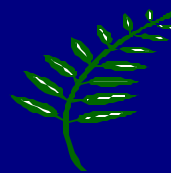


Engineers Forum on Sustainability



DECEMBER 2002

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A SPECIAL FORUM NEWSLETTER EDITION

This issue of the Forum Newsletter is special in several ways. First, we have a new format for the Newsletter which I hope you will find more readable and interesting. Second, the American Institute of Chemical Engineers (AIChE) has joined us as a co-sponsor of the Engineers Forum on Sustainability, and brings to us a strong commitment to promoting

sustainable engineering practice through its own programs and projects, and its contributions to the Forum and the Newsletter.

Third, this issue puts a special focus on the findings of a groundbreaking meeting convened by the representatives of the U.S. engineering community on November 1, 2002, which addressed the topic "Sustainable Development: The Role of the

American Engineering Community." Included are summaries of several of the major presentations made at the November 1 meeting. In addition, a press release on this meeting, and the follow-up activities and next steps planned, is included with this Newsletter.

Best wishes for a happy and a sustainable New Year!
— Al Grant, Forum Chair

Highlights of Commitments & Initiatives: Johannesburg 2002

The following is a list of agreements reached and initiatives announced during the Johannesburg Summit. This list is not exhaustive, but reflects highlights of the Summit process. The commitments shown are those agreed in the Implementation Plan adopted by Governments at the close of the Summit.

Water & Sanitation

Commitment to halve the proportion of people without access to sanitation by 2015; this matches the goal of halving the proportion of people without access to safe drinking water by 2015.

Initiatives

The U.S. announced \$970 million in investments over the next three years on water and sanitation projects.

The European Union announced the "Water for Life" initiative to engage partners to meet water and sanitation goals in Africa and Central Asia. The Asia Development Bank provided a \$5 million grant to UN Habitat and \$500 million to fast-track credit for the Water for Asian Cities Program.

The UN received 21 additional water and sanitation initiatives with at least \$20 million in extra resources.

Energy

Commitments

Increase access to modern energy services, increase energy efficiency and increase the use of renewable energy.

Phase out, where appropriate, energy subsidies.

Support the NEPAD objective of

ensuring access to energy for at least 35% of the African population in 20 years.

Initiatives

The nine major electricity companies of the E7 signed a range of agreements with the UN to facilitate technical cooperation for sustainable energy projects in developing countries.

The European Union announced a \$700 million partnership initiative on energy and the U.S. announced an investment of up to \$43 million in 2003.

The South African energy utility, Eskom, announced a partnership to extend modern energy services to neighboring countries.

The UN received 32 partnership submissions for energy projects with at

Johannesburg Summit 2002 continued

least \$26 million in resources.

Health

Commitments

By 2020, chemicals should be used and produced in ways that do not harm human health and the environment.

Enhance cooperation to reduce air pollution.

Improve developing countries' access to environmentally sound alternatives to ozone depleting chemicals by 2010.

Initiatives

United States announced a commitment to spend \$2.3 billion through 2003 on health, some of which was earmarked earlier for the Global Fund.

The UN has received 16 partnership submissions for health projects with \$3 million in resources.

Agriculture

Commitments

The GEF to consider inclusion of the Convention to Combat Desertification as a focal area for funding.

In Africa, development of food security strategies by 2005.

Initiatives

The U.S. will invest \$90 million in 2003 for sustainable agriculture programs.

The UN received 17 partnership submissions with at least \$2 million in additional resources.

Biodiversity and Ecosystem Management

Commitments

Reduce biodiversity lost by 2010.

Reverse the current trend in natural resource degradation.

Restore fisheries to their maximum sustainable yields by 2015.

Establish a representative network of marine protected areas by 2012.

Improve developing countries' access to environmentally-sound alternatives to ozone depleting chemical by 2010.

Undertake initiatives by 2004 to implement the Global Programme of Action for the Protection of the Marine Environment from Land Based Sources of Pollution.

Initiatives

The UN received 32 partnership initiatives with \$100 million in resources.

The U.S. announced \$53 million for forests in 2002-2005.

Cross-Cutting Issues

Commitments

Recognition that opening up access to markets is a key to development for many countries.

Support to phase out all forms of export subsidies.

Establish a 10-year framework of programmes of sustainable consumption and production.

Actively promote corporate responsibility and accountability.

Develop and strengthen a range of activities to improve natural disaster preparedness and response.

Initiatives

Agreement to the replenishment of the Global Environment Facility, with a total of \$3 billion (\$2.92 billion announced pre-Summit and \$80 million added by EU in Johannesburg).

Engineers for Sustainability - The View From C Street

(Ed. Note: We are pleased to include in this issue of the Forum, the full remarks of Dr. Norman P. Neuriter, Science and Technology Adviser to the Secretary of State, at the November 1, 2002 meeting on "Sustainable Development: The Role of the American Engineering Community.")

Good morning. It is always a pleasure and an honor to appear before an assembly of your distinguished engineering associations and the National Academy of Engineering. One might argue that convening here in the halls of

NSF you have offered me the best of both worlds – science and engineering, and science and technology.

It is just over two years ago that, much to the chagrin of my wife, I came out of retirement from Texas Instruments and took this job with the State Department. I did so because I believe so passionately in the role of science and engineering as an essential element in the formation and the execution of U.S. foreign policy. That was the theme that was developed so thoroughly in the

excellent National Research Council report of 1999. It was in fact that report, "Science, Technology, and Health and Foreign Policy", which led to the creation of my present position.

