

IAEA GENERAL CONFERENCE

## Amano makes first General Conference address

“I AM TRYING to change the widespread perception of the agency as simply the world’s ‘nuclear watchdog’ because it does not do justice to our extensive activities in other areas,” Director General Yukiya Amano declared in his opening speech to the International Atomic Energy Agency’s 54th General Conference, held September 20–24 in Vienna. “This year, we are focusing on cancer, which is the subject of the Scientific Forum,” he said. Amano highlighted the agency’s activities and achievements over the 10 months since he assumed office (he succeeded Mohamed ElBaradei, who had served as director general for four terms and along with the agency was awarded the 2005 Nobel Peace Prize).

Regarding nuclear power activities, Amano noted that the growing importance of nuclear energy has had a significant impact on the agency’s work in recent years, leading to a stronger focus on the needs of “newcomer” countries. “It is not an exaggeration to say that we have entered a new era,” he said. “We expect between 10 and 25 new countries to bring their first nuclear power plants on line by 2030.” For all countries expressing an interest, the agency focuses on the fundamental issues and priorities for a nuclear country, notably offering advice on how to put in place the appropriate legal and regulatory framework and how to ensure the highest standards of safety and security, without increasing proliferation risks. The agency can also offer independent expertise on the construction, commissioning, startup, and operation of nuclear reactors. The aim, he said, is for countries to “be able to introduce nuclear power knowledgeably and profitably.”

Amano stressed the following points, which he said he believes deserve attention:

- The agency should continue to respond to the needs of countries that are considering introducing nuclear power. Since taking office, Amano has added new staff mem-



Amano

*Among important issues discussed at the 2010 conference were cancer treatment in developing countries, international cooperation, and safety, security, and safeguards.*

bers, and expert consultants have been used to improve assistance to newcomer countries. In parallel, he said, “We will continue to assist countries which are expanding existing nuclear power programs. That is where most new reactors will be built.”

- The agency should encourage international lending institutions that are reluctant to support nuclear power projects to be more open to such projects. “Lending institutions could consider a new approach,” he said, “bearing in mind the fact that a large number of countries . . . may wish to include [nuclear] in their energy mix.”

- The agency should encourage a proper appreciation of the benefits of nuclear power in helping to mitigate the negative effects of climate change. These benefits deserve wider recognition.

- The agency should expand its activities in sharing best practices and disseminating information on waste management and disposal.

### Applications and cooperation

Amano explained why he made cancer in developing countries a high priority for his first year in office: “Some 665 people in developing countries die of cancer every hour—nearly three times as many as in developed countries,” he said. “Around 70 percent of cancers in developing countries are diagnosed too late for life-saving treatment. In many low-income countries, there is not a single radiation therapy machine. Treatment that can slow, or even eradicate, cancer is often simply not available. Millions of people who could be successfully treated die every year. Since 1980, the IAEA has delivered over \$220-million worth of cancer-related assistance to developing countries. I want to build on those efforts in the coming years.”

More generally, he said, the agency sees its work in radiation medicine as an important element in building up nations’ capacities in the field of human health. A new e-learning Web site, providing resources for

health professionals engaged in delivering radiation medicine, will soon be launched, he said.

Another important human health area in which nuclear technology has a role to play is water resource management. Amano noted that the IAEA recently initiated the IAEA Water Availability Enhancement Project, which is intended to help countries to acquire knowledge in this field.

The agency’s technical cooperation program, which primarily involves specific projects in member countries, is making a real difference in the lives of many people in developing countries, Amano said. “I am thinking of the farmer in the High Andes in Peru who can grow enough crops to feed his family and sell food at the market, thanks to nuclear techniques to boost crop yields in harsh environments; the child in Zanzibar who has milk to drink because the cows are not getting sick, thanks to the agency’s work to deploy the sterile insect technique, which helped to eliminate the tsetse fly; or the cancer patients in many developing countries whose disease is diagnosed in time for treatment, thanks to the agency’s assistance.”

New resources for the technical cooperation program as a whole rose to \$112.2 million in 2009 from \$91.5 million in 2008, Amano noted, with human health remaining the largest area of activity overall. For example, he said, the agency has helped countries establish safe and effective radiotherapy capabilities, provide higher quality treatment to cancer patients, and build up their expertise in food irradiation so that they can improve both the safety and quality of food and increase their exports.

“Capacity-building is at the heart of our work in technical cooperation,” Amano said. “The ultimate goal is to make countries self-sufficient—to help them establish or maintain a sustainable, highly specialized and trained human resource base in all areas of nuclear sciences and applications. For example, the agency helps member states to build the capacity to plan and introduce nu-

*This report was prepared by International Editor Dick Kovan, with contributions also from Gamini Seneviratne, who is based in Vienna.*

clear power. We help countries that already have operating plants to strengthen their capacities for training and management, for better managing long-term operation, and for lifetime planning for more efficient de-commissioning.”

