Summary

Closing of the Conference, Friday 11 October @ 11:20

Board Room B (1st floor M Building)

Mikhail Chudakov

Deputy Director General & Head of the Department of Nuclear Energy

Thank you.
Excellencies, ladies and gentlemen,

I would like to thank you for your participation in the *International Conference on Climate Change and the Role of Nuclear Power* that has taken place this week here in Vienna, organized by the International Atomic Energy Agency (IAEA) in cooperation with the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD).

The conference served as a unique forum for the exchange of information on the role of nuclear power and on the opportunities and challenges of safe, secure and safeguarded nuclear power development in supporting the low carbon energy transition needed to achieve the climate change goals.

As the first of its kind IAEA conference focusing on climate change and the role of nuclear power, it drew broad interest from the international community, with the Agency welcoming more than 500 participants from 79 Member States and 17 International Organizations. There were also close to 1100 downloads of the IAEA Conference and Meetings App to devices. This demonstrates the international community's recognition of the significance and importance of this topic. This is also reflected in the number of

contributions that we received over the past year in preparation of this event. One hundred and twenty papers were received, 84 of which were presented orally and 36 contributed as posters or e-posters.

The conference featured nine plenary sessions, including a high-level session for the international organizations and two for Member States. Eighteen parallel technical sessions addressed six topical areas and heard presentations by 125 speakers. Eight side events were organized by Member States, NGOs and the IAEA Secretariat.

A special plenary session reviewed the outcomes of the 2018 IAEA *Ministerial Conference on Nuclear Science and Technology: Addressing Current and Emerging Development Challenges,* providing an overview of the contribution of nuclear technologies in monitoring and adapting to climate change.

The heads of International Organizations—namely, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD), the United Nations Department of Economic and Social Affairs (UNDESA), the United Nations Industrial Development Organization (UNIDO), the Intergovernmental Panel on Climate Change (IPCC), the World Nuclear Association (WNA), the International Energy Agency (IEA) of the OECD, and the United Nations Framework Convention on Climate Change (UNFCCC)—agreed on the importance of considering every option in addressing the climate change challenge. They pointed out that if any technology is taken off the table, finding the solution to the problem becomes more difficult, particularly if the goal is to achieve economic growth without damaging the environment.

IAEA Member State representatives from Argentina, Bangladesh, Brazil, China, Egypt, France, Hungary, India, Mongolia, Morocco, the Russian Federation, the United Kingdom and the United States of America gave keynote speeches and elaborated on energy and climate policies in view of the transition to low carbon energy systems.

Representatives included ministers and high-level officials with expertise in the environment, energy, nuclear power and nuclear safety.

As previously stated, the conference addressed six topical areas. I would now like to summarize the key findings of each of them.

Regarding Track 1, on advancing energy policies for the climate change goals:

- Some Member States, both with high and low income, already face severe impacts from climate change and bear significant related social and economic losses. Adequate regulatory measures and more climate-resilient energy infrastructure are needed.
- Decarbonization of the electricity sector should be placed at the heart of climate strategies. The availability of clean electricity is also critical for the decarbonization of end-use sectors such as industries, buildings and transport.
- A regional approach integrating national markets and domestic capacities, as well as the deployment of smaller nuclear units, is often seen as a means for improving nuclear viability and the ability to finance new projects.
- Some Member States may not be able to integrate large nuclear projects in the immediate future, due to existing grid size, lack of domestic demand or affordability. For these countries, small, medium sized or modular reactors (SMRs) could be an effective option.

Moving on to Track 2, on nuclear power's increasing contribution to climate change mitigation, including synergies with other low carbon power generation sources, we have heard that:

- The Long Term Operation (LTO) of nuclear power plants (NPPs) has been undertaken in various countries, allowing for

opportunities to engage new staff, the local community, supply chains and to provide innovative solutions. Innovation is key to enabling the safe, reliable and cost-competitive LTO of NPPs.