Even before I showed up for work in September 2000, Jack Gibbons had signed me up to give a talk at an NAE meeting on global systems engineering. I called the talk—"It's the World, Stupid".

I did so out of a kind of frustration that no one in the election campaign of

Engineers for Sustainability - The View From C Street continued

2000 had been able— not even in the Jim Lehrer debates – to get a discussion going about the challenges of global leadership, – which clearly was the mantle that, for better or worse, like it or not, had landed squarely on America’s shoulders.

What a difference in two short years! Look at the front page of your newspaper – everyday, there is something about global war against terrorism; a critical debate in the UN Security Council the outcome of which might determine whether the US goes to war; nuclear weapons in Korea; Russians dying at the hands of terrorists or their rescuers in Moscow; Americans killed in Pakistan and in Jordan, Australians killed in Bali; and many of us have not recovered from the horror of 9/11.

Now we are talking about vaccinating all Americans against a bioterrorist attack of smallpox and are fortifying our borders against unwanted foreign students and workers. In fact, we are in danger of building walls around our science community, and we are raising a new generation of Americans to expect that some will die from weapons of mass destruction in the hands of Islamic fanatics. Yes, things have really changed in the last two years.

My point is that, *it is about the world*, but it is a world not just of politics and terrorism. It’s weather, atmosphere, oceans, global warming, energy resources, air travel, the Internet, communications, wealth and poverty, business markets, the environment, forests, infectious disease, food, agriculture, medicine, investment, money and so on. These are all parts of a single, very complex, interdependent world, a world that is crying out for a path to sustainable development.

My father, who seems in retrospect to become wiser and wiser as I get older and older -- once said to me that America’s debates are always about local issues – but those things which have the greater impact on America, have always

originated abroad. And that seems even truer today.

Now, I came here not as a prophet of doom – though I might sound like one – but as a cheerleader. I came here to be a cheerleader for what you folks have set about to do – to harness the genius and the art of the engineering world in the cause of global sustainability.

The NRC came out with another report in 1999, a seminal document called “Our Common Journey – A Transition Toward Sustainability,”– and all of the National Academies are engaged in a series of related follow-on initiatives. Today’s conference is one of those initiatives. Your impressive draft prospectus for today’s meeting has as its objective “to develop a sustainability program – both domestic and international – which the American engineering program can fully embrace”.

We at the Dept. of State commend you for setting that goal and for being willing to set out on the complex road to get there. Engineers may be the only ones who can actually make it happen.

I am always amazed at what engineers can do. One week ago today, right at this time, I was in a helicopter about 130 miles south of New Orleans landing on an offshore deepwater drilling and production platform – the Chevron Texaco Genesis Spar. To see, and even more, to feel this huge 1.5- billion dollar floating structure tethered to the bottom –housing 140 people, producing and processing up to 55,000 barrels of oil per day and some 70 million cubic feet of gas – and feeding it directly into pipelines – gas that will be burned in New York three days later – well, you have to be impressed. It is an engineering marvel. And by the way, that platform had just withstood 135-mph winds and 55-foot waves a week before as a late fall hurricane tore through the Gulf.

Today there is drilling in nearly 8000 feet of water in the Gulf with up to 20 wells drilled in many directions from a single platform. Some of those wells

may have a stem 30,000 feet long— nearly 6 miles. There are saturation divers working 360 feet down who live entirely in pressurized compartments for 28 days, including 3 ½ days to depressurize before coming out to enjoy a month off. Wells are completed and pipelines hooked up entirely by remotely operated vehicles-- thousands of feet below the surface.

When you see all of this technology in action, you began to realize that engineers could do anything that they put their minds to.

I commend you for what you are tackling today. And I know you realize you have to do it on a global basis.

From your briefing and background material, you already know most of the story of the 1992 Rio conference that began to set the policy framework for sustainability – and about the long lead-in to the World Summit on Sustainable Development (WSSD) in Johannesburg that was a global process focused on implementation.

We at State did not see Johannesburg as a single event. We refer to it as “WSSD and Beyond” -- a long process. And in fact, there has emerged from Johannesburg a new focus-- and in fact, some new trends and some new vocabulary associated with this process.

Secretary Powell, in a brief visit and speech at the Summit, represented President Bush. For the rest of the time Under Secretary of State for Global Affairs Paula Dobriansky, led the U.S. delegation. She was mainly supported from State by staff members from OES – our Oceans, Environment and Science Bureau – headed by Assistant Secretary John Turner. John now has a key role in the interagency process following up on Johannesburg.

The key sectors identified for attention after WSSD are energy, water, coastal zones and fisheries, biodiversity protection, HIV/AIDS and other global diseases, agricultural productivity, and education.

Engineers for Sustainability - The View From C Street continued

Science and technology—science and engineering—are essential components for addressing every one of these sectors. Science is needed to understand the problems—and engineering and technology to do something about them.

Two very basic themes that the US emphasized at the Summit were good governance and public-private partnerships. The point of good governance is that corrupt, mismanaged societies will not develop and money spent on them will be wasted. And the point of partnerships is that funds and foreign assistance from governments are simply not sufficient to do the job. We need to create effective partnerships between public and private organizations to address specific problems and solve them. Public/private partnerships—these are three key words for the future of global development and the road to sustainability. And here is where the American engineering community's role can be so important.

