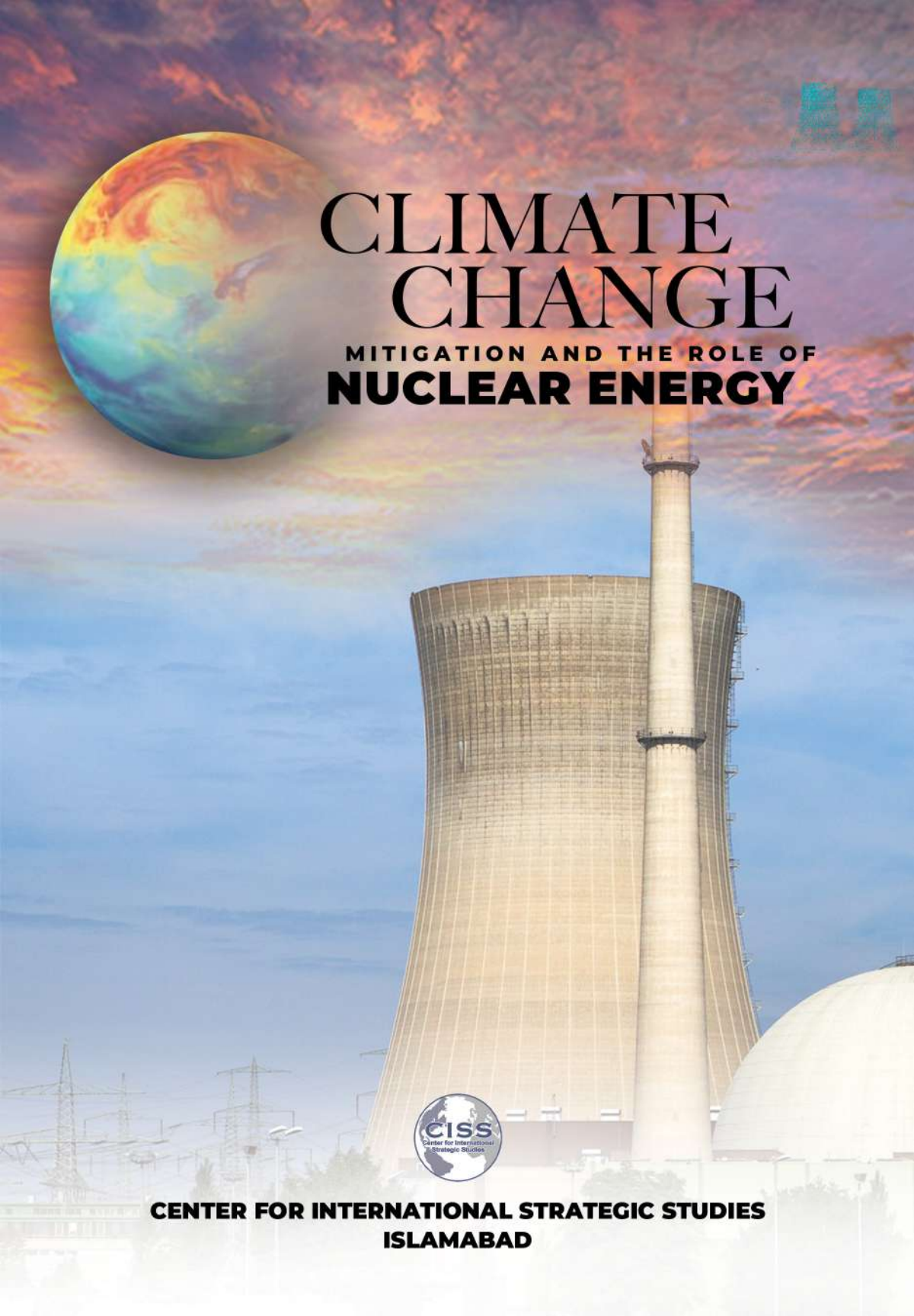

CLIMATE CHANGE

MITIGATION AND THE ROLE OF NUCLEAR ENERGY

CENTER FOR INTERNATIONAL STRATEGIC STUDIES
ISLAMABAD

CISS Seminar Report

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The Center for International Strategic Studies Islamabad conducts original policy research, analyses, and strategic outreach, and aims to highlight evolving regional and global strategic issues to promote peace and stability.

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REPORT OF CISS SEMINAR

CLIMATE CHANGE MITIGATION AND THE ROLE OF NUCLEAR ENERGY

Center for International Strategic Studies
Islamabad


CISS
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Strategic Studies

Photo: United in Purpose - A Momentous Gathering with DG IAEA, Rafael Grossi.

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Executive Summary

The Center for International Strategic Studies (CISS) Islamabad organized a high profile seminar on 'Climate Change Mitigation and the Role of Nuclear Energy,' on Thursday, 16 February 2023. The event was arranged during the visit of Director General of the International Atomic Energy Agency (IAEA), Dr Rafael Mariano Grossi to Pakistan.

The Inaugural Session, opened with welcome remarks of Executive Director, CISS, Ambassador (R) Ali Sarwar Naqvi, comprised the keynote speeches of Director General Grossi and the guest of honor Professor Ahsan Iqbal, Federal Minister of Pakistan for Planning, Development, and Special Initiatives. During the Working Session, Ambassador (R) Shafqat Kakakhel, Chairman BoG SDPI, delivered an insightful speech on the challenges posed by climate change for the sustainable development of Pakistan and the way forward. Mr Muhammad Naeem, Former Chairman PAEC, shared his expertise and knowledge on Pakistan's energy requirements, available resources, and the role of nuclear energy in the energy mix. The role of the developed world in promoting nuclear energy in Pakistan was also explored in depth by Ambassador (R) Zamir Akram, Advisor Strategic Plans Division and Former Representative of Pakistan to the UN. An engaging Q&A session ensued with stimulating discussion. Ambassador (R) Ali Sarwar Naqvi delivered concluding remarks that brought the enlightening and comprehensive seminar to a close. The valuable insights of the eminent speakers proved to be of immense value for the diverse group of participants including scholars, professionals, researchers, and students.

The key takeaways from the seminar are as follows:

- Climate change is one of the biggest threats to the present and future of humanity because of its direct impact on human security. Pakistan is a nation most affected by climate change, even though it is one of the least responsible countries for contributing to it.
- The peaceful use of nuclear energy is a ray of hope for managing this challenge.
- Pakistan has an excellent track record of nuclear safety and security and has a five-decades long experience of operating its nuclear power plants. Its effective peaceful nuclear program focuses on significant sectors of socioeconomic development including energy, health, agriculture, biosciences, and biotechnology. Nuclear energy provides it with a reliable solution of the two most severe economic and social security issues, i.e., climate change and environmental degradation.
- In 2008, changes in the global strategic environment and the Indo-US nuclear deal culminated in India getting a waiver from the NSG. It was anticipated that the US would not extend its support to Pakistan through IAEA or grant it a waiver akin to Indians. However, Pakistan was fortunate to have concluded an agreement with China for the six nuclear power plants that are currently functioning well before 2008.
- Nuclear energy is a vital source for Pakistan to move away from fossil fuels, as it is greener, cleaner, and safer, and its pollution is even less than solar energy.
- Pakistan possesses the technical and engineering capacity to build small nuclear reactors in the future. The establishment of new nuclear plants has strong political support in Pakistan.
- Pakistan cherishes its longstanding partnership with IAEA, cooperates with the agency through several initiatives, is well-equipped to achieve sustainable clean energy goals, and will continue contributing to a cleaner and safer world.
- Pakistan's nuclear safety measures and mechanisms are robust and 'world class.'
- Nuclear power is a reliable, clean, and competitive source of electricity. Pakistan must develop hydro, Thar Coal is (not clean), nuclear, and renewable energy to meet the heavy electricity demand. PAEC is working to indigenize nuclear power

technology to acquire more electricity.