### Nuclear safety and security

Amano said that the IAEA will continue to promote an integrated approach to safety, focusing on management systems, effective leadership, and safety culture. He added that the agency will also help maintain a high level of nuclear safety by promoting international cooperation, providing safety review services to member states, and supporting knowledge networks and training. He particularly noted the already widespread international support for the *Code of Conduct on Safety and Security* and the supplementary *Guidance on the Import and Export of Radioactive Sources*, whose adoption and implementation by member states in cooperation with the agency have produced significant improvements in regulatory infrastructure and capability in managing radioactive sources in many countries.

Another important challenge for the agency, Amano said, is to improve safety infrastructures surrounding the medical use

milestone of having 100 Additional Protocols to safeguards agreements in force (the actual number now stands at 102). This is an encouraging development, he said, as the Additional Protocol is an essential tool that allows the agency to provide credible assurance that nuclear material declared by a state is not being diverted from peaceful uses, and also that the state does not possess any undeclared nuclear material or have any other activities under way.

On safeguards issues, Amano said that he had nothing new to report on implementing agency safeguards in Syria and Iran. Furthermore, since the agency has not had any inspectors in North Korea since April 2009, there was nothing to report there either. North Korea, he said, has not permitted the IAEA to implement safeguards since December 2002, and it has not implemented the relevant measures called for in United Nations Security Council Resolutions 1718 and 1874. “I again call on all parties concerned to make concerted efforts for a resumption of the Six-Party Talks,” Amano added.

Discussions have been taking place for some time on possible measures to ensure reliable supplies of nuclear fuel to member states. In March, with the approval of the IAEA Board of Governors, Amano signed

an agreement with Russia to establish a low-enriched uranium reserve there to help assure supplies of nuclear fuel to member states. He also called for members to move forward in developing an IAEA-managed fuel bank (or similar system) for providing fuel-supply assurance to those countries that agree to forgo the develop-

ment of sensitive fuel technologies, such as enrichment.

### Scientific Forum

In conclusion, Amano returned to the topic of this year’s Scientific Forum. “This is the culmination of our special focus on cancer this year, which has already started to bear fruit. I believe we have succeeded in raising awareness of the problems of cancer in developing countries to a higher political level. Our cooperation with the World Health Organization is going from strength to strength. Confirmed pledges and donations to our Program of Action for Cancer Therapy are running at record levels. We are also seeing a very strong commitment by developing countries to our activities, which has led to an improvement in the quality of some of our cancer-related technical cooperation projects.” He then made another ap-

peal for members to actively support the agency’s work related to cancer control.

## Euratom-IAEA cooperation in safety, safeguards, security

In his statement to the IAEA 54th General Conference, Dominique Ristori, deputy director general of the European Commission, described how cooperation between Euratom (the European Atomic Energy Community, effectively the European Union acting in the nuclear sphere) and the IAEA has intensified in recent years in the crucial fields of safety culture, security, and non-proliferation.

The EC provides support to IAEA safeguards activities through its Safeguards Support Program, Ristori said, which covers more than 40 safeguards projects that are integrated with the nuclear security agenda of the EC’s Joint Research Centre.

As a result of their cooperation in implementing nuclear safeguards, Ristori added, all EU non-nuclear weapon member states have now acceded to Euratom’s safeguards agreement and its additional protocol (which mirror the respective IAEA documents). The use of “integrated safeguards,” which have been championed by the agency, was started in all EU countries with significant nuclear facilities at the beginning of this year. Integrating the various elements of a country’s safeguards system, he said, allows the IAEA to apply its measures in a less prescriptive and more customized manner, thereby reducing the agency’s inspection effort while maintaining effective international safeguards within the EU. An Integrated Safeguards Partnership Approach has been finalized by the two organizations related to inspection practices at the various types of facilities, with particular attention paid to gas centrifuge enrichment plants.

The EU also provides substantial support for IAEA nuclear security activities, Ristori said, and is one of the main donors to the agency’s Nuclear Security Fund, both collectively and through contributions of individual member countries.

He noted that the Instrument for Stability (IfS) forms the basis for EU action in nuclear security-related fields, with €300 million (about \$414 million) being provided for cooperation with third countries in the period 2007–2013. A major IfS contribution is earmarked for support of an IAEA fuel bank, which the agency proposes as a backup supply of low-enriched uranium to ensure that member states have access to fuel in the event of unexpected supply disruptions. Ristori said that the IfS program also anticipates the creation of chemical, biological, radiological, and nuclear (CBRN) centers in countries outside the EU to support cooperation in security efforts, providing work for scientists and engineers in these areas, as well as combating illicit traf-

## Effective national and global response capabilities are essential to minimizing the potential impacts of incidents and building public trust in the safety and security of nuclear technology.

of radiation. As medical technology using ionizing radiation continues to evolve and new technology and techniques are used globally, including in developing countries, it is important that countries’ safety and security infrastructures keep pace with developments.

With regard to nuclear and radiological incidents and emergencies, he continued, effective national and global response capabilities are essential to minimizing the potential impacts of incidents and building public trust in the safety and security of nuclear technology. He also revealed that the infrastructure of the agency’s Incident and Emergency Center, which he described as “the global focal point for international preparedness and response” in this area, will be further enhanced in the coming year.