Paula Dobriansky has said it well. “If we want to achieve concrete results from the treaties and agreements already negotiated, we must address the strengthening of good governance and capturing the power of partnerships.” That is why the partnership of the American engineering community and NAE is so vital.

I have a pretty simple concept of development, although actually doing it can be quite complicated. Development to me means equipping a country or a society to link into and become a functioning part of a rapidly globalizing world—a world that today is essentially driven by technology. With no local S&T capacity, no technical infrastructure or training of people to couple into that world—there will be little or no development. Hence, I tend to think in terms of five

specific elements where science and engineering are intimately involved in the development process:

- Building S&T capacity for sustainable development in less developed countries
- Investing in, and training, the next generation
- Ensuring access to information
- Strengthening the scientific basis of decision making
- Informing the public in an honest, transparent manner

It seems to me that you engineers have recognized the challenge. And I again commend the NAE and the engineering community for your June 24 statement on “The Engineer's Role in Sustainable Development,” a declaration by the US engineering community to the World Summit. Here today you will work to flesh out a program that will turn that declaration into reality.

Unfortunately, I cannot be with you all day, I am leaving in a few hours for Austria, but my Deputy Andy Reynolds will be here. I am sure he will make contributions, but he will also carry your message back to State as part of the total U.S. effort on sustainability.

But let me end with a specific challenge related to my own mission at State. My task is to try to raise the scientific and engineering literacy and awareness within the State Department so that such considerations will be fully comprehended in the formation of US foreign policy. It is to strengthen the scientific and technical basis of our foreign policy decision making.

But one can not do this alone, nor can one make policy by whispering science in the Secretary's ear. One needs people with this capability and this literacy throughout the whole organization. And so I have been building partnerships with the science and engineer-

ing community and several of professional societies have created fellowships and selected “science and diplomacy fellows” who come to work for one or two years at State and then go back to their other jobs. Right now from the American Association for the Advancement of Science, from the American Institute of Physics, and most recently from the Institute of Electrical and Electronics Engineers, the first engineering society to come forward with a funded fellowship—we have 31 such people—PhDs in their fields—currently serving as fellows at State. The Industrial Research Institute is also planning to sign up and I hope that the American Chemical Society will do so as well.

Let me close by reading to you from your own words in that June 24 Declaration on Sustainability.

“Engineers must be actually engaged in the entire decision making process—from conceptualization to project design, development and implementation. This includes the interdisciplinary process of building the evaluation/decision framework and the institutional infrastructures to realize a sustainable future.”

There are a large number of engineering societies involved with the NAE in this sustainability effort. I would hope that you might collectively be able to establish several “engineer-diplomat” fellowships at the Department of State. In this way, you will be an integral part of the foreign policy process that leads to international development policies and programs, and your voices will be heard—both loudly and early in the game. Establish a partnership with us at State through this program and join us in this noble effort.

I wish you great success with today's meeting.

Water Supply and Sanitation in Africa

(Ed. Note: This article is abstracted from the remarks of Robert Roche, World Bank, at the November 1, 2002 meeting on "Sustainable Development: the Role of the American Engineering Community.")

Water underpins each of the Millennium Development Goals, (MDG) that were endorsed by the international community at Johannesburg. A good water supply is essential to reducing hunger and poverty, educating children and improving health. People need water for drinking, cooking, cleaning and making business. A safe, convenient supply improves health, particularly that of children and pregnant women; saves time so children can go to school and women can better care for themselves and their families; and provides grass-roots management opportunities for people to both manage their water supply and protect their local environment.

U. S. engineers can make a big difference in sustainable water supply services in Africa and I would like to discuss how this might be done.

Let me start with a brief history of water supply in Africa. In the early 1970s international development agencies installed farmyard hand-pumps in African villages, but forgot about maintenance. The pumps broke down and there was no one to repair them. The fix was to design hand-pumps that "could not break down" and establishment of centralized, mobile maintenance teams to repair them when they did. With ongoing external support the pumps could be fixed, but down times were very long. Increasingly, international support was going into maintaining what had been constructed, rather than serving more people. In the 1980s attention shifted to improved water and sanitation technologies and community management. User friendly hand-pumps and VIP latrines were introduced and participatory techniques were developed to facilitate communities taking responsibility for the management of their facilities. In the

1990s demand responsiveness was added to the ingredients for success to ensure that assistance was targeted at communities that would maintain their facilities, and supply chains were supported so that communities could access the goods and services needed to plan, install and maintain them.

The ingredients for sustainable water supply in Africa can be summarized as follows:

Rural Water Supply

- User friendly hand-pump
- Community management
- Demand responsiveness
- Supply chains – spare parts and artisans

Town Water Supply (2000-50,000 population)

- Designs that match demand
- Autonomous (financial and political) water board

Town Water Supply

- Professional operator for routine technical/financial operations
- Specialized services to help prepare expansion and efficiency plans

Urban Water Supply

- Professional operator with foreign interest

Coverage and Investments

In dealing with water supply in Africa, one should not think in terms of urban and rural. A quarter of the population lives in towns where informal community management is not sufficient, and where autonomous water boards and professional operators supported by experienced engineers are needed.

Four hundred million of Africa's seven hundred million people (55%) have reasonable water services. Sanitation coverage is lower. The MDG propose that coverage be increased to 78% in 2015, doubling the number served. Half live in rural communities (villages) and a quarter each live in towns and

cities. The investment to achieve the MDG would be \$500 million per year in each.

