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AMERICAN SOCIETY FOR ENGINEERING EDUCATION (ASEE)
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS (AICHE)
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ENGINEERS FORUM ON SUSTAINABILITY

SUSTAINABILITY TAKING CENTER STAGE EVERYWHERE

It is gratifying to see how interest in and action on sustainability policy and practice is growing stronger each day, at local, state, national and international levels, and in government, academia, industry and the professions. The articles in this issue of the Forum Newsletter reflect this diversity of interest and the steps being taken to address the challenges of building a sustainable future.

In addition to summaries of the presentations at the January 19, 2007 Forum meeting, this issue continues the new practice of including special articles from time to time. We believe you will find many of the stories of interest, and we have included e-mail addresses for further information on each story wherever possible.

The next meeting of the Forum is scheduled for Friday, May 11, 2007, in the Lecture Room of the National Academy of Engineering in Washington, D.C. The Forum will meet from 9:00 a.m. to Noon, and the AAES International Activities Committee will meet in the same room from 1:00 p.m. to 4:00 p.m. Please mark your calendars now. Detailed agendas will be mailed out shortly. We look forward to seeing you on May 11.

Al Grant, Forum Chair

INSIDE THIS ISSUE

SPECIAL ARTICLES

Sustainability: the Ultimate Liberal Art

(Ed Note: Written by FRANK H. T .RHODES, president emeritus of Cornell University)

Ironic as it may now seem, the liberal arts of grammar, rhetoric, and logic were regarded by the ancient Greeks as practical and useful skills -so useful, in fact, that they were seen as the indispensable preparation for citizenship, for participation in a free society. And it was in Greece, the same Greece, that science was "invented." How doubly ironic, then, that in our science-driven age, we have so little place for the wisdom of Greece. It is not that we reject useful knowledge. We worship it, but we have redefined it to exclude those very elements that the Greeks judged of such significance. It is time that we reconsider our approach –for the benefit, and perhaps even survival, of our modem world. Our scholarly forebears of the Middle Ages enlarged, rather than ignored, the judgment of Greece, adding to the liberal arts the quadrivium of arithmetic, astronomy, geometry , and music, thus providing the essential educational preparation for the new age of discovery that marked the Renaissance. Even those most practical of people, the pioneers of the industrial and social revolutions of the 19th century, were careful not to reject, but to redefine, the essential content of the liberal arts -expanding them to embrace the new insights of the emerging natural and social sciences.

It is our generation that has seen the liberal arts confined largely to the liberal-arts colleges, both the smaller, traditional, independent undergraduate institutions and the colleges of liberal arts and sciences within universities. Outside those communities, the liberal arts have languished, not because they have been tested and found wanting ~ the evidence of centuries refutes that proposition -but because they have been nudged aside, elbowed out by more "practical" training and more "relevant" instruction. So our new leaders -engineers and architects, physicians and social workers, lawmakers and urban planners, business executives and economic policy makers -graduate untouched by the hard-won collective historical experience, social perspectives, moral considerations, and humane reflections of our fellow human beings through the ages. Unencumbered by such reflections, they are likely to confront each new emerging issue as something novel: a challenge now encountered by society for the first time.

Perhaps we need to learn from our forebears of the Renaissance and Industrial Revolution and reformulate the liberal arts in ways that will nurture the development of freethinking men and women for the current age. The concept of sustainability could provide a new foundation for the liberal arts and sciences.

By "sustainability" I mean the effort to frame social and economic policy so as to preserve with minimum disturbance earth's bounty -its resources, inhabitants, and environments -for the benefit of both present and future generations. The old Native American proverb captures perfectly the spirit of this sustainability: We do not inherit the earth from our ancestors; we borrow it from our children.

What might such a foundation entail? Certainly some significant exposure to the appropriate sciences: geology, natural resources, ecology, and climatology. Certainly, too, some understanding of social interaction, sociology, economics, and history. And

also, surely, some extensive familiarity with the great issues and themes of human inquiry, self- reflection, and moral consideration that have guided human conduct and reflected human creativity -with the arts and the humanities, in other words. And to anchor everything in the present, some review of the practical arts of technical discovery and invention, especially in relation to the broad issues now confronting us.

