AC 2008-1399: EARTH DAY TEACH-IN: A MODEL FOR INDUSTRY, COMMUNITY, AND EDUCATION COLLABORATION

Ken Barnard, K-State at Salina

Ken Barnard has a doctorate in Aviation and Space from Oklahoma State University, and is a professional pilot with Airline Transport Rating, Certified Flight Instructor in airplanes and helicopters and Mechanic Airframe and Power Plant ratings. Ken is a professor in Aviation at Kansas State University at Salina. A former Department Head and Director of an International Pilot Center Ken became interested in climate change issues while doing atmospheric research for the Aviation Meteorology class he currently teaches. He was selected as one of the one-thousand individuals from around the world to be trained at the Climate Project founded by the Honorable Al Gore. Ken is active on the lecture circuit addressing climate change issues.

Greg Stephens, K-State at Salina

Greg Stephens teaches business and management courses in the Technology Management program at Kansas State University at Salina. He is an Associate Professor and serves on several non-profit organization boards. Greg also produces local TV programs for Community Access. He served as chair for the Institute for Rural America and has worked with sustainable agriculture organizations for over 30 years. In 2007, he was awarded The Inspire by Example faculty award for community service by K-State.

Raju Dandu, Kansas State University at Salina

Raju S. Dandu is the program coordinator and professor of Mechanical Engineering Technology at Kansas State University at Salina. He teaches courses in CNC Machine Processes, Material Strength and Testing, Advanced CAD/CAM, Industrial Instrumentation and Controls, and Automated Manufacturing Systems II. He is active in offering workforce training in reliability centered maintenance, CE certification, process instrumentation and PLCs. His areas of interest are: Product risk analysis, Reliability Centered Maintenance, Energy Efficient Lighting, CAD/CAM, and Industrial Automation. He is a member of ASEE, ASME, SAE, and SME.

Earth Day Teach-In: A Model for Industry, Community, and Education Collaboration

Abstract

Earth Day is a driving force for environmental awareness around the world. It can also be an effective event for educating the local community and the 21st century engineer since technologists will play a vital future role in civic engagement, green economic development, and global awareness related to energy, global warming and conservation. This paper presents a cross disciplinary team presentation from faculty in Engineering Technology, Business, and Aviation collaborating together to explain the first campus Earth Day Teach-In at K-State Salina. This paper includes a focus on current environmental issues that apply to Earth Day and an explanation on how Earth Day can be organized to educate the community and the 21st century engineer. Attendees will leave with ideas on how they can organize an industrial, educational, and community collaborative Earth Day Teach-In.

Introduction

Developed nations are now enjoying the highest standard of living than any other time in human history. Technology in large part has contributed to these societies' safe structures with climate controlled atmospheres incorporating every appliance imaginable to include worldwide communication links. Convenient electric energy supplied through regional and national electrical grid networks is taken for granted. Commuting to workplace and shopping malls with environmentally controlled vehicles powered with cheap oil is common place. Further, technology helped design and build aircraft coupled with a support system that allows inexpensive travel to anywhere in the world with significant savings in that other precious limited resource called time. Emerging economies (nations) with huge population bases are now well on their way to emulate developed nations' consumption patterns.

Current Environmental Issues

There is a price to pay beyond the energy costs for this way of life. The environment in which all living things are interconnected is being adversely affected. Many aspects of technology have played major roles associated with the discovery, extraction, and the consumption of energy as well as bringing efficiencies throughout the process. The problem now being recognized is that the cheap fossil fuel era of the past cannot be sustained into the future. McDonough & Braungart (2002) stated, "The design of products and manufacturing systems growing out of the Industrial Revolution reflected the sprit of the day- and yielded a host of unintended yet tragic consequences". Burning fossil fuels increase levels of pollutants and greenhouse gasses (carbon dioxide, nitrous oxide, and water vapor). The molecules of green house gasses resonate with reflected infrared radiation from the earth and prevent most of this radiated heat from escaping into outer space. Burning of coal adds mercury, sulfur oxides, and fly ash, among others to the atmosphere. Carbon dioxide levels have been increasing exponentially since the mid 1800's when humans started burning fossil fuels in earnest. Internal combustion engines burning fossil fuels, powered the industrial revolution. Burning fossil fuels add carbon dioxide to the

atmosphere in varying amounts. By weight for example coal adds 3.7 pounds of carbon dioxide for every pound burned, where as gasoline adds 3.1 pounds of carbon dioxide for every pound burned. Carbon dioxide once entering the atmosphere remains there for approximately 100 years. The carbon dioxide pre industrial levels never exceed 290 ppm (going back 650,000 years) today their accelerating through 385 ppm; methane another green house gas has doubled. Adding methane the carbon dioxide equivalent (CO_2e) is over 450 ppm.