- To attract the necessary investment both for LTO and new constructions, investors need to have confidence that the government's commitment will be long lasting.
- Additional challenges include a reliable supply chain, long term retention of knowledge, evolving regulatory requirements and market frameworks that need to recognize the inherent economic and environmental benefits of nuclear energy.
- Nuclear power's ability to flexibly operate has been proven, providing low carbon energy in a cost-effective manner. SMRs will improve such flexibility.
- Hybrid energy systems, integrating current and new nuclear power technologies with renewables, offer flexibility in the production of electricity and heat for industrial applications.
- NPPs have resilience features allowing them to withstand environmental impacts resulting from climate change.

In Track 3, related to the development and deployment of advanced nuclear power technologies, participants highlighted the following:

- High temperature reactors represent a near term deployable solution for enhancing nuclear hydrogen production. This is an additional opportunity to decarbonize the energy sector.
- Fast reactors can use depleted uranium and over time could significantly reduce the need for uranium mining and enrichment, further reducing CO_2 emissions arising from the front end of the fuel cycle. In addition, fast reactors, in a closed fuel cycle, would significantly reduce the amount of radioactive waste per unit of energy produced.
- SMRs offer additional flexibility to accommodate intermittent renewables and are a better fit for countries with smaller electricity grids. They could also play an essential role in reducing greenhouse gas emissions, replacing aging fossil fuel power plants and providing district heat.

- Advanced nuclear power technologies can significantly reduce greenhouse gas emissions also through non-electric applications such as district heating and hydrogen production.
- Innovative uranium extraction processes already deployed actually consume CO_2.

Participants in Track 4, on shaping the future of the nuclear industry in regulated and deregulated energy markets, heard the following:

- Decarbonizing the electricity sector tenfold by 2050 in a cost-effective manner while maintaining security of supply requires additional efforts. These include recognizing and allocating system costs to the technologies that cause them, encouraging investment in all low carbon technologies and implementing carbon pricing.
- Construction costs of recent large nuclear projects show a contrasting outcome in different areas of the world due to different factors. Recent cost overruns and scheduling delays of projects occurred where there was a lack of recent experience in construction and a need to rebuild a supply chain. However, in other regions of the world evolutionary NPPs have been built on time and on budget.
- SMRs have the potential to reduce construction costs and schedules by taking advantage of modularization, factory fabrication and faster learning rates.
- Competitive electricity markets are attracting fewer investments in any new form of dispatchable electricity generation, particularly low carbon technologies. Therefore, energy policies and market designs that efficiently favour investments in dispatchable low carbon technologies are necessary to decarbonizing electricity production.
- The current framework for financing green and sustainable projects is discriminatory towards nuclear power and discourages development financial institutions from financing large nuclear projects.

Moving on to Track 5, on enhancing international cooperation and partnerships, participants found that:

- Recent successful deployments of nuclear and other low carbon power generation sources indicate that a range of different partners and cooperation mechanisms are needed. There is no one-size-fits-all solution.
- Nuclear power's potential to complement large scale renewable deployment suggests that there may be opportunities to develop partnerships with organizations that have not traditionally supported nuclear power.
- For nuclear power there are opportunities for further cooperation among international organizations, governments, the private sector, NGOs and others. Coordinated approaches can also be developed for attracting financing or accessing financing mechanisms.
- Partnerships among international organizations, including the IAEA, will continue to play an important role in driving low carbon action by building capacity in sustainable energy planning and knowledge management.

Turning to Track 6, on public and non-nuclear stakeholders' perception of the role of nuclear power in climate change mitigation, the following points were emphasized:

- Nuclear power is generally a topic that attracts a high level of public attention and scrutiny. This makes it more challenging to convey the importance of nuclear power in mitigating climate change. Ideas for clarifying misperceptions were highlighted, including efforts by several countries to improve public knowledge and perceptions of nuclear power. It is essential to focus on educating students about the value of low carbon energy sources including nuclear power.
- It is important to provide a factual narrative on nuclear power, with understandable messages delivered by trusted sources of

information including the climate community and environmental organizations. Efforts to this effect are already under way.