"That's not much different from the traditional grab bag of the liberal arts," the cynics might respond. But, in fact, it would be different in the new focus, added coherence, and stark immediacy that it would provide. Sustainability, after all, is the ultimate liberal art (and science). Mastery of such a sweeping range of topics is, to be sure, the work of a lifetime and more, but exposure to the issues and methodological approaches involved is not. It is, in fact, no more extensive in its reach or burdensome in its demands than the "old" liberal arts. How it should be framed, what it should contain, how it should be taught, and how it should be supplemented will be the questions that the governing faculty of each college and university should consider and decide for itself. There can and should be no single prescriptive approach. Experiment and variety will have much to teach us.

But we should agree on one matter: The broad range of questions that sustainability raises have no single set of answers. We have yet to develop solutions. The topic is full of approximations, assumptions, projections, extrapolations, and ambiguities. Moreover, we should avoid simple stances because, to a greater degree than most other subjects, sustainability is open to indoctrination and partisan scholarship. Although it may be possible, it is difficult to be a partisan advocate in, say, chemistry or classics. It is probably less difficult in climate change or energy policy. And beyond the complexities of sustainability as such, there lies the larger question of sustainability for what purpose. For sustainability will be best understood within the larger framework of values, meaning, and purpose -just as "solutions" are best considered within the context of the global society. That is why the wisdom that the traditional liberal arts provide is such a vital part of any such new curriculum.
Such a new approach to liberal arts, science, and sustainability will demand much of its students; it will demand even more of faculty members. But it will have one distinct potential benefit: If it is taught as an exercise in exploration and discovery, it may form the basis for a new kind of global map -a policy blueprint- that would allow us to set a common course for all the people of our rare, beautiful, and benevolent planet.

Making Peace with the Earth
(Ed. Note: This Special Article was written by Kochiro Matsuura, Director General of UNESCO)

We know now that our civilization, our species and even our planet may not be immortal. This is not the first ecological crisis that humanity has lived through, to be sure; but there can be no doubt it is the first that is so wide indeed, worldwide in scope.

What are we doing to safeguard the future of the earth and its biosphere? What are the challenges to be met? What solutions can we offer? These were the questions under discussion in the latest session of our 21st Century Dialogues organized by Jarme Bind at UNESCO headquarters on the theme "What future for the human species? What prospects for the planet?" with contributions from some 15 leading experts.

First and foremost, climate change and global warming: by the end of the century, this

planet could be hotter by an amount between 1.5C and 5.8C. Such a warming of the climate threatens many parts of the world, and is liable to provoke further disasters, from the proliferation of tropical storms to the drowning of whole island states or coastal regions.

Next comes desertification, already affecting a third of the world's land. At the end of the 20th century, almost one billion people in 110 countries were threatened by encroaching deserts: the figure might well double by 2050, when two billion could be affected.

Deforestation is continuing, too, though primary and tropical forests are home to the greater part of the world's biodiversity, and we know they help to combat climate change as well as slowing soil erosion.

The whole biosphere is threatened by pollution: pollution of air and water, oceans and soils, chemical pollution and invisible pollution. In Asia alone, the World Bank estimates the cost in human life of atmospheric pollution at 1.56 million deaths a year.

There is a world water crisis that cannot be ignored. Two billion people will face water shortages in 2025 three billion, in all likelihood, by 2050.

Lastly, biodiversity is endangered: species are becoming extinct a hundred times faster than the mean natural rate, and 50 per cent of all species could be gone by 2100. Yet biodiversity is essential to the cycle of life, to human health and to the security of our food supply.

This situation brings a serious risk of war and other conflicts, and demands a global response. Sustainable development concerns us all: it is a necessary condition for any effective fight against poverty, not least because it is the poorest who will suffer the worst of the droughts and other natural disasters to come.

Today, though, we understand that our war on nature is a world war. That is the meaning of the Stern Report on the economic consequences of climate change. If we do not take immediate action to combat global warming, we can expect to forgo between 5 per cent and 20 per cent of world GDP. Who says sustainable development costs too much?

"Business as usual" is what threatens to ruin us! Javier Prez de Cullar began our 21st Century Dialogues with a clear warning: "How can we know, yet be unable or unwilling to act?”