As world population growth increases beyond the current 6.4 billion and as cultures around the world continue to industrialize, consumption rates of all resources increase including energy. Arguably world peak oil production is here or near and with no economically viable substitute available requires second thoughts on the population-food-agriculture-fossil fuel connections. The Kansas Oil and Gas Industry Strategic Analysis, January 2007 report stated, "The energy wealth and poverty of nations has replaced industrialization as the defining national quality. Using linear regression, Dr. Michael Economides, Professor at the Cullen College of Engineering at the University of Houston, has established a clear link between per capita income of a nation and per capita oil consumption of a nation. The analysis verifies the relationship between the wealth of nations and oil consumption and suggests that measures to reduce a nation's oil consumption without a viable alternative will also reduce a nation's standard of living. Credible analyses show that fossil fuels provide over 80% of the U.S. energy supply and are projected to increase over the next decade." We have responded to this increased resource demand by increasing mining of these resources. This simple way of thinking can not be sustained. There are finite resources that are quickly being depleted and will not be available in the future. McKibben (2007) stated that human beings have used, shockingly, more raw materials since World War II than in all of prior human history. Alternate energy and consumption sustainability must be adopted world wide because we are polluting our environment and changing our climate as a direct result of our excessive consumption habits.

World Resources Institute reports that China now accounts for one third of world increase in carbon dioxide emissions and the world is headed, "business as usual" to increase carbon dioxide emissions 50% by 2030. The Intergovernmental Panel on Climate Change, fourth assessment report (2007) stated there was strong evidence that anthropogenic actions have contributed to current levels of carbon dioxide which are causing climate change to occur world wide. There is evidence in the arctic that positive feedback loops may be underway with the melting ice cap and permafrost release of methane. A doubling of carbon dioxide by 2050 (predicted under current rate increased) would increase world temperatures by 2-5 degrees centigrade causing climate extremes. It is therefore, recommended that an eighty percent reduction in carbon dioxide levels by 2050 is necessary to stabilize the climate. Mitigation cost accelerates with time. The "tragedy of the commons" by past civilizations has failed. Our species is now faced with a coming of age moment in time. Are we mature enough to act quickly enough to change our course for a better future?

Technology has played an instrumental role in our efforts to extract and consume more natural resources. It is now time to use technology for reducing carbon emissions by finding sustainable alternatives, carbon capture, implementing recycling and conservation practices. Moreover, national and world policies of carbon caps and trade with equable wealth distribution have to be implemented. Sustainability has to be in our consciousness and actions. Knowledge carries with

it a moral imperative to leave our environment healthy for future generations. The opportunity is ripe for new engineering and engineering technology students to recognize a few areas that need fresh ideas and minds working for better solutions. Further it is necessary to embrace these challenges through innovative bio-fuel, nanotechnology, mechanical, electrical, computer, composites, and battery technologies.

Objectives

The overall objective of our Earth Day Teach-In was to involve students, academia, industry, and community to:

- bring awareness of the problem: consumption, pollution, cheap oil based global economies, finite resources and the short time available for implementing solutions
- change our way of thinking: career choices and personal actions contribute to the solution
- create awareness in students so they can make a difference and be part of the solution to find alterative, sustainable energy
- teach that the technology innovations are part of the solutions

Corporate America is demonstrating that energy efficiencies can be strongly linked to profitability. Paul Anderson, CEO Duke Energy Corporation, "The time has come to act" with a growing number of companies 25+ known as the U.S. Climate Action Partnership are demanding a national carbon cap and trade, tax incentives on alternate energy, and tax on carbon emissions.

Organizing an Earth Day Teach-In

Organizing an Earth Day Teach-In is quite easy to do in engineering and technology colleges or departments. Many people are interested in the topic and technology plays an important solution to the issues raised that are related to Earth Day.

The Earth Day Teach-In at our college was initiated by our campus Multicultural Committee which gave the event legitimacy and campus wide purpose. The Multicultural Committee provided a budget and administrative support; although the budget was limited and our expenses were less than $100.