- Being a country that has contributed less than one percent to climate change and has an abundance of coal, Pakistan would undermine its interests if it were to voluntarily abandon the option of using coal, given the contemporary geopolitical hiccups. Emerging technology has ensured the reduction or possible elimination of negative consequences of the use of coal. Hence, this option should not be given up.


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Seminar on
Climate Change Mitigation and Role of Nuclear Energy
Thursday, 16 February 2023
Kehkashan Hall 1, Serena Hotel Islamabad
ISLAMABAD SERENA HOTEL


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EXIT

Introduction

Climate change has emerged as the most dangerous non-traditional threat to humans, particularly in the developing world. The United Nations Trust Fund for Human Security declared it as 'the most pressing issue of our time' and United Nations Security Council recognized climate change as a 'threat multiplier.' It has the potential to aggravate other drivers of insecurity, including factors such as water insecurity, energy, food etc.

The devastation caused by recent floods around the globe, including Pakistan, has rekindled the global debate on climate justice. Extreme weather preceded by an unprecedented monsoon and the heaviest rains ever recorded are serious indicators of climate change. Pakistan is not among the major contributors to greenhouse gas and has a negligible carbon footprint, as it accounts for less than 1 percent of global carbon dioxide emissions. Yet, Pakistan is among countries most vulnerable to climate change challenges. In this context, it is in the global interest to ensure that climate change does not undermine the growth and stability of weaker countries. Mitigating climate change is about reducing the release of greenhouse gas emissions that are warming our planet. As greenhouse gases are mainly caused by the use of fossil fuels to generate energy, adopting clean energy resources is a key component of climate change mitigation strategies. Nuclear energy is one of the most reliable clean energy sources and has been used for taking up the baseload of energy for the last seven decades. It plays a key role in climate change control, as it is set to increase its share in net energy production globally. While climate change is a product of industrialization in the Global North, the Global South remains most vulnerable to it. Due to various reasons, the development of nuclear energy has also seen slow progress in the developing world.

The developed world assumes leadership in mitigating climate change and promoting clean energy resources in the developing world, where the population and the demand for energy are growing. According to IAEA, in 2018, nuclear power produced about 10 percent of the world's electricity. In 2020, thirteen EU member States generated 683,512 GWh of electricity through nuclear energy. This accounts for nearly 25 percent of the total electricity production in the EU.

It is, therefore, not possible to accomplish the goals of the Paris Agreement to reduce global greenhouse gas emissions without relying on nuclear energy as the primary source. Nuclear energy has several other advantages for developing countries like Pakistan, along with environmental degradation prevention and climate change mitigation. These include reduction in import cost of hydrocarbons, provision of reliable and uninterrupted energy supplies, provision of economical electricity, etc. The members at COP27 Summit 2022 committed to establish a 'loss and damage fund.'

It is the responsibility of affluent countries to provide nuclear technology and encourage the use of nuclear energy for climate change mitigation, as the most vulnerable poorer countries get affected by climate change.

Against this backdrop, the CISS seminar on Climate Change Mitigation and Role of Nuclear Energy was useful in generating original and quality insights, solutions, and policy recommendations.

The session aimed at:

- Emphasizing the significance of nuclear energy for climate change mitigation.
- Examining how climate change is a dangerous nontraditional security threat for Pakistan.
- Highlighting Pakistan's nuclear energy requirements and available energy resources.
- Evaluating how developed and richer countries can support other countries like Pakistan in climate change mitigation through nuclear energy.


Center For International Strategic Studies
Seminar on
Climate Change Mitigation and Role of Nuclear Energy

Inaugural Session

Welcome Remarks
Ambassador Ali Sarwar Naqvi
Executive Director, CISS

I warmly welcome you all to the Center for International Strategic Studies (CISS) here in Islamabad. CISS is one of Pakistan's most highly regarded think tanks, focused on original and high-quality policy research and outreach to bring forth significant global and regional strategic matters and promote peace and stability. CISS has organized this seminar on Climate Change Mitigation and Role of Nuclear Energy to highlight and discuss this significant issue for Pakistan and the world. We are delighted to have the presence of Honorable Professor Ahsan Iqbal, Federal Minister of Pakistan for Planning, Development, and Special Initiatives, who has graced the occasion with his kind participation. We are also honored to have His Excellency Rafael Mariano Grossi with us today, whose leadership at the International Atomic Energy Agency (IAEA) has been instrumental in mitigating climate change challenges and promoting clean energy options. He has introduced notable initiatives which have already started bearing great results. Dr Grossi is coming to Pakistan for a very important visit to the UAE. He presided over an IAEA-organized conference on 'Effective Nuclear and Radiation Regulatory Systems: Preparing for the Future.' The subject is of great interest to Pakistan, which has an extensive peaceful nucle-

ar program in terms of power generation, agriculture, medicine, biosciences, biotechnology, etc. I was privileged to serve as Pakistan's Permanent Representative at the IAEA for five years. I have a high opinion of the Agency's work and activities. I am sure that under Mr Grossi's leadership, the Agency benefits from a person of extraordinary ability and experience. Pakistan cherishes its longstanding partnership with the IAEA. It cooperates with the Agency through several initiatives and is committed to a cleaner and safer world.

The current challenges must be considered. Climate change is one of the biggest threats to the present and future of humanity because of its direct relation to water, food, and human security. Pakistan is one of the nations most affected by climate change, even though it is one of the least responsible for contributing to it.

For the past twenty years, Pakistan has consistently ranked among the top ten most vulnerable countries on the Climate Risk Index, with 10,000 fatalities due to climate-related disasters and financial losses amounting to about USD 4 billion from 173 extreme weather events. In 2021, Pakistan was ranked eighth among the most disaster-prone nations and it experienced terrible floods and heatwaves in 2022. There are severe losses yearly due to unseasonal rains, floods, and heat waves.

The most recent Post-Disaster Needs Assessment (PDNA) estimated that Pakistan would require at least USD 16.3 billion for post-flood rehabilitation and reconstruction. The cost of floods was esti-

mated at USD 30.1 billion, consisting of USD 14.9 billion in damages and USD 15.2 billion in losses.

Pakistan is cognizant of the growing climate change issues and opts to mitigate some of them through nuclear energy, which also helps contribute to UN Sustainable Development Goals (SDGs). Nuclear energy is, in fact, a resource for Pakistan, given the escalating effects of climate change, drought, underground water scarcity, and the looming water dilemma with India.

Pakistan currently has a nuclear energy capacity of 2,332 MWe, while another 1,100 MWe is being built. Pakistan will also be able to participate in energy diplomacy by making its resources available to other nations. It is a member of the Paris Agreement, which aims at reducing the Earth's temperature to mitigate the worst effects of climate change. By the middle of the century, greenhouse gas emissions from power generation must be reduced to zero percent to meet the target of lowering global temperatures.

An International Conference in Geneva was convened on 9 January 2023 to support the affectees of climate-induced disaster in Pakistan, co-hosted by the Government of Pakistan and the UN. The event brought together governments, leaders from the public and private sectors, and civil society members. The objective was first to present the 'Resilient Recovery, Rehabilitation, and Reconstruction Framework' (4RF), which laid out a multi-sectoral strategy for rehabilitation and reconstruction in a climate-resilient and inclusive manner, and to secure international support and forge long-term partnerships for building Pakistan's climate resilience and adaptation.

