

**Statement by Dr. Anil Kakodkar,
Chairman Atomic Energy Commission &
Leader of the Indian delegation at
International Atomic Energy Agency
53rd General Conference, Vienna, 16 September 2009**



Madame President,

First of all, let me congratulate you on your election as the President of the 53rd General Conference. Under your able stewardship, and with the support of your team and the Secretariat of the Agency, this General Conference will be able to accomplish the many tasks before it.

I welcome the entry of Kingdom of Cambodia and the Republic of Rwanda to the membership of the International Atomic Energy Agency (IAEA). The expansion of our family is always a happy moment and I take this opportunity to convey our best wishes to each of our new members.

Madame President, this is a landmark year for the Agency. Dr. Mohamed ElBaradei, Director General, will be laying down office after his outstanding leadership of the International Atomic Energy Agency spanning the last 12 years. And if we look back further, it has been a magnificent quarter century of his association with the work of the Agency. Through his tireless efforts, the IAEA has been able to meet the many challenges before it. Apart from being the chief navigator of the Agency, he has also been a friend, philosopher and guide to its member States at all times.

In these years, one quality that can be said to define Dr. ElBaradei, perhaps more than anything else, is his constant personal concern and compassion towards humankind and the link he made between 'security' and 'poverty alleviation'. Indeed, when development needs remain unaddressed, the resulting misery often leads to conflicts and violence, which in turn further affect development efforts and impact on regional and global stability.

I take this opportunity to express our gratitude to Dr. ElBaradei for his outstanding leadership of IAEA and indeed all his efforts to make this world a better place. I wish Dr. ElBaradei a life of good health and happiness and one of continuing association with the Agency.

I also have immense pleasure in welcoming H.E. Mr. Yukiya Amano who will take over the reins from Dr. ElBaradei shortly. Mr. Amano brings with him his vast experience and exceptional diplomatic skills. I join others in conveying our best wishes as he prepares

for this new responsibility and assure him of our support in accelerating and enlarging the contribution of atomic energy to peace, health and prosperity throughout the world.

Role of atomic energy has become more relevant today than at any time before. There are several factors that dictate such a paradigm. Depleting earth resources and threat to global climate on one hand and the potential of nuclear energy to provide a large sustainable source of energy with negligible green house gas emissions that can address the development aspirations of a large part of humanity on the other being the major ones. There are however still some major barriers. Concerns on safety, proliferation and security as well as uncertainty in terms of assured fuel and other supplies over the lifetime of the plants would need credible and universally acceptable approaches before nuclear energy can play a role upto its full potential. In our view unless all related issues are addressed in a holistic manner, we are unlikely to reach a satisfactory solution. Compartmentalised approaches to safety, safeguards and security are unlikely to be sustainable in a scenario of expanding deployment of nuclear energy. We need technological solutions to reduce the risks arising from these factors.

We must also recognize that there is considerable urgency about our effective actions both in terms of access to means for development in under- developed areas of the world and reductions of carbon dioxide emissions. Concurrent progress on both these fronts is crucial to contain human conflicts and climate related disasters and prevent them from reaching a state of irreversible instability. Clearly, the IAEA and all its member states have a major responsibility towards reaching universally applicable solutions that are accessible to all.

The importance of nuclear power in India was recognized right since our independence in the year 1947. India has been pursuing a comprehensive programme in atomic energy covering the entire fuel cycle involving uranium, plutonium and thorium based fuels. While the three stage development of our nuclear programme is dictated by our prime long-term objective of realizing energy independence on the basis of our vast thorium resources, our understanding and experience with thorium clearly reveals several benefits of the thorium fuel cycle, particularly in heavy water reactors, in terms of proliferation resistant nuclear energy production as well as efficient fissile plutonium disposal. These features of a thorium based fuel cycle may also be of interest to other countries.

The 300 MWe Advanced Heavy Water Reactor (AHWR) being developed in India is mainly a thorium fuelled reactor with several advanced passive safety features. The safety features in its design would enable meeting next generation safety requirements such as three days grace period for operator response, elimination of the need for exclusion zone beyond the plant boundary, hundred year design life and high level of fault tolerance. The advanced safety characteristics of this reactor like Passive Containment Cooling System and Gravity Driven Water Pool have been verified in a series of experiments carried out in full scale test facilities. The reactor is manageable with modest industrial infrastructure within the reach of developing countries. Also, for the same amount of energy produced, the quantity of long- lived minor actinides generated is nearly half of that produced in current generation Light Water Reactors. Importantly, high level of radioactivity in the fissile and fertile materials recovered from

the spent fuel of AHWR and their isotopic composition preclude the use of these materials for nuclear weapons. Further, high level of fault tolerance provides for a much greater immunity even from insider threat. These features therefore, offer enhanced intrinsic proliferation resistant characteristics and high security strength.

A new version of AHWR named, Advanced Heavy Water Reactor – Low Enriched Uranium (AHWR-LEU) that uses low enriched uranium along with thorium as fuel has also been designed recently. The reactor has a significantly lower requirement of mined uranium per unit energy produced as compared to most of the current generation thermal reactors. This version of the design also can meet the requirement of medium sized reactors, in countries with small grids while meeting the requirements of next generation systems. While we strongly advocate recycle option, AHWR-LEU would also compete very favourably even in once through mode of fuel cycle. A [brochure of AHWR-LEU](#) has been made available at this conference.

