

all undermining the role of the IAEA.

The IAEA was set up in 1957 in response to President Dwight D. Eisenhower's call to the United Nations to create a program to promote the "Atoms for Peace" initiative—to spread the benefits of peaceful nuclear technology, while limiting military applications of that technology. The 139-nation agency works directly with governments and industrial partners in safeguarding nuclear material and developing safety and security standards at facilities involved in nuclear activity. "The IAEA is the only institution with this capability," says Lerch, "but it is limited since—at the insistence of the five legacy nuclear powers [the US, France, the UK, Russia, and China]—weaponization does not fall under the mandate of the agency." After the breakup of the Soviet Union, the IAEA increased efforts to stop the trafficking of nuclear material and took on the task of securing nuclear material in the newly formed republics. Nearly every UN member has signed the NPT, which forms the legal basis of the IAEA. But in 1974 India conducted a "peaceful" test nuclear explosion whose eventual impact was to weaken the treaty.

The discovery of Iraq's clandestine nuclear weapons program at the end of the 1991 Gulf War led to a broadening of the IAEA's mandate to include actively looking for covert military programs, and in 1997 the IAEA added a voluntary provision that allowed the agency to inspect undeclared but suspected facilities in member states. "This is where ElBaradei has demonstrated initiative bordering on brilliance," says Lerch. ElBaradei and his predecessor at the IAEA, Hans Blix, who came out of retirement to be the chief UN weapons inspector, "worked hand-in-glove to develop an effective inspection apparatus in Iraq and elsewhere," Lerch says. "So effective, in point of fact, that [Iraqi dictator Saddam] Hussein was persuaded to dismantle his original program to the extent that reinstituting that program became infeasible." Only about half of the IAEA's members, including Iran, have signed the voluntary 1997 provision.

Stopping the bomb

The future direction of the IAEA, and of nuclear nonproliferation efforts more generally, says Wolfgang Panofsky, senior adviser to the National Academy of Sciences Committee on International Security and Arms Control, is tied to the outcome of Iran's determination to build an indigenous nuclear power program, including en-

richment and reprocessing of uranium. Under the NPT, signatory countries are allowed to create facilities for a complete nuclear fuel cycle, but such facilities can shorten the time required to develop a military nuclear program, should a state withdraw from the NPT, as North Korea has done.

"ElBaradei has taken the lead in specifically proposing international management or outright ownership [of nuclear fuel facilities] in several of his more recent speeches," says Panofsky. "It is this pursuit of independence and calling the facts as they emerge which in my view has made the award

of the peace prize to ElBaradei a very deserved one."

Still, says Pugwash executive director Jeffrey Boutwell, "I'm not sure the award will affect nonproliferation efforts all that much, I'm sorry to say. The award's importance is symbolic, and while it does focus the world's attention briefly on nuclear issues, the impact is not that long-lasting."

But on 7 October, ElBaradei was still savoring the moment. "Overall I think my colleagues and I are going to sleep tonight with a good deal of satisfaction that finally our efforts have been fully recognized."

Paul Guinnessy



Physicists Seek to Aid Developing Countries

The World Conference on Physics and Sustainable Development drew more than 300 physicists from 70 or so countries to Durban, South Africa, from 31 October through 2 November.

The conference was intended "to bring the physics community together and have it make a commitment to working collectively on the problems of sustainability," says Judy Franz, executive director of the American Physical Society and secretary general of the International Union of Pure and Applied Physics. The conference's four leading sponsors were IUPAP, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Abdus Salam International Centre for Theoretical Physics (ICTP), and the South African Institute of Physics.

The crux of the conference was the drafting of proposals for ways physicists in industrialized countries can work with those in developing countries in four areas: economic development, energy and environment, education, and health. "Our first measure of success," says Amy Flatten, APS's head of international affairs and a conference organizer, "is that the program committees came together around concrete actions. Some will be refined, and some can be started tomorrow. There's a lot of energy coming out of this."

Action plans

The proposals in economic development include forming a network on nanoscience and nanotechnology focusing on water, air, and energy and forming a separate network on physics in agriculture. While the two networks had been considered ahead of time, a third plan, to run month-long courses in entrepreneurship for physicists, was born at the conference. "This is the one we are most en-

Conference delegates shaped ideas for how physics can contribute to sustainable development in the areas of education, economic development, energy and environment, and health.

thusiastic about," says committee cochair Peter Melville of the UK's Institute of Physics. IOP will commit money and ICTP will host pilot courses, he adds.

Enhancing efficiency and reducing pollution in transportation, promoting the use of solar energy, and developing inexpensive facilities to generate energy from local biomass for small communities were the aims laid out by the conference delegates who focused on energy and the environment. In Africa today, says cochair Osman Benchikh, who is responsible for energy in UNESCO's division of basic and engineering sciences, "Seventy-seven percent of the population does not have access to electricity. The only option that is really viable and could also be economically viable is renewable energy."

Citing a worldwide shortage of medical physicists, the physics and health group sought ways to accelerate training, says cochair Debbie van der Merwe, director of medical physics at the Johannesburg Hospital in South Africa. "There was a consensus that the same basic education should be offered worldwide." One initiative is a website with educational resources for physicists and engineers in health care (see <http://www.wcpsd.org/health/perhd.cfm>). In addition, this group sees a need for regional training centers focusing on the physics of radiation therapy and for partnerships among hospitals and medical physicists.



Mosibudi Mangena, South Africa's Minister of Science and Technology, gave the opening remarks at the World Conference on Physics and Sustainable Development (left). Some 55% of delegates (below) came from developing countries.



Making teaching materials available on the Web, developing locally and culturally relevant instructional materials to help students understand how physics is related to sustainable development, and holding workshops for people who train physics teachers in Africa, Asia, and Latin America were goals set by the group that considered education from kindergarten through college. The workshops would be organized locally with help from people in developed countries, says committee cochair Priscilla Laws of Dickinson College in Carlisle, Pennsylvania. "We would try to get leaders, who would then go out and replicate what they had learned." An initiative that already has funding, from the Schlumberger Foundation, is to electronically

link "physics on the road" programs and other roaming physics demonstrations so they can work cooperatively.

"Tread with care"

"All four themes are interesting for us," says Phuc Xuan Nguyen, a delegate from Vietnam. "We understand that the environment, energy, new

technologies, all these issues are important for development in countries like ours. It starts with education." For his part, Nguyen says he is particularly keen to follow up on the nanotechnology network idea.

Taking off his UNESCO hat and speaking as a physicist from Algeria, Benchikh says that in his discussions with people from developing countries at the conference, "there was a lot of enthusiasm. Now they expect concrete actions."

The next steps are to identify leaders and funding. On the last day of the conference, Rob Adam, director of South Africa's department of science and technology, warned that solving societal problems—or realizing the action plans laid out at the conference—is different from solving physics problems: "Sustainable development is more complex and harder to reduce to a set of laws which embody its essence. This means it is less amenable to a classic physics approach," he said. "Tread with care."

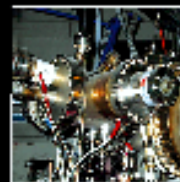
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