International Atomic Energy Agency
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Statement by Dr. Anil Kakodkar,
Chairman, Atomic Energy Commission and Leader of the Indian Delegation

Mr. President,

Kindly accept our congratulations on behalf of my Government and on my own behalf on your election as the President of the 50th General Conference. I am sure, under your able leadership and with the support of your team and the Secretariat of the Agency, this General Conference will be able to accomplish the tasks before it.

I take this opportunity to welcome the entry of the Republic of Palau, the Republic of Mozambique, the Republic of Malawi and the Republic of Montenegro to the Membership of IAEA.

Let me also use this occasion to once again congratulate Director-General Dr.Mohamed ElBaradei and the Agency for the well deserved Nobel Peace Prize.

Mr. President,

I would like to begin with a message from our Prime Minister Dr. Manmohan Singh to this fiftieth session of the General Conference of the Agency and I Quote:

Quote

“I am happy to convey my greetings to Members of the International Atomic Energy Agency, its Director-General, and members of IAEA Secretariat on the occasion of this 50th General Conference. Over the past five decades, the Agency has made commendable progress in fulfilling its objectives as laid down in its Statute. The Nobel Peace Prize awarded to Dr. ElBaradei and the Agency last year is a timely and well deserved tribute to the IAEA’s contribution.

The International Atomic Energy Agency is an unique organization in the entire UN system, founded on a strong science base and dedicated to spreading understanding of and knowledge about the benefits of atomic energy in a safe and secure manner, with special attention to those areas of the world where developmental needs and aspirations are yet to be fulfilled and are therefore most pressing. With issues related to energy resource sustainability assuming increasing salience and global climate change looming large as arguably the most serious challenge of our time, atomic energy with its immense energy potential and readily available and deployable technologies has become an inevitable and indispensable part of the solution.

Nuclear energy being unique in its ability to regenerate more fuel from uranium and thorium several ten-folds while producing energy, offers us the possibility of meeting global energy requirements in a non-polluting and sustainable manner. However, if we are to be successful in realizing the potential of the atom in meeting our needs,

we need to act in concert consistent with the spirit of global harmony and adhering to our respective international commitments. The IAEA and Director-General deserve high compliments for ensuring that the Agency is an effective platform for the global community to work together in its noble mission of 'atoms for peace and prosperity'.

India, home to one-sixth of the world population and having embarked on a rapid economic growth path, has a strong interest in utilizing the full potential of atomic energy for national development. I am confident this will be realized, based on our natural endowment of vast thorium resources and the development of effective technologies for their utilization.

We have developed advanced technological capability based on our own self-reliant efforts, while having maintained an unblemished record of responsible behaviour. I am glad that the emerging possibility for expanding civil nuclear cooperation between India and the international community would supplement and complement our domestic efforts to meet the developmental aspirations of our people through additional nuclear energy inputs. We look forward to cooperating with international partners in realizing this possibility.

While nuclear power is of crucial importance for sustainable development, of equal significance are other peaceful applications of atomic energy. The Agency's Programme of Action for Cancer Therapy (PACT) is one such important effort which I am happy to learn is being given special emphasis. India having developed

significant experience in affordable cancer – related programmes has been supporting this activity actively, and would be pleased to offer a recently developed Cobalt – 60 teletherapy machine (BHABHATRON) as a contribution to the Agency's PACT. It is my hope that the fiftieth session of the General Conference would be an important milestone in the ongoing and future work of the Agency. I wish you all productive deliberations and progress in your important tasks. My greetings and good wishes to all." Unquote

Mr. President,

The Agency and the Department of Atomic Energy, India, have traced history together. This year is also the 50th year of the Bhabha Atomic Research Centre, (BARC), the premier nuclear research centre in India. Dr. Homi Bhabha, the founder of the Indian Atomic Energy Programme, was the President of the first Geneva Conference on 'Peaceful uses of Atomic Energy' held during August 1955.

Mr. President,

The activities in atomic energy in India continue to make progress in accordance with the well established three stage nuclear power programme. Units 3 and 4 of the Tarapur Atomic Power Station, which are the 540 MWe indigenously designed and built Pressurised Heavy Water Reactor (PHWR) systems, are now in commercial operation. One more 220 MWe PHWR unit at Kaiga would also become operational before the end of this financial year.

The Government of India has recently approved pre-project activities on eight reactor units at four different sites with a total power generation capacity of 6800 MWe. With the completion of these Units alongwith other Units that are already under construction, the total nuclear power generation capacity in India would reach around 14000 MWe.

We now have sixteen reactor units with a total capacity of 3900 MWe in operation. Unit I of Kakrapar Atomic Power Station had a record continuous operation of 372 days before it was shut down for mandatory inspection. The average duration of outage of biennial shutdown has now been reduced to just 26 days.

