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ENERGY IN THE 21<sup>ST</sup> CENTURY

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In the four years since the last Ministerial Conference on Nuclear Energy, both global energy demand and interest in nuclear power have continued to grow. Most of the 30 countries already using nuclear energy plan to expand their output. More than 60 countries – mostly in the developing world – have informed the IAEA that they might be interested in launching nuclear power programmes. Of these, 12 countries are actively considering nuclear power.

The biggest change since the March 2005 Paris conference – one which none of us could have foreseen then – has been the global economic crisis. There is much discussion about what effect this unprecedented crisis will have on plans for nuclear energy. I have no doubt that this will play an important part in your deliberations in the next three days. It seems likely that the crisis could delay the implementation or expansion of nuclear power programmes in some countries for a limited period. But it is clear that, in the medium and long term, global demand for energy will continue to increase significantly as countries everywhere seek to improve living standards. Although nuclear power is not a panacea for all the world's energy problems, it will continue to play an important role in the global energy mix. The OECD Nuclear Energy Agency's high projection is for global nuclear power capacity to grow by around 66 percent by 2030.

I will begin my remarks by reviewing the current state of play in the nuclear energy sector. I will update you on what the IAEA is doing to help Member States, especially so-called "newcomers" to nuclear energy. And I will conclude with some observations about the future of the IAEA, highlighting issues which I believe governments, the nuclear industry, regulators and users of nuclear power need to consider carefully.

### **Current State of Nuclear Energy Sector**

2008 was a somewhat paradoxical year for nuclear power. It was the first year since 1955 in which not a single new power reactor came on line, but it also saw construction start on no fewer than ten new reactors. This was the highest number since 1985, the year before the Chernobyl accident. There are now 436 nuclear power reactors in operation in 30 countries. Growth targets have been raised significantly here in China, in India and in the Russian Federation. Asia remains the focus of growth in nuclear power. Of the ten

construction starts in 2008, eight were in this region – and six of them were in China. In the United States, the Nuclear Regulatory Commission has received combined licence applications for 26 new reactors. In Europe, Italy plans to restart its nuclear power programme while the Swedish government has proposed dropping plans to phase out nuclear power and building replacement reactors. Other European countries also have expansion plans.

Growing global demand for energy throughout the 21<sup>st</sup> century will reflect continued population growth, the drive by developing countries to connect 1.6 billion people who have no access to electricity and the 2.4 billion who have no access to modern energy systems. We have to understand that there is no development without energy and if we need to improve the lives of one third of humanity who live on less than \$2 per day we need to increase our supply of energy and electricity. In many countries therefore, there is a need for major investment in new electricity production plants, both to increase capacity to cope with the constant development of new technologies for industry and consumer use and to replace old, uneconomic and environmentally damaging power plants. And in this context there are a number of key drivers which are fuelling increased interest in nuclear energy – in particular energy security and the environmental benefits.

Back in the 1970s, concerns about supply security, triggered by the oil price shocks, were a major cause of nuclear expansion in countries such as France and Japan. Today, there are concerns about dwindling reserves of fossil fuels and some countries worry that their supplies of oil and gas are vulnerable to disruption. The sometimes dramatic fluctuations in the prices of oil and gas are a major concern. Many countries are also looking to renewables as a means of ensuring diversity of energy supply.

Environmental concerns are a second key driver. Nuclear power emits almost no greenhouse gases and it is therefore seen by many as part of the solution to the problems of global warming and climate change. The entry-into-force of the Kyoto Protocol and the European carbon trading scheme means there is now a real financial benefit to avoiding greenhouse gases. This increases the attractiveness of low-carbon electricity generation such as nuclear power and renewables.

The attraction of nuclear energy is supported by the improved performance of the

nuclear energy industry since the 1980s. The world has now accumulated more than 13,000 reactor-years of experience. Improvements in safety have been matched by improvements in efficiency. Nuclear plants are more economical to run, availability and productivity have increased and there is less down-time for maintenance. The long-term stability of the cost of electricity generated by nuclear power is also an important attraction.

### **Potential Risks**

Overall, safety is much better than it was 10 years ago, but we still have vulnerabilities in safety, as well as in security – even in countries with significant nuclear programmes. In some countries we see a troubling combination of old reactors, operators which are poorly managed or under-funded and weak regulators. This needs to be addressed. It is in all our interests to ensure that the highest safety standards are upheld everywhere. A strong focus on safety and security should be seen as enablers for the further development of nuclear energy rather than as hindrances. New ideas and innovative thinking to address challenges to nuclear safety and security should be encouraged.

As far as non-proliferation risks are concerned, countries that have mastered uranium enrichment and plutonium separation can be viewed as nuclear weapons *capable* states, meaning they could develop nuclear weapons within a short time span if they walked out of the Non-Proliferation Treaty or launched clandestine programmes. This is too narrow a margin of security, in my opinion. These countries may have no intention of ever making nuclear weapons, but that can change quickly if their perception of the risks to their national security changes. And security perceptions, as we know, can change very rapidly.

