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AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) AND (IEEE-USA)
AMERICAN INSTITUTE OF MINING, METALLURGICAL, PETROLEUM ENGINEERS (AIME)
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (AAAS) **APRIL 2009**

ENGINEERS FORUM ON SUSTAINABILITY

IEEE-USA, AIME, AND RNRF JOIN THE FORUM AS CO-SPONSORS

We are pleased to announce that the Institute of Electrical and Electronic Engineers-USA (IEEE-USA), the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME), and the Renewable Natural Resources Foundation (RNRF), have become co-sponsors of the Engineers Forum on Sustainability. All three organizations have strong interests and active programs involving sustainability, and their participation will contribute to the expanding role of the engineering community in sustainability issues, challenges and information sharing.

This issue of the Forum Newsletter includes summaries of the fine presentations made at the January 16, 2009 meeting of the Forum. It also includes a broad range of sustainability-related articles in the categories of Professional Organizations, Government, Academia, and International. We believe you will find many of them of interest.

As a reminder, the National Academies building at 21st and Constitution Avenue, N.W is undergoing an extensive renovation program at this time and will not be available for Forum meetings. As a result, the next meeting of the Forum will be hosted by the American Association for the Advancement of Science (AAAS). It is conveniently located in downtown Washington, D.C. and is easily accessible by Metrorail.

The Forum meeting will be held from 9:00 a.m. to noon on Friday, May 22, 2009. The AAES International Activities Committee will meet in the same room at AAAS from 1:00 p.m. to 4:00 p.m. All Forum attendees are invited to join the afternoon session as well.

Please mark your calendars. The Forum Agenda will be-emailed to you separately and will contained detailed information on the AAAS room location, address and access.

We look forward to seeing you on May 22.

Al Grant, Forum Chair
Darlene Schuster, Forum Co-Chair

Inside this issue:

PROFESSIONAL ORGANIZATIONS

IEEE PRODUCES SUSTAINABILITY VIDEOS

IEEE.tv is an internet based television network made possible by the members of IEEE. It produces and delivers special-interest programming about technology and engineering. IEEE.tv Public Access is free of charge to the public, and does not require IEEE membership or log-in. The following videos about sustainability issues are available on IEEE.tv Public Access:

A SMART GRID FOR INTELLIGENT ENERGY USE - According to the leading engineers, business leaders and public policy experts interviewed at the 2008 IEEE Energy 2030 Conference, significant energy savings will result from the use of communications and computing technology to improve electricity transmission and distribution. The smart grid will involve consumers in reducing energy consumption and will also facilitate the integration of energy from remote and distributed sources.

CARE INNOVATIONS: GREEN ENGINEERING - Designing for sustainability is the focus of this short program aimed at the general public. Experts discuss the technical challenges of greening the entire chain, from raw materials to manufacturing, distribution, and disposal.

CARE INNOVATIONS: RESPONSIBILITY FOR BEING GREEN - This program takes a look at the challenge of minimizing the environmental and health impacts of electronics manufacturing. Discussions focus on the responsibility of industry, government, academia, and the general public to foster the development of public policy and the enforcement of laws to safeguard health and the environment.

To view these videos, visit www.ieee.org/ieeetv.

AIChE SUSTAINABILITY METRICS PROJECTS

To add to the suite of metrics for sustainability which AIChE has developed, the Institute for Sustainability has launched a renewable fuels metrics roundtable. The 2007 Energy Independence and Security Act, signed into law on December 19, 2007 includes a mandate for forming an interagency task force to develop biofuels metrics. This mandate is currently expected to be funded by 2010. The Office of Management and Budget recently issued a memorandum that stressed the importance of the U.S. leading in the development of biofuels metrics to protect U.S. interests. Technical leads of the effort encouraged the AIChE Institute for Sustainability (IfS) to play a role in establishing these metrics and a need was identified to form a Roundtable to address this issue of increasing importance to industry and to proactively gather the best thinking among industry leaders for the development of metrics.

