinemann Library)

This resource book for independent readers explores light, mirrors, periscopes, lenses, and cameras. Includes activities for the children to try in school or at home. Includes a table of contents, glossary, and index.

Light (Science Activities)

By Graham Peacock. (1995, Hodder Wayland)

This resource book for independent readers explores how we see, mirrors, and color.

Light and Color (Straightforward Science Series)

By Peter D. Riley. (1999, Children's Press)

This resource book for independent readers delves into many fascinating aspects of light including how light travels, interacts with materials, and makes shadows, as well as how the eyes of humans and other animals work. Includes a table of contents, glossary, and index.

Light and Dark (Science Alive Series)

By Terry Jennings. (2009, Saunders Book Co.)

This book explores the difference between light and dark. Hands-on investigations, color photographs, and diagrams help children explore concepts including shadows, nocturnal animals, how plants use light, and reflection of light.

Light, Sound & Electricity: The Usborne Internet-Linked Library of Science

By Kirsteen Rogers, Phillip Clarke, Alastair Smith and Corinne Henderson; illustrated by Verinder Bhachu. (2001, Usborne Publishing, Ltd.)

Although only a third of the book focuses on light, this book is an excellent resource that contains clear explanations and graphics of light phenomena. Includes activities to try at home as well as suggested links to web sites about light. Also includes a table of contents, list of inventors, glossary, and index.

The Little Giant Book of Optical Illusions

By Keith Kay. (1997, Sterling Publishing Company, Inc.)

This book has children examine drawings that fool the eye into believing a flat surface is three-dimensional, that coils roll from left to right across the page, and that white spaces flash at you, plus more.

Sound and Light (Hands on Science)

By Jack Challoner; illustrated by David Le Jars. (2001, Kingfisher)

Half of this resource is focused on the topic of light. Contains three to five activities on each of nine topics about light. A good activity book for the unit.

Stellaluna

By Janell Cannon. (1997, Sandpiper)

In this engaging story, a young fruit bat falls into a bird's nest and is raised like a bird until reunited with her mother. A sweetly told story with one scientific misconception about how little Stellaluna sees. If children understand light and vision, they should be able to spot this inaccuracy.

The Story of Thomas Alva Edison, Inventor: The Wizard of Menlo Park

By Margaret Davidson. (1990, Scholastic Paperbacks)

This independent readers book chronicles the life of Thomas Edison, from his first job selling newspapers to his inventions of the phonograph and light bulb. With lots of text and some blackand- white pictures, the book provides an interesting account of his life, his impact on the field of science, and his lasting impact on today's society.

Thomas A. Edison: Young Inventor (Childhood of Famous Americans Series)

By Sue Guthridge; illustrated by Wallace Wook. (1986, Aladdin Library)

This independent readers book explores Thomas Edison's childhood and important things about his adult life including his invention of the light bulb and phonograph.

Putting Energy to Work Lessons

Web links

[Arthur Ganson's Chain Reaction](http://www.exploratorium.edu/webcasts/ganson/)

This site provide students examples of chain reaction-like images by Arthur Ganson.
(<http://www.exploratorium.edu/webcasts/ganson/>)

[Energy Star](http://www.energystar.gov/)

This site explains energy star products and how people can make their homes and businesses more energy efficient using energy star products.
(<http://www.energystar.gov/>)

[Fuel Economy](http://www.fueleconomy.gov/)

This site provides detailed information on fuel efficient cars and let's students find and compare different cars for their fuel efficiency.
(<http://www.fueleconomy.gov/>)

[The Secret Lives of Energy](http://www.fi.edu/guide/hughes/energy_us.html)

This site provides teachers and students with ideas for using energy more efficiently.
(http://www.fi.edu/guide/hughes/energy_us.html)

[Building Technologies Program: U.S. Department of Energy](http://www1.eere.energy.gov/buildings/)

This site provides information on energy efficiency by building type as well as the codes and standards needed for energy efficient buildings.
(<http://www1.eere.energy.gov/buildings/>)

[Ten Things You Can Do to Curb Global Warming](http://www.sierraclub.org/energy/tenthings/default.aspx)

A downloadable file from the Sierra Club listing ten things students can do to be more energy efficient to curb global warming.
(<http://www.sierraclub.org/energy/tenthings/default.aspx>)

[United States Patent and Trademark Office: Kids Pages](http://www.uspto.gov/go/kids/)

This site provides some great interactive opportunities for students. In "My Inventive Room," they go back in time and watch as the inventions in a room disappear. In the "Time Machine Game," they transform visionary ideas into their corresponding inventions with a time machine.
(<http://www.uspto.gov/go/kids/>)

[Games Machines Play](#)

Check this site for information about viewing episodes of Scientific American Frontiers' special "Games Machines Play" showing present-day student inventors putting their inventions to a test.

(<http://www.pbs.org/saf/1208/teaching/menu.htm>)

Inventors Hall of Fame

The inventors of industry are highlighted on this site.

(http://www.invent.org/hall_of_fame/1_4_8_ind.asp)

Invention Convention

The Invention Convention is a type of science fair for students. Students will be working on their projects independently at home unless otherwise instructed by the teacher. To become familiar with the invention process and the expectations held for students.

(<http://www.eduplace.com/science/invention/guidelines/index.html>)

Super Scientists: A Gallery of Energy Pioneers

Students can click on pictures of scientists to learn about their contributions in the field of Energy.

(<http://www.energyquest.ca.gov/scientists/index.html>)

Putting Energy to Work Lessons

Books

100 Scientists Who Shaped World History

By John Hudson Tiner. (2000, Bluewood Books)

This book for young adult readers showcases great men and women of science who significantly contributed to our understanding of the physical world around us.