There are difficult questions that we have to answer now, with courage and lucidity. It can no longer be argued that "sustainability" and "development" are conflicting goals, or that tackling poverty is incompatible with conserving ecosystems. We are going to have to fight on every front at once.

We shall also have to invent new and far more wisely restrained modes of growth and consumption. As Haroldo Mattos de Lemos emphasised in the 21st Century Dialogues, "we humans are no longer living off nature's interest, but off its capital".

The idea is not, of course, to stop growth entirely, but, as Mostafa Tolba suggested, to bring about the quickest possible shift in its nature towards less material forms of wealth,

reducing our consumption of raw materials in every area of production. There must also be far greater awareness of the devastating potential of global warming; and that awareness must result in compliance with the measures laid down in the Kyoto Protocol.

It would also be useful to promote a right to clean drinking water, laying a proper foundation for the ethical governance of water so that it becomes possible both to control demand and to manage it better, as well as improving water quality through careful use, proper treatment and recycling.

UNESCO is actively engaged on many fronts in promoting sustainable water policies, fostering education in this area and encouraging the global protection of biodiversity not least through its worldwide network of "biosphere reserves". They have truly become experimental laboratories for ecosystem conservation and the rational use of natural resources at local level.

I have also in mind UNESCO's many operations in the South to help with the training of experts and managers; for there is a cruel lack of trained professionals and educated policymakers properly aware of the links between water, poverty, health, culture and development. Cultural aspects and education are often neglected in environmental thinking and policy: yet education and culture are two essential factors in any sustainable development.

As part of the current reform of the United Nations system, a wide-ranging debate has now begun concerning the governance of the environment at a worldwide level and the need for better coordination of everybody's efforts. I, too, am convinced that our environmental activities within the UN system are too fragmented, and often suffer as a result; this must be put right. In our efforts to improve coordination, however, we must be sure to build on the mechanisms that already exist and are working well.

UNESCO is actively engaged in this debate, where our role is dictated by our mandate: the E for Education, the S for Science and the C for Culture and Communication. Here I should recall that UNESCO conducts four major international scientific programmes on the environment one on Oceans, one on Water, one on Man and the Biosphere and one on Geoscience in full cooperation with the UN and with the United Nations Environment Programme. The success of UN-Water (composed of 24 institutions and organizations belonging to the UN system, one of which is UNESCO) gives a good example of fruitful cooperation. UNESCO also acts as lead organization for the World Water Assessment Programme, and for the UN Decade of Education for Sustainable Development.

The call for us, today, to put an end to the War on Nature is a call for an unprecedented solidarity with future generations. Perhaps, in order to achieve this, humanity needs to make a new pact, a "Natural Contract" of co-development with the planet, and an armistice with nature?

We need the wisdom to champion an ethic of the future, for such an ethic must prevail if we are to make peace with the earth. This planet is our mirror image: if it is wounded, then we are wounded; if it is mutilated, human kind is mutilated as well. To change direction, we have to create knowledge societies that can combine tackling poverty with investing in education, research and innovation; in doing so, we lay the foundations of a true ethic of responsibility.

GOVERNMENT

New Executive Order Promotes Sustainable Environmental Stewardship

On January 24, 2007, President Bush signed Executive Order (E.O.) 13423, “Strengthening Federal Environmental, Energy, and Transportation Management." The new E.O. directs Federal agencies to implement sustainable practices for:

* Energy efficiency, greenhouse gas emissions, and petroleum use reductions
* Renewable energy
* Acquisition of recycled content, energy efficient, biobased, and environmentally preferable products and services
* Pollution prevention and recycling
* Reduction or elimination of toxics and hazardous chemicals
* High performance buildings
* Vehicle fleet management
* Electronics stewardship
* Water conservation

The E.O. establishes new goals for each sustainable practice that are at least as stringent, and in most cases go beyond, prior E.O. goals and statutory requirements. The new E.O. also recognizes the successful use of environmental management systems (EMS) in organizations around the world, including the Federal government, and requires more widespread use of EMS as the management framework to implement, manage, measure, and continually improve upon, the order's sustainable practices.