Regarding nuclear verification activities, Amano welcomed the IAEA’s reaching the

ficking of nuclear and radioactive material and illicit financing of these activities, and providing export control. The EC plans to establish CBRN centers in South Asia and the Middle East in 2011.

Substantial collaboration is also under way in the area of nuclear safety. Here, said Ristori, the EC benefited from IAEA support in preparing major EU nuclear safety legislation (Council Directive 2009/71/Euratom), which was adopted in June 2009. Agency support “ensured a sound and coherent approach and, at the same time, established the ground for continued enhanced cooperation,” he said. The directive brought into EU law the IAEA Fundamental Safety Principles and obligations under the Convention on Nuclear Safety, making the EU the first major region to give legal force to the main IAEA international safety standards. Ristori noted that the EC has urged making these standards binding worldwide.

In the run-up to the 25th anniversary—in April 2011—of the Chernobyl accident in Ukraine, an EC-IAEA-Ukraine joint project for the safety evaluation of Ukraine’s nuclear power plants has been successfully concluded, Ristori said. The project has provided a wealth of experience to all parties involved and a useful model for similar evaluations in other countries.

Since 2005, Ristori said, Euratom has been a party to the IAEA Early Notification and Assistance Conventions, which deal with radiological emergencies. To support this area, the two organizations have agreed to cooperate in the area of real-time radiation data exchange. Also, Ristori added, the EC cooperated with the IAEA and other international organizations to establish in 2002 the International Action Plan for the Radiation Protection of Patients, and as a member of the plan’s steering panel, the EC fully supports a proposal for a 2012 international conference on the radiation protection of patients.

## Steven Chu on U.S. support of the IAEA

The IAEA General Conference opening-day speech of U.S. Energy Secretary Steven



Chu

Chu reflected the priorities of President Barack Obama, set out in a message that Chu read to the meeting attendees. The message stressed the need to contain the dangers posed by nuclear energy while harnessing its potential for development and peaceful uses, and in this regard, Obama’s message said, “The United States stands with the IAEA.” The message continued: “The international nonproliferation

### PRESS CONFERENCE

## DOE’s Chu presents views on nuclear

Secretary of Energy Steven Chu called nuclear fission a “bridge technology” that is needed to carry us through to when “clean” sources of energy take over. Speaking at a press conference on September 21—the second day of the IAEA General Conference—Chu referred to renewable sources of energy, such as wind, solar, and biomass, as being derived from the “sun’s nuclear energy.” These sources are developing quickly, he said, but acknowledged that the problems typical of renewables—low energy density, intermittency, and need for very sophisticated transmission, distribution, and storage systems—mean that it will take decades for them to take over from fission. He said that he hopes that the transition will be completed by the end of this century.

Asked if breeder reactors will be needed, Chu said, “We don’t know,” but he did refer to what he calls hybrids, such as “wave-technology” systems, in which plutonium is bred and burned in the reactor, not retrieved for recycling in mixed-oxide fuel. The objective, he said, is to extract more of the energy from the fuel and reduce the amount of waste. He stressed, however, the risk of investing in any one energy source, adding that it makes sense to pursue a diverse set of energy options, including the breeder, which is what the world is doing. “We will see what wins,” he said.

Asked to expand on the comment during his presentation to the General Conference the previous day that funding for the establishment of an IAEA-administered fuel bank could be at risk (see article on page 45), Chu said simply that the United States is anxious to conclude the talks, which have been going on since 2008. The fuel bank is not an alternative source of low-enriched uranium, he

system has not always worked as we would hope. For this reason, the United States has called for added resources and authorities for the IAEA, penalties against those who violate their nonproliferation obligations, and new international mechanisms that ensure the safe, secure, and peaceful uses of nuclear energy.

“The United States will continue to do its part,” the message said, “having this year convened the first Nuclear Security Summit, which highlighted the risk of nuclear security at a head-of-state level, revised our nuclear posture, and reached agreement with Russia on a new nuclear arms accord.”

stressed, but is a mechanism to ensure a supply of nuclear fuel to countries that meet their nonproliferation obligations. The time for debating the principles of the fuel bank and discussing the concerns of different countries is over, he said, noting that the United States has held bilateral talks with a number of countries and believes that their concerns can be dealt with. Specific proposals for a resolution should be ready for the December IAEA Board of Governors meeting.

In answer to a question about spent fuel in the United States, Chu said that salt domes are a better type of medium for spent fuel than the conditions at Yucca Mountain. There are salt domes that have been radioactively dated and determined to be stable for tens of millions of years. The downside is that once spent fuel and high-level waste are placed in salt, they cannot be retrieved; the upside is that this means that salt is an excellent medium for final disposition.

