

**CLARK UNIVERSITY DEPARTMENT OF EDUCATION
HIATT CENTER FOR URBAN EDUCATION**

Education 386: Curriculum and Knowing in the Physical and Natural Sciences

• ENERGY IN THE SCIENCES AND IN DAILY LIFE •

Sackler Sciences Center, room 212

June 21-June 30, 2006, 8:30 a.m. - 1:30 p.m.

Fine on tree trunk, Tusasgore Park, Costa Rica, 2 March 1984

World Population, 1 AD - 2050 AD (billions)

Year (AD)	Population (billions)
1	~0.2
500	~0.2
1000	~0.2
1500	~0.3
2000	~6.0
2050	~9.0

WORLD ENERGY FLOWS

WORLD ENERGY FLOWS in 2003 show that fossil fuels are the dominant source of energy. The total energy flow is approximately 13 TW. Fossil fuels account for about 80% of the total energy flow. Nuclear power accounts for about 6%, and renewable sources account for about 14%. The diagram shows the flow of energy from primary sources to end uses.

Greenhouse Effect Diagram

The diagram illustrates the greenhouse effect. It shows the Earth's surface and atmosphere. Solar radiation (shortwave) hits the Earth's surface, which warms up and emits longwave radiation. Greenhouse gases in the atmosphere absorb this radiation and re-emit it back towards the Earth's surface, trapping heat and warming the planet.

S. Leslie Blatt, Clark University (Physics and Education); David Bourdeau, South High School; Connie Bunker, Jacob Hiatt Magnet School; Norma Chico, Doherty High School; Carmen Davila, South High School; Joann Foley, South High School; Karen Kirwin, Jacob Hiatt Magnet School; Derek Martin, South High School; Vanessa Munoz, Sullivan Middle School; and Tara Vaidya, South High School.

Course Description

The Summer Institute on Curriculum and Knowing in the Sciences for 2006 is built on the concept of *energy* and its central role in the processes in nature and in our everyday lives in the technological world that humans have constructed. Teacher-participants will experience hands-on activities that exemplify and clarify the scientific ideas and place them in the broader context of the public school curriculum. Through discussions with presenters and other participants, the learning process will be explored, and curriculum ideas for all grade levels will be developed.

We have scheduled a mixture of on-campus activities, field study, discussions, and team projects. Each participant will be engaged as a learner/scientist as we study real-world systems and learn how generalizations about our observations can be powerful guides to understanding much of the “big picture” of change and continuity in the world around us. We will, especially, investigate the enormous appetite our civilization has developed for energy, with all of the benefits and problems that this brings to us. Finally, we will look at possibilities for the future, both on the macro scale (can we reduce the pollution that seems to accompany our current energy usage and avoid the related, on-coming global warming that is already being glimpsed?) and the micro scale (how can we bring some of these ideas into our own classrooms?).

Course requirements

- 1) Attend and participate in all sessions
- 2) Write a daily journal about what you learned and how you learned it – ideas from everyone’s journals will be collected and discussed throughout the institute.
- 3) Research, plan, and present a classroom activity or unit based on ideas stimulated by the Institute – initial thoughts will be worked on during the later days of the Institute; the activity or unit should be developed over the summer and presented in your classroom in the fall. A written presentation of your curriculum activities is due in October, 2006. *This report is required in order to get credit for the course.*

Reference texts

Barry, Leonard, editor, “Energy Education Resources: Kindergarten Through 12th Grade,” Diane Publishing Co., Darby, PA (2004).

Kimberly K. Smith, “Powering Our Future: An Energy Sourcebook for Sustainable Living,” iUniverse, Inc., New York (2005).