In more practical terms let's take and example. Uganda and Ghana both have 20m people. To reach the MDG 1000 BHs/HPs and 30 piped systems need to be constructed each year in these countries. That means first helping that number of communities plan and get organized to manage their improved water supply, constructing the facilities and building the supply chains needed to maintain them.

Tanzania with 40m needs double the capacity (2000 BHs). Ethiopia with less than 25% coverage and 65m people needs four times the capacity. Nigeria with 125m people needs six times the capacity.

Technical Assistance

The provision of water and sanitation services on a large scale in Africa can be achieved by building the local private sector at the community, district and national levels. **Local, district-based NGOs/artisans** are needed to help communities to plan and manage their facilities, to install/repair hand-pumps, to distribute spare parts, and to construct latrines. **National NGOs/consultants** are needed to train the local, district-based NGOs/consultants to, in turn, help the communities in their area, and to directly help districts to establish their own water and sanitation programs. **National consultants** are needed to site boreholes and supervise their construction, and to help towns to plan, supervise construction, and provide ongoing technical assistance to local water supply operators. **International consultants** are needed to build local engineering firms and local operating companies, and to identify more cost-effective means to provide water and sanitation services. In so doing, they can supplement the capacity of national consultants but should not replace them.

Water Supply and Sanitation in Africa continued

Conclusion

National engineers are needed to (i) site boreholes and supervise their construction; (ii) plan, design and supervise the construction of piped systems, and (iii) support local town water supply operators.

Real capacity building comes with the establishment of local engineering and operating companies, not the provision of services alone. U.S. engineers could make the difference in achieving the MDG in Africa, provided their objective is small/medium enterprise devel-

opment. A foundation established for this purpose would be targeted at a practical intervention, fundamental to scaling up to meet the demand for sustainable water supply services in Africa.

The Role of Engineering in Agriculture and Natural Resource Management

(Ed. Note: This is abstracted from the remarks of Clara Cohen, Board on Agriculture and Natural Resources, National Research Council, at the November 1, 2002 meeting on "Sustainable Development: The Role of the American Engineering Community".)

I would like to address my remarks to the following questions:

What could the engineering community contribute to achieve sustainable development goals in Agriculture?

Non-engineers tend to think that engineers are purely a source of new machinery and technologies, but the more subtle parts of engineering are also important. Engineers can also contribute a different way of thinking – at a systems level. Sustainable development needs engineers' systems-level thinking more than it needs the technologies and machinery. Non-engineer scientists tend to be reductionist in their approach, so the system-level and life-cycle analysis of engineering are critical to designing sustainable systems. For example, soft-systems analysis shows us how to organize a process to make it work.

Engineers can engage at two levels. Given the growing role for the S&T community in global governance and decisions that are happening at the international level, engineers can play a large role there. A second level at which engineers could engage is at the local level. As part of the democratization process, many fledgling democracies are

decentralizing and devolving natural resource management authority to the local level (given the failure of central governments to effectively manage resources). There is a tremendous need for science and technology to inform the decision-making that is now occurring at the local level by municipal governments, planners, etc. Engineers can play a big role here, too, in supporting those decision-makers.

Turning to technologies, engineers also have a lot to offer in this area to the agriculture sector, both in developed and developing countries. We should keep in mind that a majority of technologies in agriculture were generated through spillovers from other sectors (e.g. mining, defense). So, we should be vigilant for these types of spillovers.

Here are a few examples:

- Rural infrastructure – access to markets are a major constraint for rural communities, so roads and bridges that help bring produce to market are important.
- Appropriate food and fiber processing machinery that will help communities add value to agricultural products and achieve economic growth.
- Technologies to improve resource use efficiency – precision agriculture - are applicable in developed countries and are potentially adaptable to developing countries.
- Technologies to detect, monitor, and track resources. For example,

NDVI or greenness index images from satellite data have been extremely useful to look at land use change over time and the effects of climate change. Remote sensing technologies have been useful for developing early warning systems for natural disasters. Engineers have contributed technologies to identify and track biodiversity – e.g. bio-acoustic technology that can be used to track organisms as small as tiny beetles munching in the trunks of trees and to organisms as large as herds of forest elephants in Central Africa.

- A landscape-level, eco-regional approach is used increasingly for biodiversity conservation, so geo-spatial tool development (GIS and GPS) and applications will increasingly be useful. For example, in Senegal, migratory herdsmen used GPS receivers to map and document resource availability.

What are approaches important in engagement?

Many of the big failures in development involved large infrastructural projects that were not appropriate to the local context, did not adequately build capacity of the users, or did not respond to the demand of stakeholders. Thus, it is important to consider certain approaches for engaging most effectively:

- Participatory approaches that bring all stakeholders to the table – both before an activity is initiated and

Role of Engineering in Agriculture continued

- throughout. Women need to be considered, in particular.
- Engagement needs to be in the long-term.
- Need for consideration of multiple scales – local, landscape, national, regional, and global.
- Need to involve other disciplines in teams.
- Appropriate technology that is adapted to the social, political, and cultural context. Need to consider complexity of a local situation. For example, in the Philippines, the landscape surrounding a proposed infrastructural project was highly degraded and eroded, leading to storm flashiness.
- Measurement of stream discharge contributed to a more effective design of a culvert in a road that kept washing out.
- Engineering systems need to consider not only supply management but also demand management. For example, we need to focus on sav-

ing water as well as producing water. In Morocco, there has been great success with efficient irrigation technologies like laser-level technologies and drip irrigation. The focus is on demand management and minimizing the consumption of water, not just increasing the supply of water.