The order consolidates five prior E.O.s and integrates the sustainable practices of those orders into a more cohesive approach to environment and energy management. It also adopts two memorandums of understanding - one on high performance buildings and another on electronics stewardship.

From a management perspective, the order clarifies and expands the role and responsibilities of the White House Council on Environmental Quality, the Office of the Federal Environmental Executive, the Office of Management and Budget (OMB), and the Federal Agencies. Existing and new working groups will develop the tools and guidance needed to implement the sustainable practices. Progress will be measured and reported through the report to the President and the OMB scorecard process. Primary detailed instructions will be issued shortly to help the agencies with implementation.

For more information, visit www.ofee.gov/whats/eo_13423

FFC Energy Forum Held

On February 15, 2007, The Federal Facilities Council (FFC) held an Energy Forum on Achieving Efficiency, Sustainability, and Maintainability. The FFC is a cooperative association of 25 federal agencies with interests and responsibilities related to all aspects of facility design, acquisition, management, maintenance, and evaluation.

Through its affiliation with the National Academies and the National Research Council, the FFC provides a unique forum for federal agency staff to work with their counterparts in other agencies to identify and resolve facilities-related issues of mutual concern. FFC sponsorship also provides access to the full range of resources of the National Academies, outside expertise through guest speakers and symposia, and private sector experience and expertise through industry and professional society liaisons.

The keynote speaker at the Energy Forum was Charles R. Zimmerman, Vice-President, Prototype and New Format Development, Wal-Mart Stores, Inc. Cyrus H. Nasseri, Standards Manager, Department of Energy, provided a presentation on the Energy Policy Act of 2005, with emphasis on those sections related to Federal building energy efficiency. Best Practices - Real-life O&M Experiences Affecting Energy Conservation, were presented by representatives of the Department of Agriculture, GSA , NASA, and Washington Headquarters Services.

All of the presentations are available and can be downloaded, by visiting www7.nationalacademies.org/ffc/energy_forum_agenda.

ACADEMIA

Center for Sustainable Engineering Established

Carnegie Mellon University, the University of Texas at Austin, and Arizona State University established the Center for Sustainable Engineering in 2005, supported by the National Science Foundation and the Environmental Protection Agency. The goal of the Center is to develop and implement activities to enhance education in Sustainable Engineering at colleges and universities around the world. A number of activities are planned:

* Workshops (2 days each) have been organized to assist faculty who wish to add Sustainable Engineering to their courses. The workshops also help these faculties improve their teaching, evaluate their courses, obtain funding for educational innovations, and become part of a growing network of educators in Sustainable Engineering.

* A website is being established with peer-reviewed educational materials on Sustainable Engineering. The site will be set up in cooperation with a professional society.

* An assessment of Sustainable Engineering programs and courses around the U.S. is being conducted to benchmark the status of education in this emerging discipline. Measures of quality in these programs will be explored and used to initiate an award program for excellence in Sustainable Engineering Education. The Center will collect information on courses and curricula, sustainability centers and institutes, conferences related to sustainability, and other activities related to Sustainable Engineering. To the extent possible, all 1500 accredited engineering programs and departments in the U.S. will be assessed. Detailed information about the content of courses will be obtained, such as the key concepts, types of educational activities, and written materials. In addition, a number of practicing engineers in the U.S. will be contacted to help identify

the sustainable engineering skills needed by graduates as they begin to practice their profession. Based on all the information collected, the Center will develop a roadmap for achieving excellence in Sustainable Engineering education, and will summarize the data and the roadmap in journal articles and on the Center website.

The Principal Investigators for the Center are Cliff Davidson, Carnegie Mellon University, Braden Allenby, Arizona State University, and David Allen, University of Texas-Austin.

For more information, visit www.csengin.org

PROFESSIONAL ORGANIZATIONS

ASME and AIChE Conducting Virtual Symposia on Sustainability

ASME and AIChE are sponsoring a series of new, virtual symposia on sustainability beginning on March 15th. The five, 90-minute Webinars are designed for engineers and others tasked with implementing sustainable engineering in their companies. Leading experts in sustainable engineering will present case studies on five timely topics:
§ Shaping Your Sustainability Strategy and Moving to Action (March 15th)
§ Tools for Measuring Sustainability Performance (March 22nd)
§ Sustainability Tools: Applying Life Cycle Assessment (March 29th)
§ The Business Case for a Sustainable Enterprise (April 5th)
§ Designing to Meet Sustainability Objectives (April 12th)

Each session will air from 1:00 PM to 2:30 PM Eastern Time. Companies may register for one Webinar or for the entire series. Registration and pricing information, as well as a detailed description of each session, are available at http://www.asme.org/Education/Courses/Webinars/NEWVirtual_Symposia.cfm.