To generate more sustainable and environment-friendly electricity, Pakistan can rely more on nuclear energy in the future. Pakistan has a robust peaceful nuclear program and long association with the IAEA – an ideal combination to achieve sustainable clean energy goals. Nuclear energy provides Pakistan with a reliable solution to the two most severe economic and social security issues, i.e., climate change and environmental degradation.

Keynote Address

Professor Ahsan Iqbal
Federal Minister of Pakistan for Planning, Development, and Special Initiatives

As the world becomes increasingly dangerous with climate change, humanity is responsible for preserving planet Earth. Climate change is now a reality that is no longer fiction, as some in the West would like to believe. Poor people in Pakistan's Sindh and Balochistan provinces have suffered losses and damage of more than USD 30 billion for no fault. Pakistan contributes to less than 1 percent of carbon emissions yet is the seventh most climate disaster-vulnerable country globally. The international community responded to Pakistan's call, and it was able to overcome the immediate challenge of relief and rescue. At the Geneva conference, the international community pledged USD 10.9 billion in solidarity to Pakistan, but 95 percent of those pledges have come through multilateral agencies as soft loans. In the medium long-term, Pakistanis will bear the burden of reconstructing and rebuilding their country, damaged due to no fault of their own. Pollution by other countries caused this considerable damage to Paki-

stan. Interestingly, the people of Pakistan must also bear the bulk of the burden of reconstruction and rebuilding – the world is quite unfair. Nevertheless, they will find a solution through their genius in mitigating the climate change disaster.

Nuclear energy is undoubtedly a significant source for us to move away from polluting fossil fuels. It is greener and safer, its pollution is even less than the emissions from solar energy, and it is also durable over the long term. Using 100 grams of uranium produces more energy than 1 ton of coal. Therefore, Pakistan plans to scale up its nuclear production to benefit from clean energy.

Pakistan has made great strides in developing its civil nuclear program, even though the world tends to view its nuclear capability from the prism of security. Nuclear power is being used in the energy, agriculture, and health sectors. In the context of climate change, its application in agriculture will be far greater by enabling the practice of smart agriculture. Pakistan needs more resilient crops in the future. Therefore, in terms of agricultural research, the nuclear capability will allow Pakistan to develop better plant varieties, more resilient to climate change.

Pakistan has high standards of safety and security in the nuclear field. The opportunity now is to leverage its developed capability and share it with the international community.

Pakistan is facing serious economic challenges. A fundamental challenge is its inability to develop a strong export-led growth model, and instead relying overwhelmingly on the imports substitutional model of development. As a result, the country grows at a faster pace, while the demand for foreign exchange through imports far exceeds its capacity to earn dollars through exports.

This creates a large trade imbalance that forces the government to cut down on imports and slow the economy. To break this cycle, the only path forward for Pakistan in the next ten years is accelerated exponential growth in the export sector.

The Pakistan Atomic Energy Commission (PAEC) has developed the capability to maintain a critical mass of nuclear facilities through safety and maintenance. These services and Pakistan's human resources can be shared with other countries. For instance, Pakistani scientists and technicians can do excellent maintenance jobs at the nuclear reactors in Europe, perhaps at 1/10th the price at which their agencies do this work. With the help of the IAEA, Pakistan should look for such opportunities and try to share the resources it has acquired through the years. This will enable the country to obtain foreign exchange. Every technology center should similarly earn revenue by sharing its services with other partners worldwide.

Our nuclear engineers' excellence represents the success story of Pakistan. In 1998, the Chairmen of PAEC and Khan Research Laboratories (KRL) approached the government for a development project. There was initial skepticism about whether a project in this domain would be successful, as few countries were willing to assist Pakistan. The Chairmen made a compelling argument supporting the strides Pakistan has made in the nuclear field. First, Pakistan succeeded because its organizations were organized around a purpose, with a sense of a mission instilled in every individual. A successful mission-oriented organization must guarantee that a healthy mission is shared and subscribed to by all members – this was true in Pakistan's case. Second, the stability of leadership is important. Each

of Pakistan's chairpersons enjoyed a tenure lasting up to eight years, ensuring continuity in the organization's programs, which was very instrumental. Third, our organizations are merit-based and do not compromise on recruitment, posting, and transfers. Four, they successfully developed human resources. If an organization values and invests in its people, it will always perform and deliver. Fifth, a mission and resources, and achieving a mission with resources is possible. Sixth is professionalism and respect.

In the context of these six factors, Pakistan has significantly benefited from its nuclear program. By following these principles that provide a road map for national success, Pakistan can become one of the most developed countries. It would be unfortunate if a nuclear power that can master the most complex technologies, does not solve its economic, health, education, and agriculture problems. This paradox must be broken, which is only possible by following the path of success achieved in nuclear technology via the aforementioned principles.

Apart from floods, Pakistan faced all sorts of climate disasters in 2022. From the abrupt change in seasons – the onset of summers, with the highest recorded temperature of 51°C, without the arrival of spring – to forest fires, drought, and exceptional rain in areas that previously experienced moderate rainfall. Hence, climate change is the real challenge.

Pakistan sincerely hopes that the international community will help it overcome this challenge. Technology offers great opportunities. Throughout history, the genius of human beings has always surpassed the obstacles that have come their way. For instance, technology has been influential in controlling famines by producing high-yielding crops. Similarly, all the challenges can be resolved through scientific innovation. By breaking the code of desalination, water requirements can be met sufficiently, as the Earth is composed of 70 percent water. Likewise, there are many opportunities to work through new technologies in climate change.

Keynote Address

Dr Rafael Mariano Grossi
Director General, International Atomic Energy Agency

It is pertinent to explore three themes relevant to the role of nuclear energy in climate change mitigation. First, the issue of climate change and the role of nuclear energy. Second, the part IAEA is playing in addressing the problem. Third, the opportunities and challenges for Pakistan.

What are the enormous problems we are actively facing regarding global warming and the consequences? Climate change-induced extreme weather phenomena are taking place in Pakistan and adversely affecting its people. Until not so long ago, the global elite was debating whether things like climate change or global warming existed. A few influential people consider this fiction, despite the severe consequences and their scientific explanations. A number of policy decisions were instrumental in aggravating the issue of climate change.

The phenomena leading to global warming and climate change are also well-known. They have to do with pollution and the globally widespread models of industrialization. To a certain extent, we col-

lectively came to the point of coinciding, at least multilaterally, that this was a huge problem and that we had to discuss and agree on very urgent and ambitious goals to try not to solve the problem but to re-address the issue.

The word mitigation comes straight from the practitioners and is a jargon of climate change diplomacy. Solving the issue is not talked of as it will take another level of political courage and perhaps decisions that are very difficult for several economists worldwide. We must contend with mitigating a problem that is so dramatic. The world is aiming at a solution based on developing more integrated intelligence and reducing CO_2-emitting energy matrixes. This is a critical issue because we need to power our economies. It is indispensable for industrial nations, developed countries, and developing countries. At the same time, there is a limited number of ways to power the world's economies. Fossil fuels are vastly dominating the arena, while other options include hydro, renewables, and nuclear energy.

Nuclear power experienced a critical growth phase in the 1970s. Cost, in a certain sense, was triggered by the oil crisis in the 1970s, during which nuclear power plants were being built at an incredible velocity in places like the US, France, and Germany. It is a misconception that a nuclear power plant takes up to three decades to be built. A series of events related to nuclear safety, including the Chernobyl and Fukushima incidents, turned nuclear energy into a contentious issue in the US, Europe, and some developing countries. It began to be seen as harmful, which reduced growth in the nuclear sector enormously.

Crucial policy decisions were taken based on ideological assumptions and politics, reducing the contribution of nuclear energy to the world's energy matrix. While these changes were taking place, the issue of climate change or global warming was not at the forefront of

discourse. Although the phenomenon was ongoing, climate change did not gain salience with the start of the UN Climate Change Conferences (COP). Rather, the IAEA decided to have a point of climate in the Paris Agreement.