Our initial hurdle was to develop a plan, organize various groups, generate campus support, and exceed expectations in order to make the day a success. Not everyone on campus was supportive of the idea, so we had the added burden of proving the value of this Teach-In.

Development of a Plan

Our initial reason to conduct an Earth Day event was not very focused at the beginning of the process. The idea started because our campus multicultural committee asked us to conduct the event as part of their monthly cultural program. The planning started in mid spring by identifying those leaders on campus we thought would be helpful and could play a supportive role in the event. Attending our first planning meeting were representatives from Continuing Education,

Student Services, Arts, Sciences and Business Department, Aviation Department, and Engineering Technology Department.

The first meeting was a general brainstorming session, so many ideas were brought forward. The single question of disagreement that arose from our initial meetings was whether to have a small single-speaker event or a broader teach-in event. Our group was evenly split with a tendency to lean toward the smaller event due to the lack of planning and organizing time remaining in the semester.

Following the first planning meeting, contacts were made with local business and industry leaders, educational institutions, and other organizational associations to determine the level of interest and support for an Earth Day Teach-In. The immediate response and level of interest from those entities and the general public was very strong. One reason for the strong interest might have been the recent release of the movie "The Inconvenient Truth". Another reason might have been due to a recent regional drought that caused a major river through Salina, Kansas to nearly dry up which resulted in a low water supply issue in Salina. Timing may have played a role in enhancing the support for the event. It should be noted that these timing issues may not always be present in other communities as was evident in Salina.

Because of the strong business and community interest, the planning team decided to expand the concept and conduct a larger teach-in event. The next step was to flush out a tentative agenda that included speakers, music, color, culture, art, poetry, and history for the purpose of creating an event that would touch the senses of attendees and become experiential. Within two weeks the team met with the Deans advisory staff to present a tentative plan and ask for other ideas and support.

Following the meeting with campus leadership, a core group that included three faculty and two staff persons met on a face-to-face basis and via e-mail for the next several weeks. The team had five weeks to finalize the event, confirm all speakers, make arrangements for publicity, and finalize multiple details needed for this first teach-in event. The plan was as follows: Schedule the event on a week day rather than on Earth Day which was a weekend day. The choice for the week day was to facilitate the participation of students, staff, and faculty.

The team planned to show the film Inconvenient Truth at our college library prior to the Earth Day event. Following the film a panel discussion led by international students from Kazakhstan, Nigeria, Kenya, Japan and Mexico was planned. The panel discussion focused on the cultural and international dimension for Earth Day.

Earth Day Teach-In started at our cafeteria at noon and continued with break-out sessions on multiple topics. The cafeteria sponsored a $3.00 lunch during event. This luncheon ensured a ready made manufactured crowd for our welcome and the first breakout session which gave us the appearance of success at the start of the teach-in.

Prior to the event, the team contacted the Kansas State Historical Society for a traveling KITES (Kansas Interpretive Traveling Exhibit Service) display and selected "By a Thousand Artifices:

The Folk Technology of Farming in the Flint Hills". The exhibit was on display at the cafeteria for one week prior to the Earth Day and was used to help publicize the event.

During the event facilities department coordinated the planting of a tree. At the end of the day faculty supervised volunteer trash pick-up along the roadway leading into campus.

Organizing Various Community Groups

The groups targeted for support and participation for Earth Day were students, staff, faculty, business and industry leaders, community organizational leaders, and local citizens. To get student participation, the team contacted student government for support and developed an e-mail campaign along with campus flyers. Faculty was asked to encourage their students to attend all or part of the various breakout sessions or events.

In addition, several sessions were planned with students as participants hoping the events would add to their educational experience and generate interest in attendance. For example, the evening panel discussion at the library included several international students. One breakout session included the Students Involved in Free Enterprise (SIFE) club as presenters on the topic of their recent trip to France to learn about local culture and foods. Another activity was a student "Call to Action" with a goal to have students send text message to their friends about Earth Day. Finally, Engineering Technology students had a student solar boat project on display.

The breakout sessions included topics such as technology, Leadership in Energy and Environmental Design (LEED) certification standards, energy efficient lighting systems, transportation, wind energy, green marketing, local foods, zero water landscaping and energy savings. To add ambience for the event, students organized outdoor games, flew kites, and played outdoor music.

Besides the student activity, all faculty were encouraged to participate by being involved with student events, facilitating breakout sessions, and a poetry reading. Since this was our first event and Earth Day is often thought of as a soft educational event, many faculty were inquisitive and attended breakout sessions.