Chu also remarked that because spent fuel can be safely stored for long periods, there are no impending issues that must be dealt with. In the meantime, he added, the United States is looking at several options, such as developing technologies to extract more of the energy content from the fuel and for burning long-lived actinides to reduce the resulting amount of waste, but it will take a couple of decades to develop this process. The Blue Ribbon Commission on America’s Nuclear Future, which is looking at long-term solutions for nuclear waste disposal, has been instructed not to make a decision based on today’s technology, but to look ahead at least half a century.

Regarding plutonium, Chu stressed that while plutonium from former defense programs is being downblended for burning in power reactors, the use of plutonium derived from civilian spent fuel is not being considered. “We have not found it to be commercially attractive or in our interest” to recycle this material in thermal reactors, he said.—D.K.

Obama also noted the delays in setting up an IAEA fuel bank, which would be “designed to support countries’ access to peaceful nuclear energy by underpinning the international nuclear fuel market. The time to act is now,” he said.

Expanding on Obama’s vision, Chu focused on four areas: promoting the peaceful use of nuclear energy, strengthening nonproliferation and international safeguards, advancing disarmament, and keeping nuclear material out of the hands of terrorists.

While the first area highlighted the potential of nuclear energy, Chu stressed the need to build a new framework of coopera-

tion so that countries can access peaceful power without increasing the risks of proliferation. As in Obama's message, Chu referred to various mechanisms to assure supplies of fuel so that member countries need not develop their own sensitive fuel technologies, such as uranium enrichment. A preliminary measure the United States has already taken was to downblend 17.4 metric tons of high-enriched uranium (HEU) into low-enriched uranium (LEU) to be held in reserve to support a fuel assurance mechanism. (For details on Chu's comments on fuel bank initiatives, see the related story on p. 45; also see the Special Section on Non-proliferation for further discussion of this topic.)

Chu also mentioned the name change made to the Global Nuclear Energy Partnership, which is now called the International Framework for Nuclear Energy Cooperation. The organization will seek wider international participation and will work closely with the IAEA to provide advice on infrastructure development for nations that are expanding and developing their nuclear power programs, and will help to create international mechanisms to assure reliable access to nuclear fuel services.

As part of the United States' commitment to the IAEA, Chu also mentioned the new Peaceful Uses Initiative announced by U.S. Secretary of State Hillary Clinton in May at the United Nations' 2010 Non-Proliferation Treaty (NPT) Review Conference. "This initiative will raise \$100 million to expand support for new and underfunded IAEA projects in developing countries," Chu said, with the goal of advancing medical technology, food security, water resource management, and the infrastructure needed for the safe and secure use of nuclear power.

The United States, Chu said, also supports significantly increasing the IAEA's regular budget, which is particularly important for the second area of concern: strengthening nonproliferation safeguards to increase the security of nuclear material around the world. "New facilities require safeguards and technologies require updating, yet the IAEA safeguards budget has remained relatively static," he said, adding that the Department of Energy "has also undertaken a major effort called the Next Generation Safeguards Initiative to identify technology gaps and solutions, train new experts, and develop new concepts and approaches to improve international safeguards."

Referring to Obama's message, Chu stressed, "For countries that do not adhere to their safeguards commitments there must be real and timely consequences. Iran's intransigence represents a challenge to the rules that all countries must adhere to," he added. "Iran must do what it has thus far failed to do—meet its obligations and assure the rest of the world of the peaceful na-

ture of its intentions." Chu noted that the United States has already taken action by way of the sanctions that the Obama administration has levied against those trading with Iran. Canada, Australia, South Korea, and the United Arab Emirates have also taken similar steps.

In the area of disarmament, Chu noted, "The United States is reducing the role and numbers of our nuclear weapons, extending a security assurance toward nations that are in compliance with the NPT and their nuclear nonproliferation obligations." In cooperation with Russia, he added, the United States has requested that the IAEA verify the disposition of enough weapons-grade plutonium for approximately 17 000 nuclear weapons, with the goal of completing the preparation of the required verification agreement for consideration by the IAEA Board of Governors by the end of 2011.

Regarding the issue of keeping nuclear weapons out of terrorists' hands, the United States is working with the IAEA, international institutions, and countries around the world to secure vulnerable nuclear and radiological materials. "We have accelerated HEU removal efforts and successfully removed all HEU from 18 countries," he said. The U.S. has also worked with international partners to convert research reactors and isotope production facilities from HEU to LEU fuel and targets, he added, and is developing medical isotope production processes that do not require the use of HEU.

Chu concluded that with the actions that have been taken over the past year, significant progress has been made toward a world that is safer and more secure. "Nuclear power will play a growing role in meeting the world's energy needs, and nuclear dangers will remain. And the IAEA will only increase in importance in the years to come."

## **INPRO's 10th anniversary: Looking back and ahead**

Festive, political, and technical events to mark the first decade of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) were held in conjunction with the IAEA General Conference. Steven Chu, secretary of the U.S. Department of Energy, and Sergei Kiriyenko, head of Rosatom, Russia's state atomic company, were among the top energy administrators whose presence at the events

underlined the project's importance to the global nuclear community.