Price-induced factors also affected the nuclear industry's growth, stabilizing it at around 10-15 percent of the global electricity production, but much higher in industrialized economies. In the past few years, as climate change started to gain salience, decisions were retaken based on political choices.

These developments were a problem from the prism of state policy, particularly in the case of Europe and the US. In California and other US states, pro-nuclear policies were enthusiastically pursued; in Europe, Green politicians were against the use of nuclear energy. The Fukushima accident in Japan was an important factor that affected countries' decisions to reduce the portion of nuclear energy. In the case of Germany, there was a remarkable turnaround as a country that previously had a significant fleet of nuclear reactors, decided to abandon it based on the Fukushima incident. Regardless, countries' sovereign political decisions must be respected, as they are legitimate decisions taken by democratic societies.

In France, one of the leading nations in nuclear power, roughly 80 percent of its energy comes from nuclear energy. France, known today as the G7's leading country worldwide, would perhaps not be viable without nuclear energy. At one point, it decided to reduce the portion of nuclear energy from 80 to 50 percent. Was there an energy reason, a price reason, a scientific reason,

or maybe a technical reason to do so? – it was a political decision. The same happens in many other countries.

When the gravity of the problem was apparent, slowly and steadily, the nuclear sector and the IAEA could start attempting to pass a message based on science and facts rather than on political or ideological preferences – legitimate and acceptable as these may be. The issue was how to mitigate climate change. Most countries, except for Germany, decided to continue using nuclear power. Others, like Belgium, had also decided to a nuclear phase-out, while keeping two stations in power for 10 more years. France doubled its reliance on nuclear power, reversing the previous government's policies. The UK notably moved forward. Today in Europe – contrary to a particular narrative that pretends that Europeans are moving away from nuclear – 25 percent of electricity and almost 50 percent of clean energy come from nuclear.

Hence, these are facts, and we must use them to see possibilities. Many countries are interested in nuclear energy; it is a moment of possibility. According to the International Panel on Climate Change (IPCC), without the use of nuclear energy, it is impossible to fulfill the Paris Agreement's target of decarbonization by 2050. Hence, countries that are most reliant on coal in their energy matrices, such as China and India, have solid bids for nuclear and renewables.

The IAEA is in favor of renewable energies. Nuclear energy comprises base-load energy sources perfectly adapted to inherently intermittent energy sources like solar and wind. This is a moment of possibility, where important decisions are being taken. This is a moment where ideology is being replaced by fact and size.

The IAEA, although not a financer, possesses scientific and techno-

logical advisory capabilities. It has safety standardization – which is indispensable – and has created platforms to help countries, as consultants would do, find a way to nuclear energy for climate change mitigation.

Nuclear energy is not for anybody. There has been a path for Pakistan toward nuclear energy spanning several years, the education of a workforce, and the establishment of a robust regulatory and normative set of standards with the help of the IAEA. The IAEA is actively working with confirmed nuclear users like Pakistan, and with newcomers who want to benefit from nuclear energy.

Pakistan is now operating six nuclear power plants and has picked up the record of safety, which is very important. In Pakistan, there was strong political support for the two new units that would be integrated into the fleet. Pakistan also has a future for small modular reactors; it has the engineering capacity to do this. Small modular reactors will be an exciting option for many countries where the grids are not as strong as they should be and in remote areas that need to be powered flexibly. Nuclear is not the only one certainly but is part of the solution.

Q&A Session

Q: Why has the IAEA never condemned the uranium theft incidents that regularly occur in India? Had it happened in a Muslim country, IAEA would have been lecturing the whole Muslim world about it, including Pakistan, Iran, Syria, and others. Why not directly condemn the ruling right-wing Indian government?

A: As an international organization, the role of the IAEA is not a political one. Whenever an issue of nuclear security is reported to the IAEA, it immediately contacts national regulators to address it. So, we are not hiding or passing judgment. As the head of an international organization, it is not my role to condemn or praise. What we do is address a problem. The IAEA assures that when there are documented cases of Lethal Autonomous Weapons (LAWS) and nuclear material, it is ready to hold the states responsible.

Q: Are there case studies of countries where a strong correlation between nuclear energy and economic growth was established? Is relevant data available for research?

A: The IAEA has a planning unit, used by member states in their

analysis. In this case and many others, statistics can prove one thing and its opposite. However, by and large, nuclear energy consumption coincides with countries with strong technological and economic bases and sustaining growth.

Q: How do you rank the capacity and facilities of peaceful purposes of nuclear technology in Pakistan with other countries? What confidence do you take from here, and would you like to share it with others?

A: They are world-class!

Q: Why is the number of nuclear power plants not increasing in recent years? There were many problems after the Fukushima incident and people are less attracted to nuclear energy, but is opinion changing since last year, since Europe is freezing because of the Ukraine war? How does the IAEA view these developments?

A: Statically, there is little increase in the number of nuclear power plants. We project the current increase when countries announce an increase to be realized in the future. The projection needs to be met correctly and must correlate. The estimation is that nuclear should triple for more, and if announcements materialize, we see the fleet replacement and a very slight increase. The current energy security crisis has triggered several important decisions. Not surprisingly, in Eastern Europe, Poland was the only country without nuclear energy.

Still, Poland, the Czech Republic, Slovakia, Slovenia, Serbia, Romania, and Bulgaria, all had decided to increase their nuclear fleet. There is an increase in the case of France and the UK. In the face of Switzerland, Belgium, and a question mark in the case of Spain, we are still determining what will happen. The increase is measured by financial problems in significant parts of the world, including Argentina, Brazil, and Mexico. So, it is a mixed bag but a favorable one.

Working Session

Challenges Posed by Climate Change for the Sustainable Development of Pakistan and the Way Forward

Ambassador (R) Shafqat Kakakhel
Chairman BoG, Sustainable Development Policy Institute Islamabad

Except for some effects, like ocean acidification and sea level rise, all the impacts of climate change tend to excavate and amplify pre-existing fault lines in countries, societies, and ecosystems. The IPCC has proclaimed the consensus in the scientific community that unless the world and the nations carry out a sharp and quick reduction in the release of greenhouse gases and stop deforestation and other drivers of climate change, there is likely to be a substantial increase in the global surface and ocean temperature. The increase will be more than 1.5°C or 2.5°C – mentioned in the Paris Agreement as an absolute maximum that we should allow anthropogenic increase compared to

pre-industrial times. Any increase above this will trigger multiple impacts worldwide, mainly affecting and hurting countries in the global south.

Pakistan has been a target and victim of the negative impact of climate change, such as the rise in sea levels and an increase in the number of extreme weather events including around 173 weather events in the past five decades, and floods, droughts, hurricanes, heat waves, and flash floods. There is a likelihood that the increase in temperature will accelerate the melting of glaciers in the Himalayas, Karakorum, and Hindukush, whose timely and orderly melting feeds all the rivers of Indus Basin.

Climate change also affects the twice-yearly monsoons, which bring rains that supplement the surface water flowing in rivers. During the past fifty years, we have seen an exponential increase in extreme weather events. In addition, Pakistan's average temperature has increased by about 1.1°C, which aligns with the global average. The country experienced mega floods in 2010 and 2011. More recently, the mega floods in 2022 caused colossal damage to infrastructure and agricultural fields, and almost 37 million people were affected. The effects will be felt by all the sectors and societies covered by the SDGs.