Business and industry leaders were the most motivated participants. They saw Earth Day as an opportunity to showcase to the college community their various products, services, and technologies. The strategy for the event was to elevate technology by showcasing how business, industry and technology focus on solutions to environmental issues. The business community responded. They found that Earth Day is an excellent and natural event to make this possible. For example Westar Energy, our regional utility, saw this as an excellent opportunity to talk about energy saving issues related to electrical consumption. Bucher Willis Ratliff, a regional engineering firm showcased their LEED construction certification program.

Further, North American Philips Lighting, an electric lamp manufacturer, was very interested in doing a breakout session related to efficient lighting systems. Images, a local recycling business, volunteered to present at a breakout session on recycling and composting. In addition, local wind energy manufacturers provided displays of working wind generators.

Breakout sessions were conducted on the subjects of zero water landscaping and locally grown organic foods. At the end of the day, a rap up session was conducted on how to "Reduce Your Carbon Footprint". Other opportunities were also possible for the agenda on various topics, but time slot availability was a constraint for this first teach-in.

Community organizations such as the Sierra Club and Audubon supported the event by encouraging their members to attend. The Land Institute, an internationally known local environmental organization was a partner and one of their staff moderated at the cafeteria session. Local cooperative extension personnel helped with the tree planning and participated in a breakout session on composting. And the dean of Brown-Mackie College, a local private business college, participated in the alternate transportation breakout session.

Media Outreach

To help publicize the event, we created and distributed posters on campus and throughout the community. We also participated in two local radio talk programs and the local newspaper, the Salina Journal, carried a news story promoting the event. Finally, local Community Access TV covered the event by video taping various presentations for later broadcasting on the local Access TV station.

Putting Together A Breakout Session on Efficient Energy Lighting Systems

The team encouraged individual faculty and students to get involved in coordinating the breakout sessions. Several faculty and students had "can do' attitudes and took responsibility in organizing breakout sessions. The session topics were designed to bring an educational experience with an attitude change – behavior change in the way one uses energy. Before determining the scope of each session the team agreed on a common topic framework to address the objectives of the event with the following guidelines:

- Bring awareness of the problem
- Change peoples way of thinking in relation to the energy consumption
- Involve experts in the topical areas

- Identify two speakers each for 25 min. per session

Knowing the objectives, scope of the session, and the expertise needed in the area of energy efficient lighting made it easy to plan for the energy efficient lighting system breakout session. Faculty responsible for organizing the session contacted Philips Lighting, a leader in energy efficient lighting products. The company has expertise both in product development and manufacturing. Faculty gathered the information about personnel and their expertise and contacted the people and explained the objective of the event. This process identified a person of authority in the subject area that would lead the session. During the discussion on the scope of topic, the team focused on keeping the event educational, interesting and revolving around the theme of the event. The main emphasis of the topic was to address the role of industry on environmental issues and how the public can be involved in energy conservation.

The speaker from industry talked about their role in energy efficient lighting systems technologies and trends and the other speaker focused on saving potential from adopting the energy efficient lighting systems and products by consumers. The speakers also displayed the energy efficient lighting products that are currently available in the market.

Summary

Earth Day represents an excellent opportunity for technical educators to showcase their programs, collaborate with business and industry, network with community organizations and other constituents. It provides a needed educational focus for students and provides a platform for faculty expertise. The team received excellent feedback on the event. Several faculty members asked that they be included in next year's Earth Day Teach-In. Business and industry participants were very motivated to showcase their technology and expertise. College leadership saw this as an opportunity to showcase the college, faculty expertise, and provide community service. The students had fun, and learned practical information that served as a bridge between their technical oriented classes and current events of global warming, energy efficiencies, and alternative sustainability issues.

The results of our first Earth Day Teach-In met and exceeded expectations. A respectable number of attendees were present at every session. Some breakout sessions filled up the classroom capacity. Word-of-mouth talk by faculty and students during and after the event created strong buzz marketing which caused several positive follow-up questions, discussions, and suggestions for a future Earth Day event. The Community Access TV programs also generated follow-up conversation from the larger community. Following the event, organizers met to evaluate, and discuss a future Earth Day. The main sponsor, the multicultural committee, was pleased and plans to facilitate the event in future years. Next year's event will be planned earlier to generate more support. Given more time, more community organizations will likely become involved. In conclusion it is our hope that our experience will help other college and universities promote Earth Day activities on their campuses across the nation.

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