The Renewable Energy Metrics Committee will develop, vet, test and recommend for adoption criteria and measurements for assessment of biofuels development and use. This effort will bring together experts from the private sector, including industry, academia, and NGO's with expertise and interest in developing and adopting a common set of technically viable metrics that can be used for and by the federal interagency task force. The roundtable discussion will initially focus on biosystems that can impact U.S. needs. The systems will include the entire chain of use, i.e. from growth, harvest, conversion, distribution to use. Examples of some potential metrics include:

- Cost per "standard" mile of transportation for the "standard" vehicle
- Net renewable energy per acre. Corrected, if necessary, for any significant differences in efficiency of use of the Btu's.
- Potable water consumption per "standard" mile of transportation for the "standard" vehicle
- Adverse environmental impacts on water quality per "standard" mile of transportation for the standard" vehicle
- Adverse environmental impacts on air qualit y per "standard" mile of transportation for the "standard" vehicle
- Food production displaced per "standard" mile of transportation for the "standard" vehicle.

The developing roundtable met in Tampa, Florida on April 28, 2009 and will begin holding monthly meetings (virtually) beginning in June. For additional information, contact ifs@aiche.org

BIOMEDICAL ENGINEER'S ROLE IN SUSTAINABILITY

Gerald Miller, Ph,D., Chairman, Biomedical Engineering, Virginia Commonwealth University, on behalf of the American Institute for Biomedical Engineering (AIMBE), presented an overview of the role of biomedical engineering researchers and scientists, and their relationship with the Food and Drug Administration (FDA), at the January, 2009 meeting of the Engineers Forum on Sustainability.

Dr. Miller addressed topics labeled as "hot areas" for the the FDA and the biomedical engineering community. In regard to medical devices, LASIK surgery, breast implants, proper exposure limits for medical imaging systems, contact lenses, heart assist technologies and dialysis systems were the focus. IN the area of food regulation and food safety, important elements were food safety, nutrition labels, dietary supplements, genetically engineered foods, packaging and and sealing, and usage dates. In the pharmaceutical "hot area", cholesterol lowering drugs, HIV screening tools, blood pressure drugs, arthritis and joint lubrication, and drug introduction were the focus. New combination products that are either in the approval process or have already been approved include such applications as transdermal patches for the treatment of Parkinson's disease, inhaled insulin for diabetes, transdermal patches for depression, surgical mesh with antibiotic coatings, and spinal fusion putties.

Dr. Miller proposed that over the longer term, the FDA introduce more stringent monitoring of foreign food and drugs, as well as a more stringent monitoring and application process for combination and tissue based drugs, devices and therapies. There should also be particular monitoring of food and drugs for infants, children and the elderly.

Biomedical engineers need to maintain proper R&D protocols, and animal and clinical trails. Consistent involvement with physicians and patients is necessary to insure continual feedback. Careful use of industry sponsored research is essential. In addressing sustainability issues and potential solutions, FDA protocols must be developed for food, drugs, and medical devices with a minimum ten year use, and drug protocols should provide more extensive premarket testing and prescreening protocols for foreign food and drugs.

For more information, visit www.aimbe.org.

GOVERNMENT

EPA ADMINISTRATOR OUTLINES VITAL TASKS

In a memo to EPA employees, Lisa P. Jackson, the new EPA Administrator, outlined the following vital tasks:

REDUCING GREENHOUSE GAS EMISSIONS. The President has pledged to make responding to the threat of climate change a high priority of his administration. He is confident that we can transition to a low-carbon economy while creating jobs and making the investment we need to emerge from the current recession and create a strong foundation for future growth. EPA will stand ready to help Congress craft strong, science-based climate legislation that fulfills the vision of the President. As Congress does its work, we will move ahead to comply with the Supreme Court's decision recognizing EPA's obligation to address climate change under the Clean Air Act.

