

**LEARNING OBJECTIVES:
CURRENT ISSUE
2007 CANON ENVIROTHON**

GOAL:

Students will comprehend long term and short term environmental, social, and economic considerations of energy production and usage.

ACTIVITIES:

- Students will research, compare and contrast traditional and emerging energy production resources and applications; focusing on the environmental implications of such production.
- Students will relate energy systems to corresponding natural resources in New York State.
- Students will identify the organizations (and their roles) and the processes involved in making energy decisions in New York and globally.
- Students will describe the interactions among society, technology, and use of energy sources.
- Students will identify technologies created as a result of society's concern for dwindling non-renewable energy resources (e.g., electric cars, biodiesel).

OUTCOMES:

Students will be able to evaluate appropriate energy resource choices for a specific application.

UNDERSTANDINGS AND TOPICS OF INVESTIGATION: TASKS

I Traditional energy uses and production

1. Identify and understand the traditional sources of energy generation of:
 - A. Electricity
 1. hydropower
 2. fossil fuel
 3. nuclear energy
 - B. Natural gas
 - C. Fossil fuels (vehicles)
2. Assess environmental impacts of the above
 - A. Consumption of resources
 - B. By- products (emissions/ waste)
 - C. Impacts on ecosystems
3. Assess social and economic factors and implications:
 - A. Infrastructure
 - B. Environmental justice
 - C. Conservation practices
 - D. Organizations and agencies active in energy policy decision making
 - E. Design of energy distribution systems

II Emerging energy technologies

1. Identify and understand sources and applications of renewable energy
 - A. Solar
 - B. Wind generation
 - C. Biomass
 - D. Geothermal
 - E. Hydrogen
 - F. Ocean (Tidal) generation
 - G. Ethanol/Methanol/methane
2. Assess the environmental impacts of the above.
 - A. Consumption of resources
 - B. By- products (emissions/ waste)
 - C. Impacts on surrounding ecosystems
3. Assess social and economic factors and implications of the above:
 - A. Infrastructure
 - B. Environmental justice
 - C. Conservation practices

- D. Organizations and agencies active in energy policy decision making
- E. Design of energy distribution systems

III Energy Issues Related to other Canon Envirothon Study Areas:

1. Soils:
 - A. Identify and understand issues of traditional and innovative energy sources related to:
 1. agricultural and forested lands
 2. soil erosion control
2. Aquatics:
 - A. Identify and understand issues of traditional and innovative energy sources related to:
 1. fish habitat and reproduction
 2. changes in flow rates and water levels
 3. biodiversity
 4. groundwater/aquifer resources
3. Forestry:
 - A. Identify and understand issues of traditional and innovative energy sources related to:
 1. biofuels
 2. species diversity – plant and animal
 3. pests and pesticides
 4. forest management practices
4. Wildlife:
 - A. Identify and understand issues of traditional and innovative energy sources to:
 1. migratory bird flyways
 2. habitat loss/degradation

RESOURCES and CONTACTS:

General:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy

www.eere.energy.gov

The Alternative Energy Institute

www.altenergy.org

U.S. Environmental Protection Agency, Green Communities website and links to many other websites: www.epa.gov/greenkit/q5_energ.htm

U.S. Energy Information Administration, website: www.eia.doe.gov

National Renewable Energy Laboratory

www.nrel.gov

New York state energy Research and Development Authority

www.nypa.gov/es.htm

Business Council for Sustainable Energy

www.bcse.org

Canadian Association for Sustainable Energy

www.newenergy.org

Solar Power:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy - Solar Energy

www.eere.energy.gov/RE/solar.html

Kyocera Solar, Inc., solar systems manufacturer, www.trianglcsystems.com 126 Ideaho Avenue, Plattsburge, NY 12930

International Solar Energy Society

www.ises.org

American Solar Energy Society

www.ases.org

Wind Power:

New York State Energy Research and Development Authority, Community Resources for Wind Development

www.powernaturally.com/programs/Wind/toolkit.asp

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy
Wind power

www.eere.energy.gov/RE/wind.html

Green Power Network

www.eere.energy.gov/greenpower

American Wind Energy Association

www.awea.org

Canadian Wind Energy Association

www.canwea.ca

Patel, Mukund. *Wind and Solar Power Systems*. CRC Press, 1999

Biofuels:

National Biodiesel Board

www.biodiesel.org

United States Department of Energy Biomass Program

www.eere.energy.gov/biomass

Commoner, Barry. *The Poverty of Power*. Bantam Books, July 1980.

Geothermal Energy:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy –
Geothermal Energy

www.eere.energy.gov/RE/geothermal.html

Hdropower:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy –
Hydropower

www.eere.energy.gov/RE/hydropower.html

Hydrogen power, Fuel Cells:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy –
Hydrogen
power

www.eere.energy.gov/RE/hydrogen.html

Oceans:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy – ocean
energy

www.eere.energy.gov/RE/ocean.html

Biomass Energy:

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy –
BioPower Program

www.eere.energy.gov/RE/biomass.html

Alternative Fuel Vehicles:

Advanced Transportation Technology Institute

www.etvi.org

Alternative Fuels Data Center

www.afdc.doe.gov

Electric Auto Association

www.eaaev.org

Natural Gas Vehicle Association

www.ngvc.org

Society of Automotive Engineers. *Alternative Fuels: Technology & Developments*. 1997