Major upgrades for ageing management and safety were completed on three PHWR units. The safety upgrades at the two Boiling Water Reactors that started commercial operations in 1969, were completed in just four and a half months. The replacement of all reactor feeders of one of our PHWRs was accomplished for the first time in the world. One of our latest 540 MWe PHWRs was offered for pre-start-up peer review by an expert team of WANO. This was the first ever review of its kind in Asia. We are now ready for implementation of the newly designed 700 MWe PHWR units which would enable further significant reduction in the capital cost per MWe of indigenous PHWR units.

India considers a closed nuclear fuel cycle of crucial importance for implementation of its three stage nuclear power programme with its long-term objective of tapping vast energy available in Indian thorium resources, based on development of effective technologies for their utilisation. This is central to India's vision of energy security and the Government is committed to its full realisation through development and deployment of technologies pertaining to all aspects of a closed nuclear fuel cycle.

As a part of our development efforts in high level radioactive waste management technologies, India achieved two major landmarks this year namely (i) hot commissioning of Advanced Vitrification System (AVS) which employs Joule-heated ceramic melter and (ii) demonstration of Cold Crucible Vitrification Technology.

The Fast Breeder Test Reactor (FBTR) at Kalpakkam, which has been the foundation of our fast reactor programme, has shown excellent performance with an availability factor of over 90% in the last few campaigns. The unique U-Pu mixed carbide fuel used in FBTR has reached a record burn-up of 154.3 GWd/t without a single fuel pin failure. This achievement has been possible through a combination of stringent fuel specifications, quality control during fabrication and inputs obtained from the detailed post irradiation examination of fuel at different stages combined with the modeling of the behaviour of the fuel clad and wrapper materials. This year, we

have proposed to introduce mixed oxide fuel with 45% Pu in FBTR in order to increase the power level as well as to provide experience on the behaviour of high Pu content oxide fuel in fast reactors. Last year I had informed that the carbide fuel discharged from FBTR at a burn up of up to 100 GWd/t had been successfully reprocessed. This experience in the reprocessing campaigns have provided significant inputs to the design of the equipment and flow sheet for the Demonstration Fast Reactor Fuel Reprocessing Plant [DFRP], which is in an advanced stage of construction.

The construction of 500 MWe Prototype Fast Breeder Reactor (PFBR) is on schedule and is expected to be commissioned by the year 2010. In keeping with our philosophy of efficient utilization of a fuel material by closing the fuel cycle, we have embarked on the design and construction of a fuel cycle facility to cater to the PFBR. The facility will be commissioned by 2012.

Simultaneous with the construction of the PFBR we have already initiated programmes towards the conceptualization of the FBRs to follow, with the objective of further enhancing the fuel performance as well as making the energy production more economical. To ensure rapid growth in the fast reactor programme for meeting the energy needs in the country, we have already embarked on R&D programmes targeting towards the introduction of metallic fuel in fast reactors, which would provide much higher breeding. A host of R&D programmes in associated areas such as advanced materials, structural mechanics, heat transport, in-service inspection systems,

physics, chemistry, safety, etc., are being pursued to provide R&D inputs for further advancement of FBR technology. This comprehensive and indigenous programme in all major areas provides a strong foundation for India's fast reactor programme. India is also prepared to contribute to international efforts in scaling new technological frontiers in this field as an equal partner with other countries having advanced technological capabilities.

Thorium utilization is the long-term core objective of the Indian nuclear programme for providing energy independence on a sustainable basis. The third stage of the programme is thus based onThorium-Uranium-233 cycle. We are actively engaged in developing 300 MWe Advanced Heavy Water Reactor (AHWR). The design of this reactor incorporates several advanced features to meet the objectives being set out for future advanced nuclear reactor systems. A critical facility to validate physics design of AHWR will be functional this year. The facility is flexible enough to study the physics of advanced systems, including source driven systems, in future. Development of high current proton accelerator and spallation source for Accelerator Driven Sub-Critical Systems (ADS) is also being pursued. Such systems would offer the promise of shorter doubling time, even with Thorium, and incineration of long lived actinides and fission products, thus leading to the possibility of eliminating long-lived radioactive waste. A Compact High Temperature Reactor (CHTR), with 100 kW thermal power rating, is being developed as a demonstrator of technologies relevant for next generation high temperature reactor systems. Such reactor systems

will address the needs such as electricity generation in remote places, production of alternative transportation fuel such as hydrogen, and refinement of low–grade coal and oil deposits to recover fossil fluid fuel.