- Designs should be easily maintained.
- Designs should consider the technical capacity of people who must maintain them and have a capacity-building component.

What are the partnership opportunities?

- Engineers can take advantage of existing institutional infrastructure in agriculture and natural resource management. There are possible institutional partners within the CGIAR/IARC system – and international network of 16 agricultural research centers.

- NARS – National Agriculture Research System, based in developing countries.
- Universities – developing countries and US – USAID’s Collaborative Research Support Programs are a potential model for long-term engagement of universities with counterparts in developing countries.
- NGOs – increasingly conducting research and technology development and application major challenge to engineers will be how to develop incentives to involve non-conventional partners, like agribusinesses. How can these players become involved through public-private partnerships? What other things would motivate involvement besides high consulting fees? For example, many public sector institutions have had problems keeping engineers on staff, such as IWMI (one of the CGIAR centers).

An Engineering Initiative for UNESCO

(Ed. Note: This article is abstracted from the remarks of Phil Hemily, formerly with the NAS/NRC Office of International Affairs, at the November 1, 2002 meeting “Sustainable Development: The Role of the American Engineering Community”)

There is an opportunity to develop an engineering initiative, as part of the United States rejoining UNESCO, that would focus on engaging U.S. engineering capability to support national commitments to sustainable development.

The United Nations Educational, Scientific, and Cultural Organization is an intergovernmental organization, founded in 1946, that has working relationships with other international organizations, and particularly with non-governmental organizations (NGOs) such as the International Council for Science (ICSU), the International Council for Engineering and Technology (ICET), and the World Federation of Engineering Organizations/Union of

Technical Associations (WFEO/UATI).

The United States withdrew from UNESCO in 1984, and is scheduled to rejoin in 2003. In the interim, U.S. engineers and scientists have worked through engineering NGOs in such areas as U.S. support of national hazards reduction programs and participation in the 1996 World Congress of Engineering Education and Business Leaders.

The principle priorities for UNESCO’s 2004-2005 programs are:

I. Education

Principle priority: Education for all and follow-up to the Dakar World Education Forum.

Other priorities:

- Training of teachers and educational personnel
- Human rights education
- Preventive education against HIV/AIDS and other diseases

- Technical/vocational education for citizenship and the world of work

II. Natural Sciences

Principle priority: Water and ecosystems

Other priorities:

- Capacity building in the basic and engineering sciences, and in the formulation of science policies
- Protection of the environment and sustainable use and management of natural resources

III. Social and Human Sciences

Principle priority: Ethics of science and technology

Other priorities:

- Fostering the application of human rights
- Revitalizing philosophical reflection and the human sciences

UNESCO Engineering Initiative continued

- Enhancing knowledge of social transformation.

IV. Culture

Principle priority: Promoting cultural diversity and intercultural dialogue

Other priorities:

- Support creativity
- Development of cultural industries
- Cultural policies

V. Communication and Information

Principle priority: Promoting equitable access to information and knowledge for development

Other priorities:

- Promoting freedom of expression and the independence and pluralism

of the media

- Supporting communication development

UNESCO has committed itself to a number of partnerships with NGOs as priority follow-up to the Johannesburg World Summit on Sustainable Development (WSSD). Many of these commitments (management of water resources, renewable energy resources, etc.) engage the engineering community as partners. The international engineering community is planning as a major initiative, the 2005 World Congress on Megacities of the Future, to be held at UNESCO.

While current budget and employment conditions constrain the hiring of U.S. personnel in UNESCO, there are several actions that the U.S. engineering

community should proceed with immediately:

(a) Explore through consultations with the US Department of State how to target support of future U.S. program priorities beyond current growth limitations.

(b) Seek support for "secondments" of U.S. engineers to complement the UNESCO Division of Basic & Engineering Sciences.

(c) Provide recommendations for UNESCO-World Summit on Sustainable Development (WSSD) partnerships to the U.S. Department of State and, informally, to UNESCO staff charged with preparing the next biennium program and budget.

Improving Sustainability Communications and Information Exchange

(Ed. Note: This article is abstracted from the remarks of Donald V. Roberts, P.E., President, Committee on Technology, World Federation of Engineering Organizations (WFEO) at the November 1, 2002 meeting on: "Sustainable Development: The Role of the American Engineering Community," and from the report, "Engineers and Sustainable Development," prepared by his Committee, August, 2002)

Engineers have helped develop breakthroughs in computer technology and communication networks. In the past 10 years, dramatic advances have been made in computers and computer software. Computers have become exponentially more powerful, smaller and more economical, and the Internet has made rapid communications possible throughout many parts of the world. Computer engineers played an integral role in this progress.

Along with rapid changes taking place with computers and communication networking, software development has evolved to allow enormous amounts of data to be stored, and has provided

powerful technical programs of great help to scientists and engineers. Exchanging electronic information has also allowed existing knowledge, information and technologies to be shared to fulfill public and private needs. Through this exchange of information, the engineering profession has been able to provide an engineering dimension to sustainability issues.

However, as technology has expanded rapidly, a gap has developed between the countries with access to technology and those without. This condition is commonly referred to as the "digital divide." WFEO's committees on Information and Communication (CIC, www.coi-tn.org/fmoi-cic/cic.shtml) and Technology (ComTech) are working to develop better methods for sharing information (DigitalDivide.doc) among practicing engineers.