IMPROVING AIR QUALITY. The nation continues to face serious air pollution challenges, with large areas of the country out of attainment with air-quality standards, and many communities facing the threat of toxic air pollution. Science shows that people's health is at stake. We will plug the gaps in our regulatory system as science and the laws demand.

MANAGING CHEMICAL RISKS. More than 30 years after Congress enacted the Toxic Substances Control Act, it is clear that we are not doing an adequate job of assessing and managing the risks of chemicals in consumer products, the workplace and the environment. It is now time to revise and strengthen EPA's chemical management and risk assessment programs.

CLEANING UP HAZARDOUS-WASTE SITES. EPA will strive to accelerate the pace of cleanup at the hundreds of contaminated sites across the country. Turning these blighted properties into productive parcels and reducing threats to human health and the environment means jobs and an investment in our land, our communities and our people.

PROTECTING AMERICA'S WATER. EPA will intensify its work to restore and protect the quality of the nation's streams, rivers, lakes, bays, oceans and aquifers. The Agency will make robust use of our authority to restore threatened treasures such as the Great Lakes and the Chesapeake Bay, to address our neglected urban rivers, to strengthen drinking-water safety programs, and to reduce pollution from non-point and industrial discharges.

For complete memo, visit www.epa.gov/administartor/memotoemployees.

MANAGING WATER RESOURCES IN A CHANGING CLIMATE

A study to help better manage and preserve the nation's water resources in a changing climate is now available in a report compiled by multiple government agencies. Water managers can use this report to support their efforts to provide water in communities and farms, generate power for cities, sustain ecological systems, and protect lives and homes from floods - all critical to the public health, safety, and quality of life.

The study represents the best available science to help water managers prepare for, adapt to, and mitigate the effects of climate change on the nation's water resources. The U.S. Geological Survey and the National Oceanic and Atmospheric Administration came together with the nation's principal water management agencies, the U.S. Army Corps of Engineers and the Bureau of Reclamation, to explore strategies to improve water management by suggesting processes to improve tracking, anticipation and response to climate change effects. The report, "Climate Change and Water Resources Management: A Federal Perspective," can be viewed online at: http://pubs.usgs.gov/circ/1331/.

Climate change affects the fundamental drivers of the hydrologic cycle and therefore unavoidably affects water. The effects of climate change differ from region to region and combine with factors such as population growth and changing land use. To ensure that water managers are prepared for the effects of climate change, they will need to assess regional climate change projections and adapt flexible management policies. Practicing an adaptive management approach would allow managers to make decisions sequentially over time, and may be especially useful to cope with the uncertainties of climate change. These approaches to water management would be most effective if combined with enhanced research and monitoring to improve understanding of the effects of climate change on a global and local scale.

SUSTAINABILITY PERFORMANCE OF WHOLE BUILDINGS

At the January 16, 2009 Forum meeting, Bobbie Lippiatt, Economist, National Institute of Standards and Technology (NIST), discussed the cost-effectiveness, carbon emissions, and carbon tax implications of energy efficiency measures in new commercial buildings.

Building energy efficiency has become a top priority due to the recent energy price spikes and increasing concern regarding climate change. New buildings are the easiest and least costly in which to increase energy efficiency, making new construction a good target for efficiency improvements. The NIST Building and Fire Research Laboratory is applying life-cycle cost analysis and environmental life-cycle assessment methods to extensive building cost databases, whole building energy simulations, and state-level emissions and utility rates to determine the relative cost-effectiveness, carbon emissions, and carbon tax implications of energy efficiency improvements in new commerical buildings. The analyses are being conducted within the NIST Building for Environmental and Economic Sustainability (BEES) analysis framework.