IEEE Launches Streaming Video Service

IEEE has launched a streaming video service called "IEEE.TV" to serve its members and to reach out to the general public. Many of the member-related programs build on IEEE conferences on topics such as electronic ships, RFID, and biotechnology.

The public access portion of IEEE.TV currently focuses on programs related to sustainability and green engineering. Recently, IEEE.TV released two programs on e-waste, as well as a program on wind power. Additional programs are close to completion, including segments on remote sensing and GEOSS, green engineering, and WEEE/RoHS e-waste directives, and corporate social responsibility.

To gain access to IEEE.TV it is necessary to register for an IEEE web account through the IEEE Home Page, www.ieee.org. This web account (username/password) permits entry to the IEEE.TV web site: www.ieee.org/ieeetv. In addition to outreach via its web site, the IEEE is working with commercial television producers to develop a broadcast series, called

"The Grid," that seeks to promote the public understanding of technology and related public policy issues. The emphasis of this series will be on power and energy, and sustainability.

ASCE/CEFI Addresses Innovation and Sustainability Issues

The ASCE Civil Engineering Forum for Innovation (CEFI) conducted an Executive Series Conference on The Challenges of Change: Applying Innovation and Knowledge to Solve the Nation's Infrastructure Problems. The Conference was held at the U.S. Chamber of Commerce, January 30-31, 2007. The featured speaker was John H. Sununu, former Governor of New Hampshire. The Program covered 1) The Role of Innovation in Achieving Sustainability, 2) Solving the Nation's Infrastructure Challenges - Resilience and Durability through Application of New Knowledge and Innovation, and 3) Risk Management through Life-Cycle - Applying Technology & Decision-making Tools for Improved Solutions.

The Conference focused on the rapidly growing requirements for building sustainability into engineering designs, and on the issues associated with improving project delivery; including planning, teamwork amongst contractors, integrated tools, enlightened owners, and reward/penalty systems. Education and preparation of engineers to address the challenges of innovation and sustainability and maintain engineering integrity was also discussed.

ASCE established the Civil Engineering Forum for Innovation in January, 2006 to strengthen the profession and industry through technical innovation and public policy. CEFI engages senior leaders in industry, academia and government. The CEFI Vision is "Promoting innovation to create a better quality of life in the engineered and natural environment." Its Mission is “Strengthening engineering and construction industry productivity and performance, and promoting the rapid application of project innovation, collaboration, and advances in technology."

For more information on CEFI, visit http://content.asce.org/cefi/HomePage.html

AAAS Board Releases New Statement on Climate Change

The following statement on global climates change was released during the annual meeting of the American Association for the Advancement of Science (AAAS) in San Francisco.

"The scientific evidence is clear: global climate change caused by human activity is occurring now, and it is a growing threat to society. Accumulating data from across the globe reveals a wide array of effects: rapidly melting glaciers, destabilization of major ice sheets, increases in extreme weather, rising sea level, shifts in species ranges, and more. The pace of change and the evidence of harm have increased markedly over the last five years. The time to control greenhouse gas emissions is now.

The atmospheric concentration of carbon dioxide, a critical greenhouse gas, is higher than it has been for at least 650,000 years. The average temperature of the Earth is heading for levels not experienced for millions of years. Scientific predictions of the

impacts of increasing atmospheric concentrations of greenhouse gases from fossil fuels and deforestation match observed changes. As expected, intensification of droughts, heat waves, floods, wildfires, and severe storms is occurring, with a mounting toll on vulnerable ecosystems and societies. These events are early warning signs of even more devastating damage to come, some of which will be irreversible.

Delaying action to address climate change will increase the environmental and societal consequences as well as the costs. The longer we wait to tackle climate change, the harder and more expensive the task will be.