Chu acknowledged INPRO's role in the global preparation for a sustained nuclear power future. "As the world moves toward a clean, low-carbon future, nuclear power will play an increasing role in our energy mix. We need to make sure that nuclear energy is used in a safe, secure, responsible, and sustainable way. INPRO is one part of

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## **"INPRO plays an important role in understanding the future development of nuclear energy systems from a national, regional, and global perspective."**

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achieving this goal."

Kiriyenko said that Russia is committed to making further significant contributions to help develop the project. He urged IAEA member countries "to make maximum use of INPRO's potential for practical utilization of advanced technologies and to strengthen international cooperation in applications of nuclear energy."

Representatives of many other countries also declared their national commitments to INPRO. Norma Boero, president of the National Atomic Energy Commission of Argentina, said, "INPRO plays an important role in understanding the future development of nuclear energy systems from a national, regional, and global perspective." And Frederic Mondoloni, a member of the IAEA's Board of Governors representing France, assured INPRO of France's continuing support. "France considers INPRO to be the right forum to enhance information exchanges and discussion between member states and to allow the transmission of knowledge on nuclear energy," he said.

Srikumar Banerjee, chairman of India's Atomic Energy Commission, noted that India has been a member of the project since its inception, and that its association with INPRO has been "extremely beneficial for the Indian nuclear program," and although Japan is an observer and not yet a full member of INPRO, Shunsuke Kondo, chairman of the Japan Atomic Energy Commission, renewed his country's support for the project.

Yutaka Sagayama, chairman of the Generation-IV International Forum (GIF), the other major international group that is focusing on nuclear innovation for the future, spoke of the importance of cooperation between INPRO and GIF for the development of next-generation nuclear reactor systems.

A separate technical event recalled the ra-

tionale of INPRO's initiation and what has been achieved so far. An invited panel of specialists discussed some of the challenging areas addressed by INPRO, such as nuclear sustainability, partitioning and transmutation of nuclear waste, transmutation issues of next-generation reactors, and the challenges of developing a nuclear power program for a country with a small- to medium-sized grid. The panel discussion produced a number of topics for future INPRO work, including thorium-fueled reactors and fast reactor safety. Indonesia proposed that more direct assistance be provided to developing countries for the development of sustainable nuclear strategies, and Russia called for INPRO's involvement in its Multifunctional Fast Research Reactor project.

Considerable support was given to the continuation of the INPRO Dialogue Forum and to helping newcomer countries introduce nuclear into their energy mix. The forum, recognized as a significant first-decade achievement, is a platform for communication among technology holders and users. For nuclear newcomers, it is a route to acquiring knowledge and to effectively participating in collaborative research projects carried out by INPRO member countries.

Perhaps the single most important achievement of INPRO's first 10 years was a methodology to thoroughly assess all of the key aspects of nuclear energy systems, including economics, environmental impact, infrastructure, physical protection, proliferation resistance, safety, and waste management. Known as the Nuclear Energy System Assessment (NESA), it was published in nine volumes in 2009, although INPRO members were able to use it before its official publication. In a statement the

particular to the regular interface meetings with GIF. During the technical event, the U.S. State Department's Alex R. Burkart, deputy director of the Office of Nuclear Energy, Safety, and Security, said that INPRO became the one international activity through which both developed and developing countries were talking about common problems and issues.

"When the United States first articulated the desire to develop a smaller reactor more appropriate to the smaller grids of developing countries, it went to INPRO to seek user views, resulting in the Common User Considerations study, which explored in some detail what developing countries really wanted. The INPRO Dialogue Forum has built on that effort as a continuing means of information exchange on specific issues," Burkart said.

Kiriyenko commented: "INPRO has become a generator of new approaches and solutions in the area of nuclear power infrastructure, at both national and international levels. The IAEA utilizes these developments in its activities on nuclear power infrastructure. Other pioneering activities [include the] development of innovative solutions to deploy transportable nuclear power installations of small and medium size. Such solutions address the needs of small grids, remote locations, and countries with limited national resources to develop large-scale nuclear power."



Kiriyenko

Asked to elaborate on the word "innovative" in INPRO's title, project leader Randall Beatty said that it suggests advanced reactor designs that incorporate radical conceptual changes in design approaches or system configuration, as compared with existing practice. "Innovative systems encompass not only electricity generating plants, but also plants (of various size and capa-

city) for other applications, such as high-temperature heat production, district heating, and seawater desalination, to be deployed in developed regions as well as in developing countries."

Looking to the future, Beatty said that a two-year plan has been prepared, and a five-year plan is in its formative stages. In essence, the project's specific niche is to develop tools such as the INPRO methodology to assess sustainable nuclear energy; en-

gage in activities that benefit all IAEA member countries, including nuclear newcomer countries, which share expectations of nuclear expansion; support long-range strategic planning; and complement other initiatives, such as GIF.

The Dialogue Forum will continue, focusing on institutional innovations, multilateral regional centers, and services that cover technical support, education and training, waste management and storage, enrichment and reprocessing, and fuel leasing and take-back. Other activities in the near-term will be in nuclear law and international instruments; harmonization of international approaches and guidelines for safety and safety culture; and, in the noneconomic area, factors that influence a decision to deploy nuclear energy, such as energy security, energy supply, energy diversity, and technology transfer.

