Hot Air from EEOP – *A Newsletter*

Environmental Education Outreach Program (EEOP)
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The Newsletter

This newsletter is a service of the Institute for Tribal Environmental Professionals (ITEP) Environmental Education Outreach Program (EEOP). We've created this newsletter specifically for K-16 students, educators, and tribal professionals that are interested in learning more about environmental issues with a focus on air quality.

Air Quality – Carbon Dioxide

After a four-year court battle, the Supreme Court of the United States ruled on April 2 of this year 5 to 4 that carbon dioxide and other heat-trapping emissions are "air pollutants" under the Clean Air Act, and that the US Environmental Protection Agency (USEPA) already has authority to start curbing them.

Beyond the specific context for this case - so-called "tailpipe emissions" from cars and trucks, which account for about one-fourth of the country's total greenhouse gas emissions - the decision is highly likely to have a broader impact on the debate over government efforts to address global warming. For example, the ruling may also be applied to coal burning electrical power plants. Furthermore, the ruling has largely eliminated the arguments of other lawsuits trying to block regulation of the emissions and gives new momentum to congressional efforts to control heat-trapping gases linked to climate change.

The Supreme Court ordered USEPA to make a fresh decision on curbing heat-trapping pollution from new cars, SUVs, and trucks – this time relying solely on global warming science and not on illegal excuses for inaction. The Supreme Court decision is likely to help forge consensus in Congress for new and more comprehensive global warming legislation in the future.

The Natural Resources Defense Council (NRDC) was joined in the suit by 12 states (CA, CT, IL, RI, MA, ME, NJ, NM, NY, OR, VT and WA), Baltimore, New York City, Washington, D.C., and numerous other environmental groups and non-profit organizations. Fourteen "friend of the court" briefs were also filed from an array of scientists, former EPA administrators and others.

The Supreme Court's decision will have far-reaching implications. The EEOP staff is available to help educators provide more information to students about Global Warming issues. The remainder of this newsletter will be dedicated to providing information on Global Warming.

(This newsletter article was compiled and modified from several newspaper articles, including articles from "International Herald Tribunes", the "Seattle Times", the "Environment News Service", the "Washington Post" , the Huffington Post, and the "USA Today".)

Global Warming

For over the past 200 years, the burning of fossil fuels, such as coal and oil, and deforestation have caused the concentrations of heat-trapping "greenhouse gases" to increase significantly in our atmosphere. These gases prevent heat from escaping to space, somewhat like the glass panels of a greenhouse.

Greenhouse gases are necessary to life as we know it, because they keep the planet's surface warmer than it otherwise would be. But, as the concentrations of these gases continue to increase in the atmosphere, the Earth's temperature is climbing above past levels. According to National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA) data, the Earth's average surface temperature has increased by about 1.2 ºF to 1.4 ºF since 1900. The warmest global average temperatures on record have all occurred within the past 15 years, with the warmest two years being 1998 and 2005. Most of the warming in recent decades is likely the result of human activities. Other aspects of the climate are also changing such as rainfall patterns, snow and ice cover, and sea level.

If greenhouse gases continue to increase, climate models predict that the average temperature at the Earth's surface could increase from 2.5 ºF to 10.4 ºF above 1990 levels by the end of this century. Scientists are certain that human activities are changing the composition of the atmosphere, and that increasing the concentration of greenhouse gases will change the planet's climate. But the scientists are not sure by how much it will change, at what rate it will change, or what the exact effects will be.

Even though there is a great deal of uncertainty in all the changes resulting from Global Warming, we all need to understand the issues better. The EEOP staff is available to help educators with curriculum resources or leading learning activities to help develop more understanding of the issues.

Greenhouse Gas Overview

Gases that trap heat in the atmosphere are often called greenhouse gases. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. There are four main greenhouse gases that enter the atmosphere because of human activities.

Carbon Dioxide (CO2): Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is also removed from the atmosphere when it is absorbed by plants as part of the biological carbon cycle.

Methane (CH4): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

Nitrous Oxide (N2O): Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

Fluorinated Gases: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (i.e., CFCs, HCFCs, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases").

Global Warming – Taking Action

We all release greenhouse gases as a result of using energy to drive our cars, using electricity to light and heat our homes, and through other activities that support our quality of life like growing food, raising livestock, and throwing away garbage. Greenhouse gas emissions can be reduced through simple measures like changing light bulbs and properly inflating your tires. Below are some ideas for taking action. These actions and others would be appropriate for students and teachers as they learn about the Global Warming issues and how they are impacting our world.