History provides many examples of society confronting grave threats by mobilizing knowledge and promoting innovation. We need an aggressive research, development and deployment effort to transform the existing and future energy systems of the world away from technologies that increase greenhouse gases. Developing clean energy technologies will provide economic opportunities and ensure future energy supplies.

In addition to rapidly reducing greenhouse gas emissions, it is essential that we develop strategies to adapt to ongoing changes and make communities more resilient to future changes.

The growing torrent of information presents a clear message: we are already experiencing global climate change. It is time to muster the political will for concerted action. Stronger leadership at all levels is needed. The time is now. We owe this to future generations.

The conclusions in this statement reflect the scientific consensus represented by, for example, the Intergovermental Panel on Climate Change, and the joint National Academies Statement."

For more information, see the AAAS Global Climate-Change Resources page, www.aaas.org

INTERNATIONAL

U.N. Reports on Confronting Climate Change

The United Nations Department of Economic and Social Affairs (DESA), in its role as Secretariat to the United Nations Commission on Sustainable Development (CSD), invited Sigma XI, the Scientific Research Society, to convene an international panel of scientific experts to prepare a report outlining the best measures for mitigating and adapting to global warming, for submission to the CSD.

To carry out the task, the Scientific Expert Group (SEG) was formed and is comprised of 18 distinguished international scientists. The panel was asked to consider innovative approaches for mitigating and/or adapting to projected climate changes, and to anticipate the relationship of response measures to sustainable development.

Highlights of the resulting report, "Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable" include"

*To avoid entering a regime of sharply rising danger of intolerable impacts on humans, policy makers should limit temperature increases from global warming to 2-2.5 degrees centigrade above the 1750 pre-industrial level. It is still possible to avoid unmanageable changes in the future, but time for action is now.

*The technology exists to seize significant opportunities around the globe to reduce emissions and provide other economic, environmental and social benefits, including meeting the United Nations' Millennium Development Goals. To do so, policy makers must immediately act to reduce emissions by: 1) improving efficiency in the transportation sector through measures such as vehicle efficiency standards, fuel taxes, and registration fees/rebates that favor purchase of efficient and alternative fuel vehicles; 2) improving design and efficiency of commercial and residential buildings through building codes, standards for equipment and appliances, incentives for property developers and landlords to build and manage properties efficiently, and financing for energy-efficient investments; 3) expanding the use of biofuels through energy portfolio standards and incentives to growers and consumers, and 4) beginning immediately, designing and deploying only coal-fired power plants that will be capable of cost-effective and environmentally sound retrofits for capture and sequestration of their carbon emissions.

The report also calls for Societies to do more to adapt to the already unavoidable impacts of climate change, and for the international community, through the UN and related multilateral institutions, to work together to advance action in managing the unavoidable and avoiding the unmanageable.

The executive summary and the full report are available and can be downloaded by visiting www.unfoundation.org/SEG/

CAETS Adopts Statement on Energy Role of Hydrogen

CAETS is the International Council of Academies of Engineering and Technological Sciences, Inc. There are 24 academy members worldwide, including the U.S. National Academy of Engineering. The CAETS statement, The Role of Hydrogen in our Energy Future, was published in 2006, and concludes and recommends urgent attention to a number of issues, including the following:

Our governments should develop energy policies based on comprehensive long-term strategies, which include all major potential sources of energy. Any long-term energy policy should increase the supply of renewable energy and explore the potential of hydrogen as an energy carrier.

At the present time, the transport sector seems to be the most promising candidate for the first large-scale application of hydrogen. R & D to facilitate breakthroughs in fuel cell costs, fuel cell durability, and on-board hydrogen storage systems should be given high priority.

In the short term, natural gas conversion (reforming) will remain the primary source for hydrogen production. Small-scale natural gas reforming will be an important source for hydrogen during the transition to a full-scale hydrogen economy. Hydrogen from industry by-products (i.e. coke-oven gas and from the chlorine alkali industry) could be collected and purified to supply part of the hydrogen.

Coal will remain an important source of energy for decades. More R & D is needed on carbon dioxide capture and storage, which will benefit both electricity generation and hydrogen production from coal.