In 1999, WFEO endorsed a proposal to establish a virtual engineering library for sustainable development. Virtual engineering libraries can be accessed from the Internet, and range from those

that provide titles or abstracts only, to those that provide access and downloads for full text papers of lecture notes. It was envisioned that virtual engineering libraries on the Internet would be useful in supporting engineering education in schools, technical colleges and universities. The Institution of Engineers, Australia and the Institution of Professional Engineers, New Zealand agreed to lend support to the development of a prototype of such a system. It is hoped that this prototype, named the Australasian Virtual Library (AVEL) could become a model for a future global system, called the Virtual Environment and Sustainable Systems Engineering Library (VESSEL). This program is described in a paper (VesselFinal6.doc) by William J. Rourke, Special Advisor to the president of WFEO.

The AVEL program has been incorporated into the Australian Virtual Colombo Plan, which is being funded as part of Australia's overseas aid program. Substantial funds are also being

Improving Sustainability Communications continued

provided by the World Bank. The Virtual Colombo Plan is initially being directed towards primary and secondary school teachers and policy makers. In coming years, material will be supplied to university lecturers, including those giving engineering courses.

I suggest a communications program that envisions, in part, a breakthrough in funding by the use of a coalition or consortium of donors such as used by the "Consultative Group on International Agricultural Research (CGIAR). This organization has been in place for more than 30 years and had a budget in 2001 of \$340 million dollars. CGIAR is now providing hands-on help in 100 countries and coordinates research programs at 16 research centers. The CGIAR coalition of donors includes the Rockefeller Foundation, the Ford Foundation, the Kellogg Foundation and 12 international and regional funding organizations.

I suggest that a coalition of donors might be developed to fund an even broader variety of global programs led by engineers to improve living conditions, etc., especially for developing nations. I suggest that the November meeting participants consider forming a

WFEO standing committee or task group that would coordinate programs related to sustainable development that now cross all four standing committees of WFEO and which also involves the International Federation of Engineering Consultants (FIDIC). I envision a team effort between a new standing committee and a coalition of donors that could generate funds of \$5 million per year to start and maybe 10 to 20 millions per year later on.

The US standing committee could be made up of representatives of the various technical societies such as those at the November 1, 2002 meeting. Visible facilitation by the National Academy of Engineering would help in forming such a group.

I think the coalition of donors could include the State Department and/or several federal agencies, major producers of goods and services that would support sustainable development projects, such as the Packard Foundation, Microsoft, Sun Microsystems, and service companies. The donors could also include major employers of engineers and service firms such as Bechtel, Fluor and CH2M Hill. I wouldn't rule out other major foundations such as Rockefeller,

Ford, etc.

I suggest that to test these ideas, the group might consider the following:

1. Select one or more champions willing to spend quality time testing these ideas and developing them further.
2. Prepare a more complete summary of these ideas as a discussion paper.

About \$25,000 in funds should be obtained as a grant to allow the champion and a few others to flesh out these ideas and meet with potential donors. Set a target date of about six months to have a viable model to consider with a group of stakeholders. Then if it seems appropriate, present the ideas to the organization that will be the US member in WFEO and then to the WFEO Executive Board.

Further information on the proposed communications program can be found at www.wfeo-comtech.org, as part of the new report entitled, "Engineers and Sustainability".

EPA Develops Clean Fuels and Vehicles Initiative

The U.S. Environmental Protection Agency has developed a Clean Fuels and Vehicles Initiative. This initiative will address vehicular air pollution worldwide, and will bring together governments, industry and non-governmental organizations to implement these efforts. The Clean Fuels and Vehicles Initiative will focus on two priority areas:

- The elimination of lead in gasoline; and
- The reduction of sulfur in diesel and gasoline, while concurrently adopting cleaner vehicle technologies.

Air pollution in many cities in the devel-

oping world is reaching crisis proportions. According to the World Health Organization, only 15% of the largest cities in developing countries have acceptable air quality. Poor air quality is related to approximately 3 million deaths each year, and contributes to the plight of millions more around the world who suffer from asthma, chronic obstructive pulmonary disease, cardiovascular disease, and lung cancer. Lead emissions are extremely harmful to children under age six, interfering with the developing brain and other organs and systems.

Motor vehicles account for a significant portion of urban air pollution in

developing countries. The growth in urban travel in the developing world will further exacerbate this problem unless steps are taken to reduce emissions. Vehicles, both gasoline and diesel, emit significant quantities of nitrogen oxides, sulfur oxides, particles, carbon monoxide, and hydrocarbons. These pollutants can be reduced by using lower-sulfur and lead-free fuels and by introducing the new vehicle technologies and advanced emission control devices that require such fuels.

The stakeholders will contribute their resources and expertise to implement the goals of the initiative and will work together to:

Clean Fuels and Vehicles Initiative continued

- Help developing countries to develop action plans to complete the global elimination of leaded gasoline and start to phase down sulfur in diesel and gasoline fuels, concurrent with adopting cleaner vehicle requirements;
- Support the development and adoption of cleaner fuel standards and cleaner vehicle requirements by providing a platform for exchange of experiences and successful practices in developed and developing countries as well as technical assistance;
- Develop public outreach materials, educational programs, and awareness campaigns; adapt economic and planning tools for clean fuels and vehicles analyses in local settings; and support the development of enforcement and compliance programs, with an initial focus on fuel adulteration; and
- Foster key partnerships between government, industry, NGOs, and other interested parties within and between countries to facilitate the implementation of cleaner fuel and vehicle commitments.