With Poland recently joining, INPRO membership now stands at 32 (31 countries and the European Commission) and is due to increase. Cameroon, Malaysia, Romania, Tunisia, Vietnam, and the United Kingdom are considering membership.

## IAEA supports UAE's Khalifa University

The IAEA and the Khalifa University of Science, Technology and Research (KUSTAR) in the United Arab Emirates (UAE) signed a "Practical Arrangements" agreement to establish an e-learning portal aimed at supporting cooperation in education, training, and research in nuclear science and technology. The agreement was signed on September 21 by Yuri Sokolov, the IAEA's deputy director general for nuclear energy, and Tod A. Laursen, president of KUSTAR.

The new portal, which is designed to supplement classroom studies, was recently installed, along with the Asian Network for Education in Nuclear Technology (ANENT), at the KUSTAR Abu Dhabi campus, where it is now in pilot operation. These online resources are aimed at supporting the UAE's



Sokolov

efforts to educate the experts and leaders needed to drive and sustain the nation's nuclear power development plans. Human resource development has become an increasingly important strategic consideration since the country embarked upon its ambitious nuclear power program, having ordered four power units from a Korean-led consortium in December 2009. KUSTAR plays a vital role as the UAE's only educational and training institution devoted to nuclear engineering at the master's

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week after the conference, INPRO manager Yuri Sokolov, IAEA's deputy director general for nuclear energy, said that NESA has now been applied by 11 countries according to their national and international priorities, and that two—Belarus and Kazakhstan—are currently performing assessments, while Indonesia, Italy, Jordan, and Poland are planning assessments.

INPRO also works with other international initiatives, Sokolov said, referring in

level.

The cooperation between the IAEA and KUSTAR is intended to promote the use of ANENT's e-learning system. ANENT was established in 2004 as a regional partnership for cooperation in capacity building and human resource development, including education and training in the peaceful uses of nuclear technology, in Asia. ANENT currently comprises 16 member countries: Australia, Bangladesh, China, India, Indonesia, South Korea, Lebanon, Malaysia, Mongolia, Pakistan, Sri Lanka, the Syrian Arab Republic, Thailand, the Philippines, the UAE, and Vietnam.

## Teletherapy unit donated to Sri Lanka

India's donation of a teletherapy unit for cancer treatment to Sri Lanka, through the IAEA's Program of Action for Cancer Therapy (PACT), was marked by a special ceremony at the IAEA General Conference on September 22. The donation of a Bhabha-tron II unit supports a PACT initiative to implement a comprehensive cancer control program in Sri Lanka. Representing Sri Lanka at the ceremony was Wimaladharm Abeyewickreme, chairman of the country's Atomic Energy Authority.

At the event, Werner Burkart, IAEA deputy director general and head of the Department of Nuclear Sciences and Applications, described the donation as a "triumph of hope and collaborative effort to control cancer in developing countries. India's initiative is making radiotherapy more accessible, saving lives and lessening suffering," he said. He also acknowledged Sri Lanka for making cancer diagnosis and treatment a priority. The country has been earmarked as one of three Model Demonstration Sites in the Asia/Pacific region.

Created by the IAEA in 2004 in response to the developing world's growing cancer crisis, PACT aims to raise cancer awareness, assess needs, develop demonstration projects, and attract donors. PACT promoted the development of the World Health Organization/IAEA Joint Program for Cancer Control, and also aims to work with leading cancer organizations to develop partnerships to support the countries in their fight against cancer and raise funds for cancer control where they are most needed.

Srikumar Banerjee, chairman of India's Atomic Energy Commission, praised PACT for its role as a vehicle for channeling resources. "PACT has a major impact on cancer treatment in the developing world," he said. Rajendra Achyut Badwe, director of Mumbai's Tata Memorial Center, India's national comprehensive cancer center, said, "We strive to see that uniform cancer care is offered throughout India and to neighboring countries," with the goal of trying to ensure that no patient feels hopeless.

## SCIENTIFIC FORUM

### Cancer a growing threat in the developing world

The two-day Scientific Forum, held annually as a regular side event of the IAEA General Conference, this year focused on how to improve cancer control and care in developing countries. World Health Organization (WHO) Director General Margaret Chan called the rise of cancer in low- and middle-income countries "an impending disaster."

In a video message to the September 21-22 event, Chan said that cancer is "a complex disease that must be tackled on multiple fronts by multiple partners." Seven of every 10 cancer deaths now occur in the developing world, where 5.5 million deaths



Chan

annually will rise to 9 million a year by 2030 if no concerted action is taken, according to WHO estimates. "In the same period, cancer deaths in wealthy countries are expected to remain fairly stable," she said. Most health systems in the less-wealthy developing countries are designed to cope with episodes of infectious disease, and are unable to cope with the "simply crippling" costs of cancer care. They lack the capacity "for prevention, public education, screening and early detection, diagnosis, and treatment," Chan noted, whether it involves surgery, chemotherapy, or radiotherapy. She added that many of these countries "do not possess even a single radiation therapy machine."

