

## 2007 CURRENT ISSUE TOPIC ALTERNATIVE/RENEWABLE ENERGY

### RATIONALE

Decisions about the production and use of energy are critical issues of environmental, economic and social policies and of individual choice. Decisions about sources and uses of energy are made not only in the halls of national and local governments, and in corporate boardrooms, but in private homes and individual minds. The environmental, economic and social outcomes of these choices will shape the future of our nation and our planet.

Efficient use of energy generated from traditional sources and the development of renewable energy resources are two aspects of energy policy currently the focus of extensive research by state and federal government agencies, academic institutions and private companies. The fund of knowledge is great, continues to grow, and offers a wealth of resources for an Envirothon competition.

The present generation of high school students will be asked to make difficult decisions about energy both in matters of public environmental and economic policy and in matters of personal choices. Providing a structure and materials for intensive investigation into energy resources and alternatives would be a service to those students and their schools. Sustainable, renewable energy is a crucial and intrinsic element of sustainable development. Until energy needs are met by affordable, environmentally sound means, sustainable development efforts will be greatly hampered.

### GOAL

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

### ACTIVITIES

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

### OUTCOMES

Students should be able to 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 California 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

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