Change five (5) lights: Change a light, and you can help change the world. Replace the conventional bulbs in your five (5) most frequently used light fixtures with bulbs that have the ENERGY STAR qualified options and you will help the environment while saving money on energy bills. If every household in the U.S. took this one simple action we would prevent more than 1 trillion pounds of greenhouse gas emissions. The Compact fluorescent light-bulbs (CFLs) cost 3 to 5 times as much as a conventional bulb, but it uses 75% less energy and lasts years longer. (One concern with the CFLs is that many contain a small amount of mercury. This mercury is an issue only if you break the light bulb. If a light bulb is accidentally broken, clean up the glass, and air out the room.)

Reduce, Reuse, and Recycle: If there is a recycling program in your community, recycle your newspapers, beverage containers, paper and other goods. Use products in containers that can be recycled and items that can be repaired or reused. In addition, support recycling markets by buying products made from recycled materials. Reducing, reusing, and recycling in your home helps conserve energy and reduces pollution and greenhouse gases from resource extraction, manufacturing, and disposal. (In rural communities recycling does not always save energy. If you are making special trips to deliver recyclable materials, the energy of transportation may exceed the savings from recycling.)

Use water efficiently: Saving water around the home is simple. Municipal water systems require a lot of energy to purify and distribute water to households, and saving water, especially hot water, can lower greenhouse gas emissions. There are also simple actions you can take to save water: Be smart when irrigating your lawn or landscape; only water when needed and do it during the coolest part of the day, early morning is best. Turn the water off while shaving or brushing teeth. Do not use your toilet as a waste basket - water is wasted with each flush. And did you know a leaky toilet can waste 200 gallons of water per day?

Global Warming – Curricular Resources

Curricular resources for this important issue are in short supply. However, Global Warming is emerging as one of the big issues of this century. One approach the EEOP staff would recommend is to use Problem Based Learning (PBL). With PBL the teachers and students can create their own information. There are also a couple of useful curricular resources below that teachers may want to consider.

Problem Based Learning: In a PBL format, the role of the teacher is to act as a facilitator, assisting their students in developing questions about the issue under investigation, finding resources and activities that shed light on the questions, and creating a final product or performance that shares their proposed resolution for the problem. The teacher is NOT expected to be the expert on the topic or issue; instead, the teacher will learn along with their students and facilitate student learning.
(http://www4.nau.edu/eeop/aqcp/pbl.asp)

Great Expectations in Math and Science (GEMS) - Global Warming & the Greenhouse Effect: The application of solid science to real-life conditions—and the urgency of this resolvable environmental problem—make this GEMS unit invaluable to teachers of young people whose understanding of global warming may affect their lives and those of their children. Students explore this powerful environmental topic in a wide variety of formats, from hands-on science activities and experiments to a simulation game, analysis of articles, a story about an island threatened by rising sea levels, and a world conference on global warming.
(http://www.lhsgems.org/GEM322.html)

Teach students about climate change and ecosystems: Use the Climate Change, Wildlife and Wildlands: A Toolkit for Teachers and Interpreters to learn about the science of climate change and its potential effects on our nation's wildlife and their habitats.
(http://www.epa.gov/climatechange/wycd/ORWKit.html)

Engage middle school students in estimating emissions: Enhance critical thinking skills by introducing the Global Warming Wheel Card Classroom Activity Kit to middle school students. A hand-held wheel card and other resources help students estimate household greenhouse gas emissions in order to encourage students to think about ways to reduce their personal, family, school and community contributions to climate change.
(http://www.epa.gov/climatechange/downloads/ActivityKit.pdf)

Future Issues

We are also interested in publishing articles from you. We are interested in articles sharing stories from students, teachers, or tribal professionals influenced by ITEP or EEOP activities. In the next issue we will share information on some recent activities and plans for the summer.

Credits and Contacts

The US Environmental Protection Agency (USEPA) Office of Air and Radiation provides part of the funding to make this newsletter possible. The newsletter is disseminated on various list serves, however, if you would like to join the newsletter list serve, contact mansel.nelson@nau.edu.

Our staff looks forward to providing new services and developing new programs, as well as continuing existing programs. We especially look forward to hearing from you. So please visit our website at http://www.nau.edu/eeop or contact us via telephone or email.

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