The Clean Fuels and Vehicles Initiative will begin a new commitment to phasing down sulfur in diesel and gasoline, following the lead of the U.S., the EU, and the Japanese, who are requiring the introduction of ultra-low sulfur fuels over the next decade, concurrent with the adoption of advanced vehicle technologies. Sulfur fuel specifications around the world currently vary from near-zero to 10,000 ppm, with most countries in the 1,000 to 10,000 ppm range. For those countries with very high levels of sulfur (5,000 to 10,000 ppm), sulfur reductions to intermediate levels and concurrent adoption of inter-

mediate vehicle standards may provide cost-effective emission reductions, depending on regional economies, and alternate emission reduction opportunities. Clean Fuels and Vehicles Initiative will include representatives from the private sector (oil companies; vehicle, emissions control, and engine manufacturers; emission control companies), governments, and non-governmental organizations.

Jane Armstrong, U.S. EPA
Office of Transportation &
Air Quality, Ann Arbor, MI
T: 734-214-4471; F: 734-214-4053
Armstrong.jane@epa.gov

Jane Metcalfe, U.S. EPA
Office of International Affairs,
Washington, DC
T: 202-564-6451; F: 202-565-2411
Metcalfe.jane@epa.gov

EPA Builds Partnership for Clean Indoor Air

The EPA has developed a Partnership for Clean Indoor Air to address the serious health effects associated with elevated indoor levels of smoke from cooking and heating practices. The Partnership will bring together governments, industry and non-governmental organizations, and will aspire to halving mortality related to indoor air pollution in targeted areas.

Over 2 billion people worldwide use traditional biomass fuels (wood, dung, crop residues) for cooking and heating. As a result, an estimated 2 million people – particularly women and children – die each year from breathing elevated levels of indoor smoke. These practices are also associated with adverse pregnancies (e.g. stillbirth and low-weight babies) and may increase by 2-6 times a young child's risk of serious respiratory infection. The World Bank has designated this issue as one of the four most critical global environmental problems.

Harnessing the convening power of

the US Government, the partners will contribute their resources and expertise to implement the goals of the initiative and will work together to:

- Obtain formal commitments from, and develop action plans with, key sectors (health, environmental, energy) in partnering countries before beginning efforts in a given country;
- Develop culturally appropriate training and other public outreach materials, educational programs, and awareness campaigns, and adapt economic and planning tools to local settings;
- Identify in-country industry – including local entrepreneurs and other non-governmental partners to participate in planning and implementation activities; and
- Identify lessons learned from past efforts and develop performance measures to evaluate past and current activities, and identify suc-

cessfully locally-based implementation strategies.

The Partnership for Clean Indoor Air will initially focus on the 4 core dimensions to the problem:

- **Social/Behavioral Barriers:** Develop locally targeted training modules for community and local public health leaders to identify strategies to understand and modify behavior patterns to overcome the cultural barriers regarding use of traditional fuels and stoves.
- **Market Development:** Support development of local business models and markets for improved cooking mechanisms, including development of micro-finance and other financial assistance options to develop local businesses and spur investments.
- **Technology Design:** Develop a certification organization (to be self-sustaining over time) to identify, and develop design guidelines

Partnership for Clean Indoor Air continued

- or standards for, efficient and needs-responsive cooking and heating technologies and ventilation systems.
- Health Effects Research: Identify and pursue priority research needs to expand and refine knowledge of health effects of indoor cooking and heating practices in a variety of settings

As part of the development of action

plans with partnering countries, the Partnership will identify high-risk regions for pilot implementation. Partners will facilitate training of key country actors and help them perform training in the target regions to achieve broad local buy-in among key community and business leaders, and develop community-wide programs to address this indoor air pollution issue. Partners will also work with local businesses to pilot implemen-

tation and financing strategies to support business development. Initial non governmental partners include The Shell Foundation, Winrock International, and the Univ. of CA at Berkeley's Energy and Resources Group.

Mary T. Smith, U.S. EPA
Office of Indoor Environments
T: 202-564-9444; F: 202-565-2039
Smith.maryt@epa.gov

“Engineers Without Borders – USA” and Sustainable Engineering Projects

Engineers Without Borders – USA is a non profit corporation created under the laws of the State of Colorado. Its mission is to help disadvantaged communities improve their quality of life through implementation of environmentally and economically sustainable engineering projects, while developing internationally responsible engineering students. EWB-USA's outward vision is of a world where all people have access to adequate sanitation, safe drinking water, and the resources to meet other self-identified engineering and economic development needs. EWB-USA's web site is <http://www.ewb-usa.org>.

Currently, EWB-USA has on-going projects in Belize, Nicaragua, Haiti, Peru, Mali, Mauritania, Nepal, Thailand, and Afghanistan. Other projects

are under development. More than 30 students at the University of Colorado at Boulder alone have been involved in the aforementioned projects. Detailed descriptions of these projects can be found on the web site.

For further information please contact Bernard Amadei at (P) 303-492-7734 or amadei@spot.colorado.edu.

The first chapter of EWB-USA was formed at the University of Colorado at Boulder in 2001, and additional student chapters are being developed. EWB-USA also has started professional chapters, allowing professional engineers to work on humanitarian projects in partnership with engineering students.