High level radioactive waste disposal is another issue that needs attention. While we consider recycle option backed up by immobilization of residual waste in inert matrices as a proven technological option for safe geological disposal, there is perhaps a need to develop partition and transmutation technologies that will reduce the radioactive half life of the waste to a level wherein most of the radioactivity is lost within a practical time frame comparable with life span of institutions that are required to manage them. Clearly this necessitates intense research and development. Given the level of understanding and development that we have reached today, it seems to me that this is a realizable goal. Madame President, an important objective and guiding principle of the Agency in its work is to foster the exchange of scientific and technical information on peaceful uses of atomic energy. Here, I reiterate India's commitment to make a significant contribution to the growth of nuclear energy globally within the framework of IAEA.

I would now like to present some other achievements of the Indian nuclear power programme, which has by now clocked over 300 reactor years of safe and economic nuclear power generation. The Enmasse Feeder Replacement (EMFR) for RAPS-2 has been completed with highest degree of safety. This complex and technologically advanced project was carried out with entirely indigenously developed technology. India is one of the few countries in the world which have experience in the ageing management of nuclear power plants. Our PHWR units offer a wide range of possibilities in the small and medium reactor category with proven performance and cost competitive advantage.

Construction has been almost completed of three 220 MWe Pressurised Heavy Water Reactors (KAIGA-4 and RAPS 5 &6) while two 1000 MWe Light Water Reactors and one 500 MWe Prototype Fast Breeder Reactor (PFBR) are currently in advanced stages of construction. The unit size of Indian Pressurised Heavy Water Reactors have been further increased to 700 MWe and a series of such units are planned for installation in the country. Our Fast Breeder Test Reactor (FBTR) has successfully achieved yet another milestone with its unique (U,Pu)C fuel crossing 165 GWd/tonne burnup without any fuel failure. PFBR fuel which is under irradiation testing in FBTR has reached a burnup of 90 GWD/tonne.

Madame President, India's indigenous programme is set to accelerate. At the same time, India looks forward to mutually beneficial two-way nuclear cooperation with other members of the IAEA. Last year was a year of intense diplomatic activity in which India and other friendly countries with advanced nuclear technologies worked closely in order to consolidate the framework for cooperation. We are presently in the process of reformulating our plans for the larger scale programme implementation taking advantage of new possibilities that are emerging. This year is already a time for results and RAPS-2 (200 MW) is our first Pressurised Heavy Water Reactor that is operational using imported natural uranium.

Nuclear energy not only lights up bulbs and drives machines, but also has applications in medical field for raising food production and water management. Therefore, these areas need special thrust. During the 2007 IAEA General Conference, India offered a new Bhabhatron-II Teletherapy unit to the Socialist Republic of Vietnam under the Programme of Action for Cancer Therapy (PACT) of the IAEA. We are happy to report that Bhabhatron teletherapy unit was dispatched to Vietnam in August, 2009 and the high-capacity telecobalt source for this machine is also ready for shipment.

This year, two new mutant varieties were notified for commercial cultivation taking the total number of mutant varieties developed by Bhabha Atomic Research Centre (BARC) using nuclear techniques to 37. The interest of entrepreneurs in using radiation technology for hygenising and preserving food and allied products is increasing and 15 such facilities are now operational in India with some more under construction. Radiation technology has also helped India in increasing its exports of food items including to the most developed markets in the world.

Water is the basis for life and the greatest human civilizations have developed around water bodies. Not surprisingly, when we look for signs of life on other planets, we begin with the search for signs of water. And yet, if there is one crisis that threatens each one of us, it is the declining access to water. Our hybrid Nuclear Desalination Demonstration Plant (NDDP) at Kalpakkam, comprising of Reverse Osmosis (RO) based unit of 1.8 million litres per day commissioned in 2002 and a Multi Stage Flash (MSF) desalination plant of 4.5 million litres per day as well as a barge mounted RO desalination unit commissioned recently would help in dealing with the shortage of water in our water-stressed coastal areas. Rejuvenation of springs that are the sources of drinking water in villages on the foothills of Himalayas through use of isotope hydrology techniques is another example of the important role atomic energy can play in this vital area.

Madame President, as I have said earlier, we are now in an era where reserves of fossil fuels are finite and concerns regarding climate change and sustainable development are paramount. This is indeed the nuclear age and the challenge is to meet the enormous expectations of mankind from IAEA in the 21st century. It is India's firm belief that there is no substitute for intensifying joint collaborative activity within IAEA and we have, for instance attached the highest importance to INPRO from the time this programme commenced in 2001. There is the need for all member states to pool in resources and experience in the best interest of mankind. Such collaborative activities should be in the

form of participative partnerships that lead to capacity building and grass root level participation of all stakeholders.

In the final analysis, IAEA's success in intensifying the use of nuclear energy in the service of mankind is dependent on urgent action to develop human resources in adequate numbers. One of the biggest limitations to expansion of nuclear power, particularly in countries only now looking in this direction, is the lack of qualified manpower. India is willing to do its bit here in working with friendly developing countries.

Madame President, we are now coming to the end of the Homi Bhabha Birth Centenary year and I am happy to inform you that an international conference on "Peaceful Uses of Atomic Energy" will be held in New Delhi from 29 September to 1 October, 2009. I thank IAEA for its support to this conference. I take this opportunity to recall the words of the father of India's nuclear programme, Dr. Homi Bhabha, as President of the International Conference on Atomic Energy for Peaceful Uses at Geneva in 1955. He said,

"For the full industrialization of the underdeveloped countries, for the continuation of our civilization and its further development, atomic energy is not merely an aid, it is an absolute necessity. The acquisition by man of the knowledge of how to release and use atomic energy must be recognized as the third epoch of human history".

Thank you, Madame President