For some years, therefore, I have been advocating the establishment of multinational mechanisms to assure access for all countries to nuclear fuel and reactor technology, as envisaged in the IAEA Statute. Important progress has recently been made on a number of proposals, including the establishment of a fuel bank to be managed by the Agency and a Russian proposal to guarantee supplies of low enriched uranium to the Agency. I hope to present proposals on this to our Board of Governors in June. I remain convinced that, ultimately, a multinational approach to the entire fuel cycle – including the back end – has great potential to facilitate the expanded safe and secure use of nuclear energy for peaceful purposes, while reducing the risk of proliferation. I hope that the new

environment created with the declaration by Presidents Medvedev and Obama to move through concrete steps along with other weapon States to establish a world free from nuclear weapons should create a new and positive atmosphere in this regard.

### **Role of IAEA**

Every country has the right to make use of nuclear power, as well as the responsibility to do it in accordance with the highest standards of safety, security and non-proliferation. The IAEA's statutory objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world." That means helping interested Member States to exercise their right to use nuclear power and to meet their responsibility. Our advice has the advantage of being comprehensive and impartial.

Requests from Member States for the Agency's assistance with nuclear power projects have grown significantly. We help them to analyse their energy system to see under what conditions, if any, nuclear power might make sense. Sometimes, our advice is that a country should not resort to nuclear power at this stage and that other energy sources might be more appropriate.

Before countries decide to proceed with the introduction of nuclear power, we impress upon them the fact that they will need to plan properly, to build the human resources and infrastructure, to establish independent and effective regulators and to adhere to international safety, security and non-proliferation instruments. The IAEA has developed milestones to help countries work systematically towards the introduction of nuclear power. We provide guidance, organize workshops and give specific assistance if requested. We offer advice in drafting nuclear legislation and we train regulators and operators. We have developed a methodology which countries can use to perform a self-assessment of whether they are ready to introduce nuclear power, and we offer a service to provide an integrated nuclear infrastructure review (INIR) for any interested country as it moves towards nuclear power.

We stress that the primary responsibility for all aspects of a nuclear power programme – and in particular for safety, security and safeguards – lies with the countries concerned. This cannot be outsourced. By launching a nuclear power

programme, countries take on a long-term commitment to deal responsibly with nuclear material for possibly hundreds of years. It is vital that they develop sufficient national expertise so they can take full responsibility for all aspects of running a nuclear plant in the long term.

We also make the companies which supply the equipment and expertise aware of *their* responsibility. Suppliers of nuclear technology owe a duty of care to the recipients and to the world at large. This is because failures of either safety or security can have consequences stretching well beyond national borders, as the Chernobyl accident demonstrated. Cooperation between the suppliers and users of nuclear technology must be continuous, stretching well beyond the handover of a plant to an operator. Public attitudes towards nuclear energy have become more positive in the past decade, due not least to improvements in safety and growing concern about climate change. But the nuclear industry needs to remain open and transparent in order to generate and maintain public trust.

Although in many countries high level radioactive waste has been safely stored for many decades, the management of spent fuel and disposal of high level radioactive waste remain key challenges for the nuclear power industry. Experts agree that the geological disposal of high level radioactive waste is safe and technologically feasible. Finland and Sweden have made the most progress in this area. However, public opinion will remain sceptical at least until the first deep geological repositories are operational in a decade or so.

### **Strengthening the IAEA's role**

I have been concerned for some time about the erosion of the IAEA's ability to perform effectively the tasks entrusted to us by Member States because of years of zero growth budgets. Fortunately, there are now reasons for hope on that front. An independent *Commission of Eminent Persons*, which I appointed to make recommendations on the future of the Agency, proposed last year that our budget should be doubled by 2020. Recently, the new U.S. administration of President Obama has proposed that our budget should be doubled within four years. Our latest budget submission proposes a substantial increase in resources in order to meet the growing demand from Member States for Agency services in all areas of our work.

Of course, money is not the whole problem. As well as adequate, stable and predictable resources, the Agency needs sufficient legal authority in nuclear verification, safety and security if it is to do its job properly. I hope that before long all Member States will have implemented the additional protocol to comprehensive safeguards agreements so the Agency can credibly verify that no undeclared nuclear activities are taking place. I also hope that all Member States will join the safety and security conventions and adhere to all Agency standards.

The *Commission of Eminent Persons* made many practical suggestions for strengthening the Agency and improving our services to Member States. I would like to single out two which I believe may be of particular relevance to your discussions here in Beijing. The first is that global nuclear security standards should be made *binding* rather than voluntary as at present, so that the risk of nuclear terrorism – the most dangerous threat we face – can be addressed more effectively. The second is that the IAEA should lead an international effort to establish a global nuclear safety network, also based on binding agreements. Countries should submit to mandatory international nuclear safety peer reviews. Having seen peer review in action through voluntary Agency mechanisms such as our Integrated Regulatory Review Service (IRRS), I firmly believe that this is the way ahead – experts and practitioners sharing experience and best practices for the benefit of all.

In conclusion, I would like to thank the Government of the People's Republic of China and the China Atomic Energy Authority for hosting this important International Ministerial Conference on Nuclear Energy in the 21<sup>st</sup> Century and for their generosity and support. I wish you every success in your discussions.