- Information sharing and networking among stakeholders and public communicators are key to addressing common challenges and fostering positive trends through initiatives with proven results. A number of strong initiatives from around the world, including infographics, animations, online tools, and educational games have already been developed.

Regarding the conference's final session on nuclear safety and security, it was emphasized that commitments to and ongoing implementation of the highest levels of safety and security, consistent with IAEA safety standards and security guidelines, throughout the life of nuclear power plants are critical to all countries pursuing nuclear power for peaceful purposes. Avoidance of complacency is key to maintaining high levels of nuclear safety and security.

International cooperation on nuclear safety and security, and national provisions for nuclear safety and security, have continued to be strengthened over recent years.

The nuclear industry continues to undergo comprehensive safety reassessments and take measures to strengthen plant safety and security, improve regulatory oversight and enhance emergency preparedness as well as international collaboration.

The IAEA has played an indispensable role in facilitating these processes, including when ageing plants go into long term operation.

Ladies and gentlemen,

For the energy sector, global energy demand has increased, as has electrification, and both are projected to continue increasing.

Emissions in all sectors will need to be significantly reduced to meet climate goals. Action is urgently needed, making use of all possible technologies to reduce emissions and rapidly move to the decarbonization of the energy sector. In most scenarios developed by relevant international organizations, nuclear power contributes to the decarbonization of electricity supply to achieve climate goals by 2050.

The historical evolution of primary energy sources is a stark reminder of the very challenging work ahead of us: at the time of the Rio Earth Summit in 1992, fossil fuels represented 81% of the global energy mix. Twenty-five years later in 2017, despite efforts to promote energy efficiency and to deploy renewables, fossil fuels' share of the global energy mix remained unchanged, with CO_2-equivalent emissions increasing in 2018.

Taking into account the expected growth in world population and energy demand, it was confirmed that, in order to decarbonize the energy sector, nuclear power has a significant role to play.

Ladies and gentlemen,

The role of governments is of critical importance. Long term strategies and planning are key to reducing uncertainties and volatility in the energy sector, particularly in deregulated markets.
Well-targeted incentives can be used to increase the production of carbon free, dispatchable and flexible electricity generated by nuclear power.

The nuclear industry has a role to play by introducing innovation at all levels, reducing construction times and costs and making new nuclear power systems competitive with other baseload energy sources. Through accelerated development and deployment of innovative nuclear systems, nuclear power will become more

sustainable and flexible for integration with other carbon free energy sources and for non-electric applications.

Also highlighted was the IAEA's important role in facilitating international cooperation by working with Member States and multiple partners worldwide to support the safe, secure and peaceful use of nuclear power.

As the future of nuclear power deployment can be constrained by societal preferences, it is increasingly important to engage with the public and non-nuclear stakeholders. All energy generating technologies have risks and benefits. However, perceptions and awareness of hazards are often disconnected from scientific evidence. New and effective communication channels will need to be utilized, with evidence-based risks presented in an understandable way.

Ladies and gentlemen,

The past week has been an exciting opportunity to explore the role of nuclear power in climate change mitigation.

I would like to express my heartfelt thanks to our Scientific Programme Committee for organizing the conference and evaluating and reviewing the scientific contributions.

Likewise, I would like to thank all those who contributed papers, presentations and posters.

Please allow me to thank all Track Leaders of our Technical Tracks and the Chairpersons and Moderators of the Technical Sessions.

I also want to thank our scientific secretaries: Huang Wei, Andrea Borio di Tigliole and Stefano Monti, as well as Aliki Van Heek, Mikhail Koroshev, Jessica Callen, Martina Neuhold and Sanjai

Padmanabhan. All have worked professionally to make this conference a success.

I wish you an enjoyable remaining stay in Vienna and a safe journey home.

I declare that this International Conference on Climate Change and the Role of Nuclear Power is now closed.