Pakistan is acutely vulnerable to climate change impacts because of geophysical factors such as its location in a hot and humid

region with meager average precipitation. While the region has also been historically drawn to extreme events such as floods and droughts, it suffers from the effects of climate change because of extremely low resilience. Pakistan's climate change resilience is low because it has a vast population that is increasing rapidly, with around 225 million

people increasing at more than 2.2 percent annually. There is also irregular and chaotic urbanization. The country has had slow economic growth and widespread and deepened poverty. Pakistan needs technology, technological capacity, and financial and human resources to counter this challenge.

Pakistan played a historic role in facilitating the success of the negotiations that culminated in adopting the UN Climate Change Convention in 1992. Between 1992 and 2008, the country has yet to do anything. It was only in 2008 that it began to address the severe challenges of climate change by setting up a task force, that carried out a comprehensive analysis of the impact of climate change and gave suggestions for response measures. Since then, many climate change-related policies and strategies have been developed.

Pakistan developed a comprehensive Climate Change Policy in 2012 and recently revised it in 2021 to better reflect the SDGs. Pakistan had a policy blueprint called Vision 2025. It also developed a Sustainable Development Policy Framework. In 2017, the parliament approved the Climate Change Act, establishing an elaborate institutional system for dealing with the Climate Change Council, Climate Change Authority, and Climate Change Funds. In April 2018, the Council of Common Interests (CCI) adopted, with the approval of the provincial governments, a National Water Policy. Pakistan also has an Alternative and Renewable Energy Policy. In 2019 and 2020, it devised an Electric Vehicle Policy to ensure that all or at least 30 percent of vehicles on the road should be run on electricity.

The Ten Billion Tree Tsunami Program was launched in 2019 with the help of all provincial governments. With the support of UN agencies' funds and programs, recently a multi-project initiative called the Living Indus Initiative has been completed, which will hopefully restore Pakistan's patrolled ecology and ecosystems around the Indus River, covering all four provinces of Pakistan.

Pakistan aims to ensure that 60 percent of the share of renewable energy will be the energy mix, including nuclear, hydro, wind, and biomass. So far, Pakistan's energy mix has been dominated by fossil fuels. Coal is being used but it is the dirtiest fossil fuel.

Pakistan has a comprehensive Disaster Risk Management Framework and a National Disaster Management Authority (NDMA) at the federal and provincial levels. Both frameworks and authorities provide relief, rehabilitation, and reconstruction during extreme weather events. The quantity and quality for implementation of policies and strategies could have been more satisfactory and encouraging but unfortunately this is not the case. The factors that impede progress in the implementation of adopted policies are institutional deficits – low technical and technological know-how, inadequate coordination between the federal and provincial governments and autonomous regions, and our inability so far.

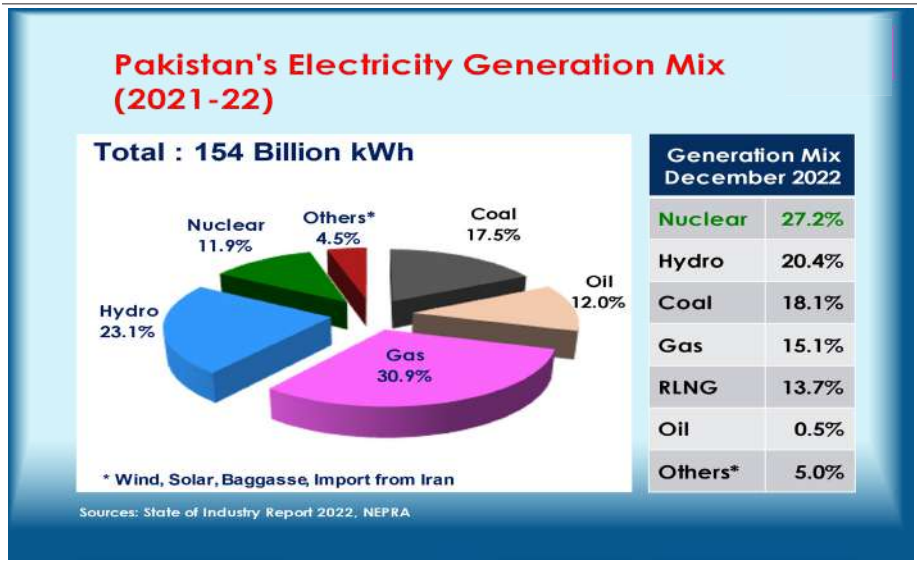
Owing to these weaknesses, Pakistan is unable to secure substantial support from the windows of cooperation available at multilateral and bilateral levels from friendly countries like China, the US, the European Union, and the Republic of Korea.

The way forward is to try harder to implement the policies and strategies already adopted, strengthen the institution that already exists with more resources and direction, and improve cooperation and coordination at the horizontal and vertical levels between the federation and provincial governments as well as with autonomous regions. This alone will ensure that Pakistan saves itself and the planet from the ravages of climate change.

Pakistan's Energy Requirements, Available Resources and Nuclear Energy

Mr Mohammad Naeem
Former Chairman, Pakistan Atomic Energy Commission

Pakistan is the fifth most populous country in the world. The energy consumption per capita is 3.8 per ton or equivalent, and per capita in terms of electricity is 5.25 kilowatt per hour. Developed countries like Canada have abundant resources, up to around 15000. Pakistan is at the bottom – around 5.25. India and Sudan are in similar league. Pakistan has a total installed electricity generation capacity of 44786 MWe. The share of oil and gas is 48.5 percent, and hydro is 23.9 percent. The installed capacity of nuclear is 8.1 percent.



Due to the non-availability of other resources, the share of nuclear energy in the electricity generation mix went up to 27.2 percent in December 2022. Pakistan produced the highest energy during that month.

The sectoral electricity consumption can be improved. Comparing the 1984-1985 fiscal year with 2021, the electricity consumption in the domestic sector has increased from 28 to 50 percent, reduced from 15 to 8.8 percent in the agricultural sector, and from 25 to 6 percent in the industrial sector. The figures could have increased in the industrial sector or at least remained constant, reflecting the country's priorities. In the context of Pakistan's need for electricity, the GDP is at a low development rate and may further decline by 2025. The peak demand for electricity is about 27000 MW.

Pakistan has multiple plausible options to produce electricity. These include wind, solar, biomass, ocean tide, geothermal, hydro, gas, oil, coal, and nuclear. These are intermittent sources. Hydroelectricity can be more useful if we have many reservoirs. The actual baseload energies are gas, oil, coal, and nuclear. Other sources have a secondary role.

Pakistan's oil and gas reserves are likely to last another thirty years. There are 13 plants and proven oil reserves, 54 plants of Thar Coal, and 60,000 MWe of hydro potential that efficiently runs 60 plants.