IAEA Director General Yukiya Amano opened the forum, underscoring the need for global cooperation to improve cancer control and care in developing countries.

"The lesson for all of us here is that we, too, need to work together [to] share experience, expertise, and knowledge to ensure that cancer patients gain access to the best modern treatment and care."

Amano and Chan both reiterated the now universally shared view that cancer is no longer a

disease of wealthier countries alone. When Amano began his tenure as head of the agency at the end of last year, he committed to making cancer control the IAEA's highest priority in his first year in office. The forum theme, "Cancer in Developing Coun-

tries: Facing the Challenge," is a highlight of that undertaking.

"The IAEA's expertise lies in radiotherapy, nuclear medicine, radiology, and medical radiation physics. We provide equipment and training, deliver know-how and technical support, and help developing countries establish cancer control policies and centers." Since 1980, Amano said, the IAEA has provided over \$220 million worth of cancer-related assistance.

He said that the agency's Program of Action for Cancer Therapy (PACT) works with WHO and many other partners to help developing countries establish comprehensive national cancer control programs. "But more than 80 percent of Africa's 1 billion inhabitants still have no access to basic radiotherapy and related cancer services."

In this regard, Massoud Samiei, the head of PACT, recently estimated that there is a shortfall of around 7000 radiotherapy machines at prevailing cancer rates, mainly for lack of funds. To address this, PACT has initiated a process to try to encourage manufacturers—through consultations and meetings that bring together users and suppliers—to simplify their designs and make them more affordable and suitable for developing countries' needs. Currently it would cost around \$4 million to set up a radiotherapy clinic in a developing country. PACT's aim is to persuade manufacturers to produce a package that would include all of the essential elements and components for a cost of \$1 million. At least two manufacturers have said that they are working on this. "I understand that they are hoping to put them on the market very soon," Samiei added.

In an agency secretariat paper, the cancer crisis in the less-wealthy world is summarized: "Cancer kills more people than HIV/AIDS, tuberculosis, and malaria combined and is second only to heart disease." The paper also notes that WHO estimates that 84 million people will die in the next 10 years,

**PACT has initiated a process to try to encourage manufacturers to simplify their designs and make them more affordable and suitable for developing countries' needs.**

most of them in poor countries, if action is not taken now.

"More than one-third of cancers can be prevented and another third are curable if detected early," the paper states. "But in

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many developing countries with overburdened health systems, cancer is a low priority in terms of allocated resources, and there are few screening or prevention programs. About 70 percent of all cancer cases are diagnosed too late.”

The IAEA expected that this year’s Scientific Forum would come up with effective strategies and solutions to the crisis through interdisciplinary deliberations among its participants, representing the whole spectrum of people active in combating cancer. Accordingly, participants included senior government policy makers and officials, WHO, and several other international non-governmental organizations (NGO), including the Union for International Cancer Control, the Lance Armstrong Foundation, and Breast Health Global Initiative, as well as industry, technologists, and medical personnel.

Amano said that he hoped that at the end of the event, participants would better understand how best to work across disciplines to fight cancer in developing countries. He added that cancer is an overlooked aspect of global health, and that a global gathering such as the Scientific Forum could strengthen international cooperation, build public-private partnerships, and mobilize resources.

The forum consisted of six sessions: a simulated tumor board on a notional breast cancer patient; cancer as part of the global health agenda; partnering in fighting cancer; the IAEA’s role; emerging technologies; and safe and appropriate use of new radiation medicine technology.

All the sessions were moderated by Nik Gowing, a well-known British journalist and a principal program anchor for the international television news channel BBC World. Each session was guided by a panel



Panelists at a session during the Scientific Forum discuss the IAEA’s efforts to provide cancer treatment capabilities to developing countries worldwide. (Photo: IAEA/Dean Calma)

gle presentation of less than an hour. It gives the audience a snapshot of patient-therapist experience and interactions. In countries with developed health systems, real-life tumor boards are held routinely as collaborative consultations among the medical specialists responsible for a patient’s care. The purpose of these boards is to ensure that the best possible treatment is provided.

The forum simulation involved radiologists, nuclear medicine specialists, surgeons, radiation oncologists, pathologists and oncologists from Brazil, Canada, Singapore, South Africa, and Sweden. They played their real-life roles in simulating the care and counseling of a make-believe breast cancer patient.

Following the simulation, participants aired their appraisals and experience. Many pointed out that most developing countries lack the trained medical specialists, equipment, and supporting infrastructure to put such a simulation into practice. Nevertheless, the exercise was seen as a valuable demonstration of the complexities of cancer care, and also illustrated how cancer care systems should be developed. Participants stressed the widespread need for more coordination and resources to allow for such an infrastructure to be put

them. On the other hand, experience in treating diseases such as AIDS and tuberculosis, in rich and poor countries, demonstrates that existing technologies may be quite adequate, or even more suitable, in less well-endowed cancer/health systems. The best approach, then, is to focus on making the most of what is available while gradually upgrading equipment and systems, participants said.