EWB-USA provides innovative ways to educate engineers interested in addressing the problems faced by developing countries and communities. It is clear that engineers of the 21st century are called to play a critical role in contributing to the peace and security in an increasingly challenged world.

EWB-USA is actively seeking partnerships with a broad cadre of corporate, government, and academic groups, NGOs, and engineering professionals (active and retired) having like-minded values. EWB-USA is particularly interested in any and all suggestions relating to possibilities of University Chapter and Professional Chapter affiliations nationally, in-kind assistance and potential funding sources and pathways.

American Institute of Chemical Engineers to Host Water Discussion

We are familiar with the headlines -“a full scale emergency” - “wells running dry” - “a world running out of water”. Water, essential for human survival, was once treated as an inexhaustible resource. However, it is now estimated that humans use half of all fresh water available today – double the amount used 35 years ago. Water use by humans will increase by another 40 percent in the next two decades. So what are we to do? Is the world running out of water or are water issues regional and

matters of proper distribution? How should a scarce resource that traditionally has been essentially free be managed and priced? Who should own and operate water systems?

This discussion will address these and other issues and attempt to put them into perspective. Program panelists Mary Jo Baedecker, US Geological Survey; Gary Wolff, Pacific Institute; Karl Fennessey, The Dow Chemical Company; and Manian Ramesh, ONDEO-Nalco, will discuss

their views of current practices and policies related to water use and management.

Join us for this discussion, April 1, 2003 during the AIChE Spring Meeting in New Orleans. For more information please visit <http://www.aiche.org/conferences/criticalissues/>.

For complete AIChE sustainability programming information please contact Darlene Schuster at darls@aiiche.org.

Information regarding this newsletter can be obtained from:
Dana Ponciroli, AIChE
3 Park Avenue
New York, NY 10016
Phone: 212-591-7462; Fax: 212-591-8895
e-mail: danap@aiche.org

For more information on the three societies sponsoring this newsletter please visit their web sites:

ASCE: <http://www.asce.org>
American Society of Civil Engineers

ASEE: <http://www.asee.org>
American Society for Engineering Education

AIChE: <http://www.aiche.org>
American Institute of Chemical Engineers

ICE Publishes Plan on Society, Sustainability and Civil Engineering

Society, Sustainability and Civil Engineering: A Strategy and Action Plan, 2002-3, has been published by the Institute of Civil Engineers, Great Britain. It was prepared by a team comprising the Institution of Civil Engineers (ICE), the Association of Consulting Engineers (ACE), the Civil Engineering Contractors Association (CECA), the Construction Products Association (CPA), and the Construction Industry Research and Information Association (CIRIA). The document is intended to build on the vision set out in "Building a Better Quality of Life," the government's strategy for more sustainable construction. The Report sets out a commitment to help the civil engineering industry to deliver more sustainable civil engineering, a series of actions that the partner will undertake themselves, and a series of recommendations for three other groups—individual civil engineers, clients of civil engineering, and the commercial organizations in the civil engineering supply chain.

The document is the first such coordinated plan, and will be updated and extended over the coming months and years, the partners having committed themselves to review and revise it at least annually.

The Report contains sections on the challenge of sustainable construction, the benefits and impact of civil engineering, the business case for sustainable engineering, and measuring sustainability performance.

For further information, contact the Institute of Civil Engineers. One Great George Street, Westminster, London SW1P3AA United Kingdom, Tel +44(0)20 7222 7722; Fax +44(0)20 7222 7500; web site: <http://www.ice.org.uk>.

GSA Publishes Real Property Sustainable Development Guide

The U.S. General Services Administration, Office of Government Policy, has published a handbook, "Real Estate Sustainable Development Guide," to implement Executive Order 13123, "Greening the Government Through Efficient Energy Management," issued June 3, 1999. The Principles of Sustainable Development for Federal Agencies (for siting design and construction, developed under Executive Order 13123) are summarized in the Guide as follows:

Site: Optimize Site Potential
Energy: Minimize Nonrenewable Energy Consumption
Materials: Use Environmentally Preferable Products
Water: Protect and Conserve Water
IEQ: Enhance Indoor Environmental Quality
O&M: Optimize Operational and Maintenance Practices

The Guide describes the principles of sustainable development and the tools for implementing sustainability and contains a number of case studies summarizing the application of these principles and tools to a wide range of Federal building complexes.

For further information, please visit www.policy.gov/realproperty

TRB Addresses Sustainability Concerns in Transportation

The Transportation Research Board of the National Academies has published Transportation Research Record No. 1792, "Sustainability and Environmental concerns in Transportation, 2002." The Record is a compilation of papers by distinguished authors in the transportation planning and administration field. Several papers of interest are noted below.

- Sustainable Transportation Findings from an International Scanning Review and Implications for the U.S. -

Elizabeth Deakin, University of California Transportation Center.

- Sustainable Urban Transport in the 21st Century: A New Agenda – Lee Schipper, Climate Program, World Resources Institute.
- Environmental Justice in the Transportation Planning Process: Southern California Perspective – Nancy Pfeffer et al, Southern California Association of Governments

- Promoting Environmental Stewardship in Transportation – Debra A. Nelson et al, New York State Department of Transportation

For further information on the Record, contact the TRB Business Office: Tel. 202-334-3213; Fax 202-334-2519
e-mail TRBsales@nas.edu.