NIST is running whole building energy simulations for eight commercial building types and 16 U.S. cities located in different sub-climate zones. Two scenarios are run for each building type-location combination: a building design in compliance with 2007 energy codes (ASHRAE 90.1-2007) and a "Low Energy Design," which selectively increases the thermal efficience of insulation and windows, "right sizes" the HVAC system, and adds daylighting controls and overhangs for window shading. Over a 40-year study period, early results early results indicate the group of energy efficiency measures recommended for the Low Energy Designs are cost effective without carbon restrictions for nearly all locations in the United States. Ninety-eight percent of the 128 building type-location combinations studied have competitive Adjusted Internal Rates of Return of greater than 3% in real terms. Life-cycle costs, energy use, and carbon footprints are all reduced over the 40-year study period. The introduction of a $50 per metric ton carbon price increases the rate of return on energy efficiency investments across all locations and building types, substantially improving the business case for energy efficiency investments.

NIST is in the process of expanding the scope of this analysis to consider advanced HVAC systems, solar PV systems, additional financial incentives and alternative building types, designs, locations, and electricity pricing schemes. For more information, contact Bobbie Lippiatt at blippiatt@nist.gov.

ACADEMIA

ACUPPC ADOPTS VOLUNTARY CARBON OFFSET GUIDELINES

The American College & University Presidents' Climate Commitment (ACUPPC), which now includes over 600 colleges and universities in 50 states, has adopted a Voluntary Carbon Offset Protocol. The Protocol includes a set of guidelines that each will voluntarily apply to any investments in carbon offsets or participation in carbon markets they may undertake as part of their efforts to achieve greenhouse gas (GHG) neutrality, and that will provide guidance for making investmkents and reducing the risks associated with those investments. The guidelines are as follows:

1. Offset projects are real and emission reductions are additional: Projects result in actual reductions of GHG emissions and would not have otherwise occurred under a reasonable and realistic business-as-usual scenario.

2. Offset projects are transparent: Project details (including project type, location, developer, duration, standard emplyed, etc.) are known to the institution and communicated to stakeholders in a transparent way to help insure validity and further the goal of education on climate disruption and sustainability.

3. Emission reductions are measurable: Projects result in measurable reductions of GHG emissions.

4. Emission reductions are permanent: Projects result in permanent reductions of GHG emissions.

5. Emission reductions are verified: Projects result in reductions of GHG emissions that have been verified by an independent third party auditor.

6. Offset projects are synchronous: Projects result in reduction of GHG emissions that take place during a distinct period of time that is reasonably close to the period of time during which the GHG emissions that are being offset took place.

7. Offset projects account for leakage: Projects take into account any increases in direct or indirect GHG emissions that result from the project activity.

8. Credits are registered: Credits generated from project activities are registered with a well-regarded registry.

9. Credits are not double-counted: Credits generated from project activities are not double-counted or claimed by any other party.

10. Credits are retired: Credits are retired before they are claimed to offset an institution's annual greenhouse gas inventory, or a portion thereof.

For more information on ACUPPC and the Protocol, visit www.presidentsclimatecommitment.org.

INTERNATIONAL

FREQUENTLY ASKED QUESTIONS ON GLOBAL WARMING

Internationally, the Intergovernmental Panel on Climate Change (IPCC), under the auspices of the United Nations (UN) Meteorologicl Organization (WMO), and the United Nations Environment Program (UNEP), is the most senior and authoritative body providing scientific advice to global policy makers. They address issues such as the buildup of greenhouse gases, evidence, attribution and prediction of climate change, impacts of climate change, and policy options.

Listed below are a number of questions commonly addressed to climate scientists, and brief replies (based on IPCC reports and other research) in common understandable language. The list is periodically updated, as new scientific evidence comes to light.

1. Introduction
2. What is the greenhouse effect, and is it affecting our climate?
3. Are greenhouse gases increasing?
4. Is the climate warming?
5. Are El Ninos related to global warming?
6. Is the hydological cycle (evaporation and precipitation) changing?
7. Is the atmospheric/oceanic circulation changing?
8. Is the climate becoming more variable or extreme?
9. How important are these changes in a longer-term context?
10. Is the sea level rising?
11. Can the observed changes be explained by natural variability, including changes in solar output?
12. What about the future?
13. Further reading

To read the answers, visit www.ncdc.noaa.gov/oa/climate/globalwarming.