Installed Electricity Generation Capacity
(As of 30th June 2022)

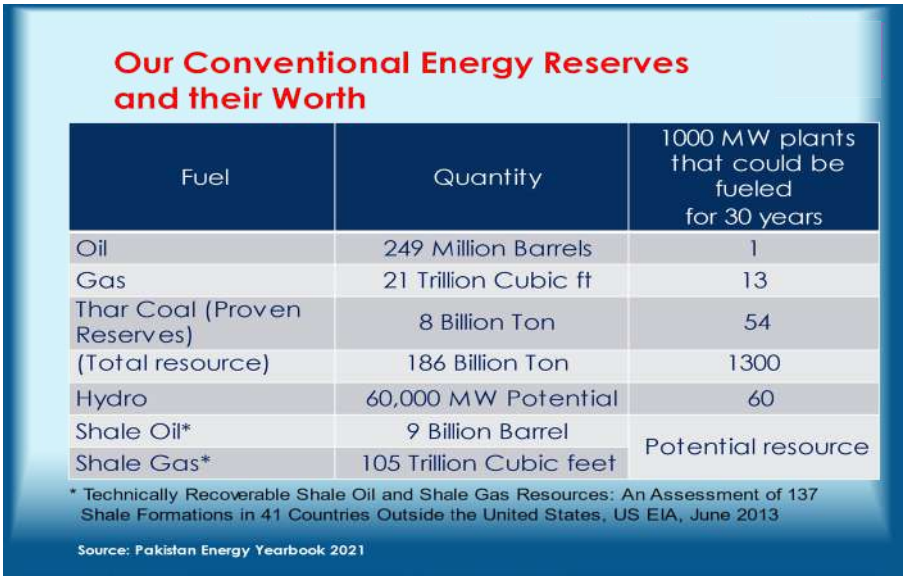
	MW	% Share
Nuclear	**3,620**	**8.1**
Oil/Gas	21,555	48.5
Coal	5,812	13.1
Hydro	10,635	23.9
Wind	1,899	4.3
Solar	586	1.3
Baggase	369	0.8
Total	44,476	

Source: NEPRA State of Industry Report, 2022

The country meets more than 50 percent of its oil requirement through imports. There is an increasing need for gas, and the demand-supply gap is rising. Liquid Natural Gas (LNG) is being imported to meet the partial demand.

As Pakistan is an agricultural country, the gas must be converted to urea. However, the country is importing urea and burning gas for other purposes. There are good coal resources, and 40 MWe capacity is operational at Thar, Balochistan. Around 95 percent of Pakistan's coal resources are at Thar. Extensive use of coal will increase the emission of poisonous greenhouse gases, including nitrogen oxide and sulphur oxide.

Pakistan's hydropower potential is high and only 18 percent is exploited. The challenge with hydro is the high investment cost and losses in electricity transmission.



Our Conventional Energy Reserves and their Worth

Fuel	Quantity	1000 MW plants that could be fueled for 30 years
Oil	249 Million Barrels	1
Gas	21 Trillion Cubic ft	13
Thar Coal (Proven Reserves)	8 Billion Ton	54
(Total resource)	186 Billion Ton	1300
Hydro	60,000 MW Potential	60
Shale Oil*	9 Billion Barrel	Potential resource
Shale Gas*	105 Trillion Cubic feet	

* Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States, US EIA, June 2013

Source: Pakistan Energy Yearbook 2021

Socio-political issues also affect the energy sector. These include allocation of water among provinces, resettlement of people, projects, and investments. Climate change causes alteration in the seasonal flow of the Indus River system, and fluctuation in the amount of rainfall, making it difficult to rely on hydropower.

Wind power potential in Pakistan is theoretically around 60,000 MWe. The capacity factor is deficient and merely is 3-8 percent. Solar potential is high, with a capacity factor of around 20 percent. Wind and solar energy are fuel savers but not capacity savers; winds have low annual capacity. Hence, the capacity factor is crucial.

At the dawn of nuclear age, Pakistan was the 15th country to operate a nuclear power plant. Work on the Karachi Nuclear Power Plant (KANUPP-1) started in 1966, and it was formally inaugurated on 1 December 1972. After about 50 years of operating safely and efficiently, it was decommissioned in 2020. Most countries pursued their civil nuclear energy programs after Pakistan. At KANNUP-1, 137 MWe were commissioned, vendor support was withdrawn, and an international embargo was imposed but, with the initiative of a PAEC chairperson, Pakistan ran the plant indigenously, giving it the confidence to enter the nuclear arena. Thereafter, the plant was operated through indigenous efforts that helped PAEC gain expertise in local manufacturing of fuel and develop expertise in other spheres.

A technical support system, including fuel management and safety assessment was developed indigenously.

Operational Nuclear Power Plants in Pakistan (All NPPs are underIAEA Safeguards)

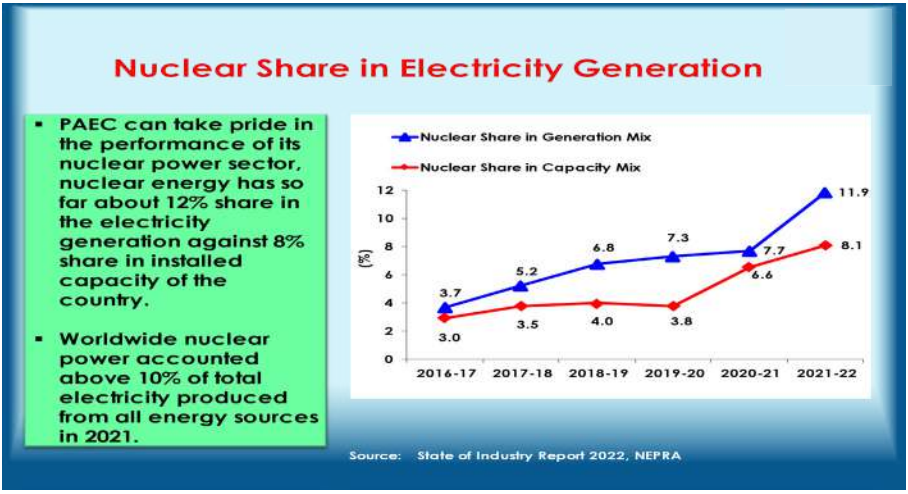
	C-1	C-2	C-3	C-4	K-2	K-3
Capacity (Gross)	325 MW	325 MW	340 MW	340 MW	1100 MW	1100 MW
Ground breaking	26-12-1992	08-04-2005	05-08-2010	01-04-2011	26-11-2013	26-11-2013
Grid Connection	13-06-2000	14-03-2011	15-10-2016	01-07-2017	18-03-2021	04-03-2022
Life Time Capacity Factor	77%	86%	87%	85%	79%	90%
Highest Continuous Operation Record	280 Days (24-02-2017)	425 Days (08-09-2020)	382 Days (09-03-2022)	373 Days (07-07-2020)	103 Days (01-09-2021)	100 Days (23-01-2023

Seventeen years later, there was an interruption caused by the non-availability of fuel, after which work on nuclear power was resumed. In 1992, the ground-breaking of Chashma plant took place with Chinese assistance. Chashma 1 (C1), and Chashma 2 (C2), have 325 MWe capacity. Similarly, Chashma 3 (C3) and Chashma 4 (C4) have a capacity of 340 MWe. KANUPP-2 and -3 plants have 1100 MWe capacity each. These were also built with the Chinese assistance under IAEA aegis.

A crucial factor is the lifetime capacity factors of these plants - 77 years in the case of C1, and 86 years in that of C2. Hence, the capacity is a bit low compared to other nuclear power plants. Currently, KANUPP-2 is low as refueling has to be done for the first cycle earlier, so that time has reduced its capacity factor, but next time refueling cycle will also come above 80-85 percent.