### An Indian approach

On the subject of upgrading systems, India’s Three-Tier Tele-Networking System for Comprehensive Radiotherapy Care aroused a great deal of interest and is likely to benefit other developing countries that adopt or adapt it. As described by a representative of the Gandhi Cancer Institute and Research Center, the first stage of the system involves creating new radiotherapy facilities with basic teletherapy units.

These primary radiotherapy centers, which would be responsible for early detection and preventive oncology in various communities, would be augmented by secondary radiotherapy centres that would provide teletherapy, brachytherapy, and simulator and treatment planning. The third stage is a center with advanced treatment facilities, teaching, training, and research to deal with only the most complex cases that have been referred from the lower-level centers.

Another point stressed by experts on the panel and from the floor was that staff should be well trained to handle new technologies before any are obtained. Such prior training is frequently not required in many facilities around the world, and as a result, patients’ safety may be at stake. As noted by forum participants, despite constraints, developing countries are acquiring more machines to diagnose and treat cancer, which is leading to growing concerns about patient safety.

Cancer experts and regulators explored

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of leading cancer specialists. The program was designed in a format that facilitated discussion, and audience participation was a key feature of the event.

The “simulated tumor board” presented at the first session was developed as a teaching tool in medical training. In essence, it condenses a course of care and therapy that would normally take many years into a sin-

in place.

In other sessions, new and emerging technologies were described, especially diagnostic tools for early detection that could potentially save more lives than existing ones. But the discussion made clear that these tools are beyond the reach of resource-poor countries, which lack both cash and the capability to procure and deploy

problems and possible solutions related to the safe and appropriate use of new radiation medicine technology in developed and developing countries alike. A Belgian expert said that the vast majority of accidents are caused by a lack of training and safety culture, not by faulty or inappropriate equipment, and a participant from France agreed that staff training and a safety culture are at least as important as effective regulation and safety standards.

### The forum report

Presenting his report on the Scientific Forum to the General Conference plenary, rapporteur Twalib A. Ngoma, executive director of Tanzania's Ocean Road Cancer Institute, noted that when the UN Millennium Development Goals were formulated, priority was given to HIV/AIDS, malaria, and tuberculosis. As a result, cancer and other noncommunicable diseases were marginalized in the global development agenda, even though cancer and heart disease are now the major causes of death globally.

Among developing countries, where the majority of cancer cases and deaths today occur, some are so poorly equipped to respond to the looming crisis that by 2030, of the estimated 13 million-plus deaths worldwide every year, about 9 million will occur in the developing world. The forum found a lack of global awareness of the enormous magnitude of this crisis.

The forum provided an opportunity to learn more about how to work together against cancer, Ngoma said. There is a need to strengthen international cooperation, build public-private partnerships, and mobilize new resources. The IAEA partnership with WHO is a great example of international organizations working for a common cause. International organizations cannot build cancer care infrastructures in developing countries, but they can assist by providing training, expertise, and advice, and by ensuring that their voice is heard.

For example, PACT is working with a growing number of member states to bridge the gap between the agency's work in the area of human health, as well as work that is under way in developing countries to establish comprehensive cancer care networks. "There was hope, passion, and energy in the discussions and some heart-rending stories," Ngoma said. "There was a young radiation oncologist from Malawi, the only one in his country, who has no radiotherapy equipment and can only prescribe chemotherapy. There were surgeons

who said they can only offer mastectomies to breast cancer patients rather than less disfiguring lumpectomies because they have no radiotherapy facilities."

The details of the technology and resource gap in the real world were also covered, with a recognition of the critical need for government support in the development of health systems. In this regard, the IAEA's significant role in providing radiation medicine know-how and training was acknowledged to be a key component in the fight against cancer.

Ngoma's report recommended the development of partnerships through PACT, built around technology, training, and services. The need to put regulations in place for the safe and appropriate use of radiation medi-

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cine technology was also stressed. "There was general agreement in the Scientific Forum that having cancer as part of the global development agenda is an essential prerequisite for addressing the growing cancer problem in developing countries," he noted.

Ngoma summed up the forum's report with the following recommendations:

- The agency should maintain the priority given to cancer within its programs and, in particular, continue to support, allocate, and mobilize resources for the implementation of its cancer-related program.
- The agency should continue to advocate for a comprehensive approach to cancer control, from prevention to palliative care, integrating the safe and effective use of radiation medicine in close cooperation with WHO.
- The agency should strive to further pursue the necessary steps to place cancer on the development agenda and to support the cancer control capacity-building efforts in its member states.
- The agency, member states, and NGOs should actively participate in the UN General Assembly's debate and discussions on the review of the Millennium Development Goals.

Ngoma also reported that participants in the Scientific Forum firmly believe that the support of world leaders and the UN system is crucial in order to turn the focus on the impact of cancer and other noncommunicable diseases across the developing world. ■