India has had a fusion research programme of its own since the early eighties. Two tokamaks have been indigenously built. The Steady State Super conducting Tokamak-SST-1 is currently undergoing commissioning tests. India has recently joined ITER as one of seven full partners. On the basis of indigenous experience and expertise available in Indian industry, India will contribute equipment to ITER and will participate in its subsequent operation and experiments. Indian scientists are also working on establishing an India- based Nutrino observatory for doing comprehensive research in Neutrino Physics, an area in which Indian research groups have sustained interest and have made significant contributions. We would welcome participation of interested international scientific groups in this effort. The 2.5 GeV synchrotron radiation source Indus-2 being set up at Raja Ramanna Centre for Advanced Technology, Indore, has started functioning. The utilization of the storage ring for condensed matter studies using the synchrotron radiation from the bending magnet beam lines has also begun.

The excellent safety record of Indian reactors and other facilities has been achieved through sustained Research and Development programmes. As part of the safety studies on nuclear

containment structures, the construction of a 1:4 size containment test model has been initiated at Tarapur. The ultimate load capacity of the containment would be studied on this test model and the experimental results would be available to the participants of a round robin exercise, which is being organized by us. We would welcome participation of interested research groups in this exercise.

As in the previous years, we have been interacting with the IAEA very closely in almost all its activities. We have been an active participant in the IAEA – INPRO programme. We were one of the six countries to perform a national case study for development of INPRO methodology under INPRO phase-1B part-1 activity which was done using the Indian Advanced Heavy Water Reactor. We are also involved in joint case studies on fast reactor with closed fuel cycle and high temperature reactors for hydrogen generation. We have also contributed to chapters of the INPRO document on guidance and methodology for assessment of economics, safety and waste management. We strongly support international cooperation through cooperative research and joint initiatives, as envisaged under INPRO phase-2. India remains supportive of the IAEA fulfilling its statute responsibilities, particularly the developmental and international co-operative dimensions of nuclear energy.

The Indian programme on the application of radioisotope and radiation in health, agriculture, industry, hydrology, water management and environment for societal benefit has a close match with several activities of the Agency. Our experts thus take active

part in all Agency activities. As a founder member, we participate actively in RCA activities. Last year, we had hosted 6 events in India. We have also hosted 34 IAEA Fellows and Scientific visitors. I am glad to inform this gathering that the International Union Against Cancer (UICC) selected the Tata Memorial Centre in Mumbai for the "Outstanding UICC Member organization" award for its outreach programmes related to cancer control. PACT programme drawn up by the Secretariat deserves our fullest and speedy support.

Mr. President,

A special event on "New Framework for Utilisation of Nuclear Energy in the 21st Century: Assurances of Supply and Non-Proliferation" is currently in progress as a part of this General Conference. Out of the current fleet of 443 nuclear power reactors operating in the world, less than half are under IAEA safeguards. Even in this scenario and with a very slow growth of nuclear power in the last two decades, the volume of human and financial resources needed for implementation of IAEA safeguards have constituted a large fraction of the resources available to the Agency. Now with anticipated rapid growth in demand for nuclear power, mainly in the developing countries, cost effective safeguards are essential so that the safeguard system does not itself become an hindrance to the development of nuclear power while at the same time providing the necessary assurances in terms of verification. India therefore feels it is necessary to look for institutional as well as technological solutions with enhanced proliferation resistance along with an assured fuel supply, without adversely affecting long-term sustainability of nuclear

fuel resources. Thorium offers a very important and attractive solution from this perspective and we urge the Agency and its members to give serious consideration of the possibilities offered by the Thorium route.

Over the years India has developed advanced capabilities in the utilization of thorium, as a part of its strategy to enhance nuclear capacity through a closed nuclear fuel cycle that would enable timely deployment of its thorium reserves. We are convinced that this is a viable and sustainable strategy for India's and global long term energy security. Seen in the context of nuclear power becoming a significant fraction of energy supply in a world where everyone is assured of a minimum of 5000 KWh of energy in a year, entire global Uranium if used in once through mode would last only a few tens of years. Even with a shorter term perspective of deployment of a proliferation resistant nuclear energy system that could address the need for incineration of available surplus plutonium, the use of thorium, in reactors using proven technologies, presents a vastly superior option as compared to other options based on fast reactors. In my presentation at the special event tomorrow I would elaborate on this aspect further. I will urge the IAEA to give a further boost to its activities that could lead to an early expansion of global reach and volume of deployment of nuclear energy, using thorium based fuel cycle as one of the important routes to reach the goal.

We have been constantly reminding the Agency of the need to maintain a balance between its promotional and safeguards related

activities. The risk arising out of global climate change and rapid depletion of global fossil fuels is real and substantial. We believe that future enhancement of the share of nuclear energy as a clean energy source is possible and feasible in a manner that satisfies the imperatives of nuclear safety and security. Let us therefore resolve that we would pool our scientific and technological abilities together in finding holistic solutions so that the next 50 years are seen as the golden period of nuclear energy development in meeting global energy needs. As a responsible state with advanced nuclear technological capabilities, India is prepared to play its part in this glorious endeavor.

Thank you Mr. President.