If new high-temperature nuclear reactors are developed, research on hydrogen generation from nuclear heat should be promoted.

Wind energy-to-hydrogen and biomass-to-hydrogen are recognized as important potential technologies for hydrogen production. Exploratory and fundamental research on photo-biological and photo-electrochemical processes should not be neglected.

Demonstration projects should be started in the various fields of hydrogen production, storage, transport and utilization. Information and campaigns on hydrogen must address public safety concerns in addition to the advantages that hydrogen use could bring to society in the long term.

International cooperation is essential to provide guidance and support on key technical challenges and to push for hydrogen end use projects (e.g., vehicle using hydrogen as an energy source).

For more information, visit www.caets.org

OTHER DEVELOPMENTS

Winner of NAE Grainger Prize for Sustainability Announced

The National Academy of Engineering (NAE) has announced the winners of the 2007 Grainger Challenge Prize for Sustainability. The contest sought innovative solutions for removing arsenic from drinking water that is slowing poisoning tens of millions of people in developing countries. Three prizes were awarded from a field of more than 70 entries.

The prize winners were recognized for the development, in-field verification, and dissemination of effective techniques for reducing arsenic levels in water. The systems had to be affordable, reliable, easy to maintain, socially acceptable, and environmentally friendly. All of the winning systems meet or exceed the local government guidelines for arsenic removal and require no electricity.

Abul Hussam, an associate professor in the department of chemistry and biochemistry at George Mason University, Fairfax, Va., received the Grainger Challenge Gold Award of $1 million for his SONO filter, a household water treatment system.

Arup K. SenGupta, John E. Greenleaf, Lee M. Blaney, Owen E. Boyd, Arun K. Deb, and the nonprofit organization Water For People, shared the Grainger Challenge Silver Award of $200,000 for their community water treatment system.

The Children's Safe Drinking Water Program at Proctor & Gamble Co, (P&G), Cincinnati, received the Grainger Challenge Bronze Award of $100,000 for the PUR Purifier of Water coagulation and flocculation water treatment system.

The primary purpose of the Grainger Prize is to accelerate the development and dissemination of technologies that enhance social and environmental sustainability for the benefit of current and future generations. The prize stimulates innovation, initiative, and marketing of good ideas.

The goal of this particular challenge was chosen with the assistance of an advisory panel expert in the areas of sustainable development. The selection of the recipients was made by a committee of Academy members with expertise in water chemistry, manufacturing, environmental engineering, and public health. Charles R. O'Melia and Abel Wolman chaired the selection committee.

The Granger Challenge Prize for Sustainability is made possible through the generous support of the Grainger Foundation. The prize was administered and managed by the National Academy of Engineering.

For more information about the Grainger Challenge Prize and the award-winning projects, visit www.nae.org

The Economics of Building Green Discussed

At the January 19, 2007 Forum meeting, Mary Tod Winchester, VP Administration @ Operations, Chesapeake Bay Foundation, reviewed the high performance features of The Philip Merrill Environmental Center, which received the highest rating (platinum) from the U.S. Green Building Council, and houses the Chesapeake Bay Foundation. A number of these features were described and illustrated.

Healthy Design - Building occupants use operable windows for natural ventilation. Sensors keep track of outdoor temperatures and humidity and automatically shut down air conditioning and open motor-operated windows. Sensors also switch on indicator signs throughout the building when conditions favor open windows.

Water - Composting toilets reduce water use in the building. A rainwater catchment system captures water, also reducing the need to draw from wells. Storm water passes through a bioretention storm water treatment system in the form of manmade wetlands to filter water and treat oils before the water enters the bay. Drought-tolerant native plants minimize irrigation, and mowing meadow and grasslands only once a year reduces fuel use and pollution on site.

A "Less is More" Interior - On the interior, unfinished pressed wood fiberboard and the lack of finishes and fixtures reduces resource use and indoor air pollutants. Natural

renewable materials were chosen, such as cork flooring, bamboo flooring, and natural linoleum, eliminating the use of virgin materials and petroleum-based materials. The building beams are parallel strand lumber constructed from waste lumber strips.

