Smithsonian Institution
National Science Resources Center

January 1, 2011

Dear Principal, Science Supervisor or Teacher:

The following information may help you make a decision regarding sending teachers to the *Smithsonian Science Education Academy for Teachers—Energy: Past, Present and Future*. This event utilizes the scientific and educational resources of the Smithsonian Institution, combined with other museums and partners, to provide teachers with a unique week-long learning experience.

Academy Overview
The course builds upon an initial introduction to pre-industrial energy resources and provides a unique combination of physical science concepts and content presented in an historical and social context. Some course sessions use inquiry-based pedagogical approaches as vehicles for teacher instruction that can translate into exciting classroom experiences for school students. The course syllabus therefore closely aligns with the National Science Education Standards grades 5-12 (of the National Research Council), and many state standards for science and technology education.

Academy Concepts
Concepts and content areas that relate to this academy, that are included in most state standards include:
• The nature and different forms of energy
• Energy transfer
• Changes in temperature that take place during chemical and nuclear reactions
• The chemical potential energy of fuels
• Combustion being used to provide kinetic energy
• Generation and use of electrical energy
• Electrical circuits provide a means of transferring energy—in the form of electrical energy
• Conductors and insulators
• The sun as the major source of energy on the earth's surface.
• Fossil fuel formation and use
• Alternative energy resources—wind, solar and others
• A wide range of standards that relate to scientific inquiry, included access to researchers and exemplary hands-on inquiry based sessions
• Understandings about the relationship between science and technology, and the process of technological design
• Standards that relate to the social perspective of science, such as the use of natural resources, environmental quality, and global change
• Understandings about the nature of science as a human endeavor, and the history of science and technology

The content, concepts and pedagogy are presented using exhibits at a number of museums, visits to industrial plants and presentations by experts in appropriate fields. In addition a number of sessions (about 25%) will be hands-on classroom sessions, where teachers explore ways of teaching science concepts. The museum environment is particularly conducive to addressing the historical and social perspectives that relate to the topic, and which are often underemphasized by teachers.

Daily Academy Overview
The following list provides a breakdown of the sessions. Please note that some sessions are still tentative, being dependent on venue and staff availability. *Sessions may be added, removed, and are subject to change.*

Sunday Evening
• Overview and introduction to the program
• Pre-assessment
• Creating an energy use timeline

Day 1
• Pre- and Early Industrial Energy Resources (animal, water, wind, and early steam power). *Curator of National Museum of American History Exhibit*
• Electricity Generation. *Hands-on and presentation of early electrical artifacts*
• Early Electrical Generation. *Presentation illustrated with artifacts*
• Teaching About Electricity Transmission/ *Hands-on inquiry session*
• Transmission of Electricity. /*Artifact based presentation and discussion*

Day 2
• Sources and Nature of Fossil Fuels. / *Dept Mineral Science Natural History Museum*
• Current Electrical Generation Practices. / *Electrical generating plant visit*
• Nuclear power—Looking Ahead/*Engineer from Baltimore Gas and Electric*
• Energy for Transport 1: An Historical and Technological Perspective/*Baltimore and Ohio Railroad Museum curatorial staff.*

Day 3
• Energy for Transport 2: Changes in Energy Use and Changing Patterns of Transport/ *Museum of American History. Inquiry-based museum floor exhibit session and participant presentation*
• Is There a Future for Biofuels? / speaker from the *Department of Energy*
• Experimenting with Wind Energy: Hands-on Science and Technological Design Session/ *NSRC curriculum developer/inquiry science specialist*
• Geothermal Energy Resources / speaker from the *Department of Energy*

Day 4
• Energy Technology-visit to technology laboratories/ *Scientists of the National Institute of Standards Technology*
• Energy & Coal exhibits on rail transportation and the use of coal and steam/*Baltimore and Ohio Railroad Museum*

Day 5
• Solar cells and fuel cells. /*National Museum of American History curator and speaker from Fuel Cells 2000*
• Fuel Cell cars: Hands-on session and experiencing a real Fuel Cell Car/ *NSRC science specialist and GM*
• Post assessment and wrap-up

I hope this description of the program is helpful, and you find a close match between your instructional needs and what has been planned for this week-long *Smithsonian Science Education Academy for Teachers: Energy: Past, Present and Future*.

Sincerely,

David Marsland
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