ENGINEERS AUSTRALIA'S SUSTAINABILITY CHARTER AND PORTAL

Engineers Australia's Sustainability Charter has the following objectives:

* Sustainable development requires balanced improvement across economic, social and environmental objectives in an integrated short term and long term decision making process.

* In circumstances where scientific information is incomplete, the precautionary principle and risk management practices should be used to ensure irreversible consequences are avoided and not passed on to future generations.

* Renewable resources should be utilized within the limits of natural regeneration and non-renewable resource use should be limited to levels which can be offset by substitution with renewable sources or other forms of capital.

* The release of hazardous or polluting substances to the environment should be limited by the capacity of the environment to assimilate them and in all instances such releases should be fully costed and attributed.

* A strong, diversified and internationally competitive economy provides the basis for Australian participation in the global movement towards sustainable development.

* Adjustment towards sustainability requires competitive neutrality in the Australian and international economies. Achieving competitive neutrality is already a major feature of Australian competition policy but has not been applied uniformly in all situations, resulting in unsustainable outcomes. A precondition for sustainable development is that such implied subsidies are removed.

* Policy, program and project solutions should be needs-based and not technologically driven, with appropriate consideration being given to demand management and administrative solutions.

* Planned risk managed, diversified, and proactive solutions, clearly articulated to all stakeholders, and to the community at large, are preferable to reactive solutions.

Engineers Australia has also developed a Sustainability Portal as a tool for engineers to access information on engineering sustainability. The information ranges from regulatory and standards, through to emerging think pieces on the subject. The information is organized by industry and, within that, by category.

For more information on the Sustainability Charter and Portal, visit www.engineersaustralia.org.

UPCOMING SUSTAINABILITY EVENTS

The **2009 Green Chemistry & Engineering Conference** will be held June 21-26 at the Marriott Inn and Conference Center in College Park, MD. For more information go to: http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_TRANSITIONMAIN&node_id=830&use_sec=false&sec_url_var=region1

EPA and the Institute for Sustainability announce the **First International Congress on Sustainability Science and Engineering, (ICOSSE Aug 09)**. The Congress will be held in Cincinnati Ohio, Aug. 9 to 13, 2009 and will address the multidisciplinary nature of industrial sustainability along the supply chain. The Congress is organized by AIChE's Institute for Sustainability, cosponsored by EPA, NSF, NIST, University of Kentucky, AIChE Sustainable Engineering Forum and is supported by ASME, ACS Green Chemistry Institute and IChemE. For additional information: www.aiche.org/IFS/Conferences/index.aspx

AIME and its 4 Member Societies, SPE, TMS, SME, and AIST[1], are hosting **The Role of the Engineers in Meeting 21st Century Societal Challenges**, Engineering Solutions for Sustainable Development: Materials and Resources - An International Workshop. It will be held on July 22nd-24th, 2009 at the Ecole Polytechnique Federale university in Lausanne, Switzerland. The American Society of Civil Engineers (ASCE) and American Institute of Chemical Engineers (AIChE) are co-sponsoring this event.

With impending and burgeoning societal issues affecting both developed and emerging nations such as India and China, the global engineering community has a responsibility and an opportunity to truly make a difference and contribute. This workshop will focus on what materials and resources are integral to meeting basic societal needs in critical areas such as: energy, transportation, housing, food and water, recycling and health, the engineering answers for cost effective and sustainable pathways, and the development of the strategies needed for enabling the effective utilization of engineering solutions and the global engineering community. Attendees will receive proceedings, a white paper/report with policy/study recommendations, and a resource reference book[2]. It will be an opportunity for engineering societies as well as global organizations with a stake in the world's future to share the collective perspectives on the engineering grand challenges that face our world today.

For detailed program, speaker, and logistical information, please visit www.spe.org/events/aime. Formal invitations have been mailed for the limited number of seats but if you have suggested participants, please contact AIME Associate Executive Director, Michele Gottwald at Gottwald@aimehq.org.

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