All About the Industrial Revolution

By Peter Hepplewhite. (2003, Hodder & Stoughton)

This age-appropriate book covers many aspects of the Industrial Revolution including the factory system, education in factories and schools, the growth of industrial towns, and the effects of the industrial revolution on the world.

Amish Children

By Phyllis Pellman Good and Jerry Irwin. (2002, Good Books)

This book shows students how different their lives are from that of Amish children, who grow up without television, telephones, or computers.

Amish Home

By Raymond Bail. (1995, Houghton Mifflin Co.)

Through colorful photographs, students gain insights into Amish life, a way of life reminiscent of the way people lived in the 19th century.

The Gift to Be Simple: Life in the Amish Country

By Bill Coleman. (2001, Chronicle Books)

This book takes students on a visual journey through the Pennsylvania Amish valley, a region largely untouched by tourists and the amenities of modern existence.

Inventors and Inventions (Grades 4–8)

By Lorraine Hopping Egan. (1999, Scholastic Professional Books)

This book provides students with activities to help them explore the history of inventors and inventions and develop scientific problem-solving skills.

Isaac Newton: The Greatest Scientist of All Time (Great Minds of Science)

By Margaret J. Anderson. (2001, Enslow Publishers, Inc.)

Offering details about Newton's childhood and life, this age appropriate book highlights his dedication to science and mathematics.

Janice VanCleave's Scientists Through the Ages

By Janice VanCleave. (2003, John Wiley & Sons)

This book profiles the lives and work of more than 25 important thinkers in astronomy, biology, chemistry, earth science, and physics. Includes short biographies of the scientists, descriptions of their contributions to science, and simple experiments that reveal some of their most important discoveries.

Light Bulb

By Marc Tyler Nobleman and Hal Wallace. (2003, Capstone Press)

This book explains the history of the light bulb, how it works, and the various types of light bulbs used today.

Michael Faraday (Scientists Who Made History)

By Stewart Ross. (2003, Raintree/SteckVaughn)

This age-appropriate book provides students with a glimpse into the life of Michael Faraday, the 19th century scientist whose discoveries led to the invention of the electric generator.

The New York Public Library Amazing Scientists: A Book of Answers for Kids

By The New York Public Library and Jim Callan. (2001, John Wiley & Sons)

Fact-filled and fun, this book's question-and-answer format lets children explore the discoveries of some of the world's greatest scientists.

Thomas Alva Edison: Inventor and Entrepreneur (Great Life Stories: Inventors and Scientists)

By Claire Price-Groff. (2003, Franklin Watts, Inc.)

This age-appropriate book provides a biography of Thomas Edison.

Thomas Alva Edison: The King of Inventors (Scientists & Inventors Series)

By David C. King. (1997, Discovery Enterprises Ltd.)

In this book, students can read parts of Thomas Edison's own journal and lab notes, and peruse photos and critiques from his day.

The Way Things Go

Icarus Films, 2009

Available in DVD format, this 30-minute feature shows a variety of energy transfers in a chain reaction-like format, including fireworks and things dropping and rolling. A great enrichment film to support the inventions lesson.

Who's Who in Science and Technology: A Guide to Famous Scientists

By Bob Fowke. (2000, Hodder & Stoughton Children's Division)

This guide describes 300 of the most famous and fascinating scientists and inventors from Ancient Greece to the 20th century.

Chain Reaction: Rube Goldberg and Contemporary Art

By Ian Berry. (2001, Distributed Art Publishers)

This book depicts how contemporary artists have used the ideas of Rube Goldberg in their depictions of mechanical devices and functions.

The Kid's Invention Book

By Arlene Erlbach. (1999, Lerner Publications Company)

Profiles 11 inventors between the ages of 8 and 14, describes the steps involved in inventing a new product, and discusses contests, patents, lawyers, and clubs.

Mistakes That Worked

By Charlotte Foltz Jones & John O'Brien. (1994, Doubleday Books for Young Readers)

This book highlights inventions made by mistake, including Silly Putty, trouser cuffs, popsicles, and insulin. An excellent book to have in the Science Center.

Put a Fan in Your Hat! Inventions, Contraptions, and Gadgets Kids Can Build

By Robert Carrow. (1997, Learning Triangle Press)

This out-of-print book encourages and fosters the spirit of invention by describing how to build a homemade motor, a hat with a fan in it, and a motorized shoe buffer.

Rube Goldberg: Inventions!

By Maynard Frank Wolfe. (2000, Simon & Schuster)

A collection of Goldberg's inventions, comic strips, editorial cartoons, and sketches, as well as a biography of Goldberg, are presented in this book.

Samuel Todd's Book of Great Inventions

By E.L. Konigsburg. (1991, Atheneum)

This book for early elementary readers shows inventions that make Samuel Todd's day easier, such as Velcro®, a thermos bottle, training wheels, and mittens.

Totally Absurd Inventions

By Ted VanCleave. (2001, Andrews McMeel Publishing)

Offers more than 100 of the funniest patents ever made. Students will be amused as they read about the Diaper Alarm and the dog lover's Ear Tubes.

Turn on the Lights—From Bed! Inventions, Contraptions, and Gadgets Kids Can Build

By Robert Carrow. (1997, Learning Triangle Press)

This out-of-print book encourages the spirit of invention by describing how to build a wireless intercom, remote-controlled room lighting, and a “dinner’s ready” light.

World’s Wackiest Inventions

By A.E. Brown & H.A. Jeffcott. (1970, Dover Publications)

Features 60 of the wackiest inventions ever undertaken. Students will get a laugh out of the lip shaper, automatic saluting hat, and water-splashing wake-up clocks.