The highest continuous operation is also a significant factor for power plants. The accounting operation of Chashma-2 surpasses 425 days, after which the plant has to shut down for refueling. The installed capacity of nuclear-share electricity is 8.5 percent, and the contribution to the grid is 11.9 percent. In 2022, all six nuclear plants were operational and their contribution to the energy matrix was 27.9

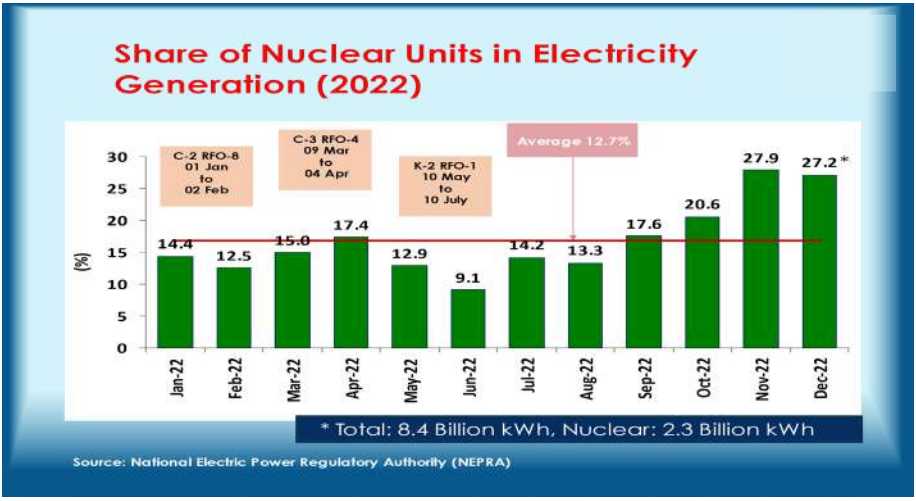
percent in November and 27.2 percent in December.



Pakistan should continue to pursue nuclear energy because it is the cleanest, sustainable and most baseload carrying source.

Pakistan has 96 reactor years of operation experience. During this period, safety has been the hallmark of the nuclear industry. As a member of the World Organization for Nuclear Operations (WANO) and owing to its engagements with the IAEA, Pakistan is very conscious of the safety of its nuclear plants. These plants undergo peer view processes via Pakistan's Nuclear Regulatory Authority

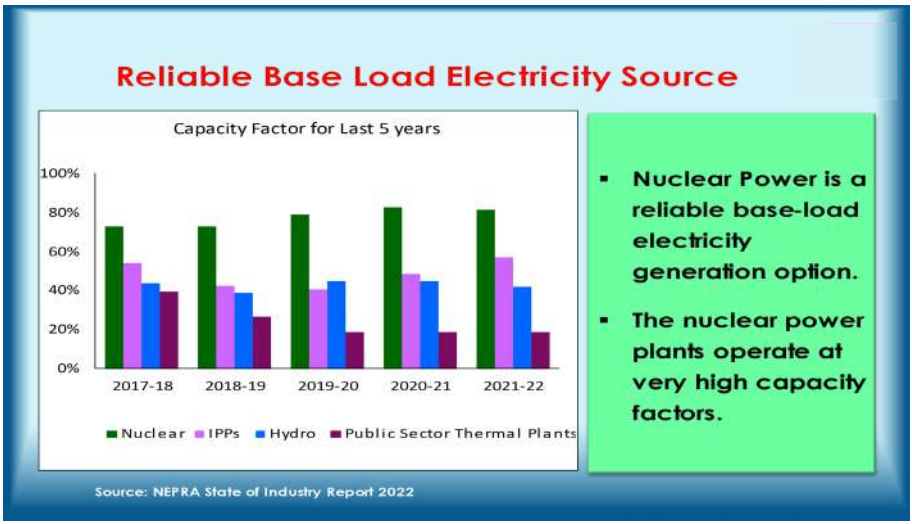
(PNRA), which controls the safe operation of nuclear power plants. The construction of another Chashma-5 nuclear power plant is in the works. PAEC is a strong advocate of this plan and is convinced that Pakistan needs more energy from nuclear source.



Besides this, PAEC has very good education and training institutes that provide in-house training. These institutes include the Pakistan Institute of Engineering and Applied Sciences (PIEAS) which is an independent university, education and training centers in Chashma, Pakistan Welding Institute, and Nuclear Center for Non-disruptive Testing.

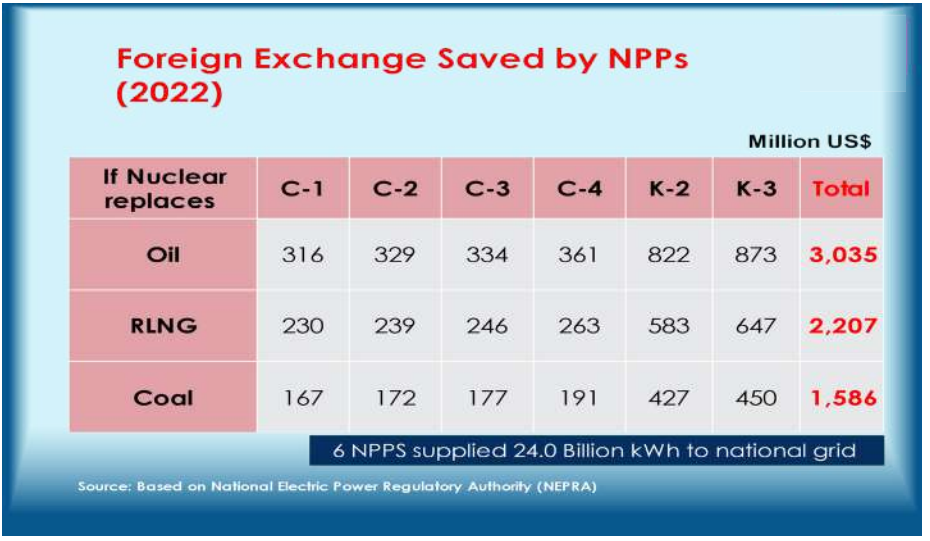
Nuclear energy has high availability and a capacity factor of more than 80 percent, which enhances energy security. As nuclear energy is clean, it contributes to climate change mitigation and is an economical energy source. A comparison can be drawn between four electricity sources: nuclear energy, independent power producers (IPPs), hydro, and public-sector thermal energy.

The availability factors are the highest in the case of nuclear. Nuclear capacity factors are much higher contributors in the country. Hence, it is vital to choose the nuclear energy option. The use of nuclear power ensures energy security as nuclear power plants provide sustainability of electricity price, having a low share of fuel cost. Oil is imported through ships or gas pipelines. It would be best to have a small building to refuel nuclear plants.



Opting for nuclear energy has no impact on fossil fuel prices. The minimal quantity of uranium pellets, for instance 10 grams, has equivalent energy, which may be 17,000 cubic feet of natural gas, 149 gallons of fuel, or one ton of coal. Nuclear is a clean energy source because it has zero greenhouse gas (GHG) emissions; no nitroxide or sulfur dioxides are emitted, which are dangerous for health. In a year, 6 million tons of GHGs are emitted from a 1000 MW coal plant. In the case of oil and gas, it is 5 and 3 million tons respectively. In the

case of nuclear, there are no GHG emissions, which shows how clean nuclear energy is.



PAEC gives economical unit prices for all nuclear power plants. The unit price for C1 is the lowest in the country, with a per unit rate of PKR 6.61. For C2, it is about PKR 11-12, which will be reduced further to the same level as C-1 after some repayments in a few years. The highest rate is from C-3 at PKR 16 or 17 per unit. Hence, the average rate of all the nuclear power plants is PKR 15.28 per unit. In 2022, six nuclear power plants (NPPs) supplied 24 billion units to the national grid. The country is spending USD 3.03 billion on oil, USD 2.2 billion on LNG, and USD 1.586 billion on coal imports. The difference is quite obvious.

For Pakistan, the two major baseload power generation options are coal and nuclear energy, where the former emits GHGs. Pakistan must have an energy mix pot, not reliance on single source of energy. The share of nuclear energy in the energy mix must be from 10 to 20 percent. Pakistan must develop hydro, Thar Coal, nuclear, and renewable energy to meet its electricity demands. Operational nuclear power plants in the country are performing well. Their capacity factor is the highest and safety is also extremely good as the country is a member of WANO and IAEA, has established institutions such as the Pakistan Nuclear Regulatory Authority (PNRA), and a strong safety group – the Directorate General of Safety – within PAEC.