Recycled Materials - Recycled materials in the building include galvanized steel siding, galvanized roofing, and medium density fiberboard. The sun louvers are made from salvaged pickle barrel staves. Reused broken concrete from the previous structure covers the road beds. A majority of materials used for construction were produced within 300 miles of the construction site.

Energy - Structurally insulated panels (SIPs) form the building envelope, using less wood than conventional framing and resulting in a higher R-value. Renewable energy sources provide approximately 30% of the building's energy load. Solar hot water heating provides all the domestic hot water for the building, saving approximately 120 kilowatt-hours (kWh) of electricity per day. The Center uses a ground source heat pump system for heating and cooling. Forty-eight wells, each 300 feet deep, use the earth's constant temperature as a heat sink in the summer and a heat source in the winter. A desiccant dehumidifier and a heat recovery wheel on the heat pump's ventilation system also save energy. A glazed wall of windows on the south contributes daylight and passive solar heating. Light sensors automatically dim lights when daylight is strong.

For more information, visit www.savethebay.cbf.org.

Forum Briefed on Fuel Cell Developments

Bob Rose, Executive Director, U.S. Fuel Cell Council, briefed the attendees at the January 19, 2007 Forum meeting. The Council is the trade association for the fuel cell industry and supports commercialization for all applications.

A fuel cell was briefly described as an electrochemical device that utilizes a fuel containing hydrogen and an oxidant, usually oxygen from the air, to produce electricity without combustion. A number of benefits of fuel cells were identified.

Energy Security - Because they are efficient, modular and fuel flexible, fuel cells can enable a transition to a secure, renewable energy future, based on the use of hydrogen or hydrogen rich liquid fuels.

High Efficiency - Because they make energy electrochemically and do not burn a fuel, fuel cells are fundamentally more efficient than combustion systems.

Environmental Benefits - Stationary fuel cells offer excellent environmental performance compared to power generation technologies that rely on combustion. Fuel cell vehicles are the least polluting of all vehicles that consume fuel directly.

Operating Flexibility - Stationary fuel cell systems can ease the strain on the existing power grid, and reduce inefficiencies due to transmission losses.

Portable (Micro) Power - Portable (micro) fuel cell technologies are an excellent source of power for emergency First Responders and for recreational uses where access to the electric grid is not available.

In terms of current status and development, fuel cells are commercially available today in some markets, such as telecommunications and backup power systems, but in most cases these early products require government incentives to make them affordable. Full commercialization on an accelerated timetable will require collaboration between government and private industry, including a substantial public investment in research and development, demonstration and pilot programs, early commercial purchases, incentives for early adopters, and removal of market barriers.

The U.S. government has been a major force in the development of fuel cells. NASA's space program was the initial commercial use of fuel cells. Many other federal agencies have funded initiatives consistent with their mission, including the Departments of Defense, Commerce, Transportation, Energy, and the Environmental Protection Agency.

The Energy Policy Act of 2005 includes significant provisions for fuel cells and supporting infrastructure. Nearly every U.S. State has at least some incentives or policies favoring fuel cells and hydrogen.

For more information, visit www.usfcc.com

Upcoming Sustainability Events

The EPA P3 Award Program and National Sustainable Design Expo will be held on April 24-25 on the National Mall in Washington, D.C. For more information, visit htpp://es.epa.gov/ncer/p3?

Time to Register for the AIChE Spring Meeting, April 22 to 25. Sustainability Sessions include Biofuels, Practical Approaches to Sustainable Development. Featured Speakers include Dan Arvizu, Director, US DOE National Renewable Energy Lab, Karen Kostner, VP Cytec, Inc. Visit: http://www.aiche.org/Conferences/SpringMeeting/Index.aspx

The Center for Sustainable Engineering has scheduled two workshops at the University of Texas for faculty members who wish to include lecture materials and assignments on sustainability in their classes. They are scheduled on July 15-17 and July 18-20, 2007. For more information, visit http://www.csengin.org/workshops.htm

The Mascaro Sustainability Initiative-University of Pittsburgh will host “Engineering Sustainability 2007: Innovations that Span Boundaries”, April 15-18, 2007. Register at Htt;://www.eswp.com/MSI2007.htm.

Plan to attend the Green Chemistry and Engineering Conference, June 25-28, 2007 in Washington, DC. www.acs.org for additional information.

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