Pakistan's six NPPs are under IAEA safeguards and have a perfect track record. A competent local human resource, which is educated and trained within the system, operates, and maintains these NPPs. PAEC is gradually increasing the indigenization of nuclear power plants and moving towards more spheres.

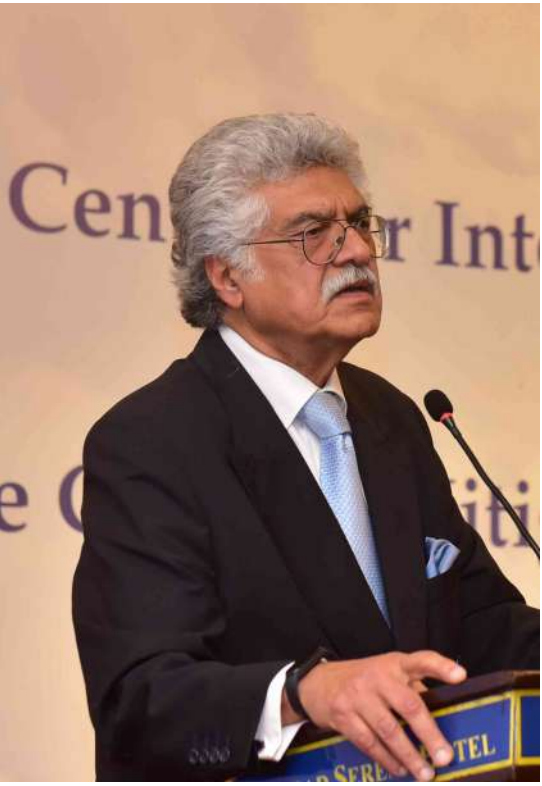
Role of the Developed World in Promoting Nuclear Energy in Pakistan

Ambassador (R) Zamir Akram
Advisor, Strategic Plans Division & Former Permanent Representative of Pakistan to UN

Since its independence, Pakistan recognized nuclear energy as a vital source of energy. It was among the first countries to sign up for cooperation under the Atoms for Peace Program. It became a recipient of assistance under the program, which was extremely helpful, not only in terms of the acquisition of the technology for the peaceful use of nuclear energy, but more so for the training of Pakistan's scientists, engineers, and technicians who would go on to play a significant role in the country's nuclear program in later years. Hence, Pakistan's critical initiative to join the program benefited it. In the early 1970s, one of the outcomes of cooperation in the civilian area of nuclear technology was Canadian assistance in setting up the KANDO-type reactor, called KANNUP-1.

The dual use of nuclear technology is an important and serious factor. Whatever technology can be used for producing energy can also be diverted toward the production of weapons. In 1974, India conducted its first nuclear test, demonstrating that it had clandestinely and illegally transferred nuclear material from its civilian reactors towards creating a nuclear weapon.

Unfortunately, the impact of the incident was not so much on India as it was on Pakistan because the Canadians escalated their demands for intrusive safeguards and monitoring mechanisms for KANNUP. Pakistan had already accepted the safeguards arrangements under the IAEA protocol, so the Canadian arrangement was not feasible.



The Canadians eventually pulled out of the KANNUP reactor. As a result, PAEC indigenously operated the nuclear power plant. The other outcome of the Indian nuclear test was the adoption of several legislative measures, especially in the US, which was complemented by other partners of the US in Europe and Asia.

The timeline drawn for activities that could lead to the diversion of nuclear technology towards weapons gave India a free pass because all of these became effective and operational after 1974. So, anyone who crossed the threshold after 1974 would have been caught in that net that was not overtly but certainly aimed at preventing Pakistan from going down the nuclear route. It suffices to say that Pakistan was denied technology in the nuclear domain, even for its peaceful nuclear program under safeguards, even though it was seeking nuclear cooperation under IAEA safeguards.

By then, the Nuclear Non-proliferation Treaty (NPT) had kicked in. Importantly, the IAEA statute and its safeguards requirements do not call for the denial of nuclear cooperation with countries that are not

members of the NPT – it is a requirement set by the NPT. Hence, the IAEA statute precedes the NPT, whereas Pakistan is not member to the treaty and can legally argue that its commitments do not bind it. If Pakistan has a safeguards agreement with the IAEA, it should be allowed to engage in nuclear cooperation, but that is the legalistic point of view. Practically, these matters enter the domain of politics, where the role of great powers prevails.

To make matters worse, in 2008, because of the changed global strategic environment and the emerging strategic partnership between the US and India, the Americans first concluded a bilateral civilian nuclear cooperation agreement to use Delhi as a counterweight to China. As a result, the US facilitated India with a waiver from the Nuclear Supplier Group (NSG), which also included additional protocols with IAEA. It was one of the dark moments in our history when this was being considered at the IAEA headquarters in Vienna. In 2008, the then Pakistani government succumbed to the pressure from the US to withdraw its objection to the American-backed exemption for India and the conclusion of additional protocol by the IAEA.

However, here the tribute goes to some of Pakistan's diplomats who had anticipated that the US, despite our asking, would not extend the same facility of civilian nuclear cooperation with Pakistan or a waiver through the NSG. It was written very clearly on the wall. President Bush, during his visit to Pakistan, had clearly stated that India and

Pakistan were on different trajectories owing to their different histories. Pakistan had already been negotiating with China, anticipating that it would need a source to build its civil nuclear capabilities. That agreement is the source for the six nuclear power plants in Pakistan at Chashma and Karachi. While the Western developed world has not contributed in any way, we have successfully cooperated with Chinese in enhancing our civilian nuclear capacity after the Atoms for Peace Program. This cooperation will continue and soon there will be a fifth reactor at Chashma.

Pakistan, which has contributed less than one percent to global warming or climate change, and a country with a supply of plentiful coal under its soil, would be undermining its interests if it were to voluntarily abandon the option of using coal. We should not give up this option. The Indians repeatedly made the argument in the Paris climate talks and subsequent consultations on this issue irrespective of the fact that India is among the worst offenders regarding greenhouse emissions and always stays interested in using its coal. Hence, Pakistan should not give up its options just for the sake of some environmental concerns which are not even its fault. Instead, we must use our vast coal reserves innovatively through new ways and technologies.

Q&A Session

Q: Since all power plants are connected to the national grid, can nuclear consumption by each sector, such as household industry and transportation, be calculated?

A: In 1984-85, nuclear contribution to the domestic sector was 28.9 percent while today it is 53 percent. Unfortunately, it has been reduced in the agricultural and industrial sectors. Development demands that the country increases nuclear energy consumption in these two sectors.

Q: Is there a possibility for Pakistan to become a member of the NSG?

A: Realistically, there is no such possibility for either Pakistan or India. The Indians presented an application for membership in 2015 and so did Pakistan. Countries that are not signatories of NPT cannot become part of the NSG. The rules, however, are not very clear. Neither India nor Pakistan is a member of the NPT. Several NSG members are making the argument that new criteria have to be drawn up for non-NPT nuclear weapon states. A small group argues that it is better to bring these countries, including Pakistan, India, and Israel, into the NSG framework because it will be more universal and safer.

On the contrary, many states, particularly those that gave up their nuclear weapon programs to join the NSG and NPT, are against the proposition. Despite American and Western efforts to grant India an NSG membership based on the already granted waiver, China has stressed that the criteria should apply to everyone – it must be equitable, universal, and non-preferential. As long as the Chinese take this position, the likelihood of either India or Pakistan getting NSG membership is very slim.

Q: I sent a research article to an American think tank arguing that the world should pay Pakistan climate change compensations. They responded that Pakistan is a friend to the largest emitter of carbon in the world i.e., China, and that it invests in nuclear weapons instead of green transition. What should be our response?

A: What you describe is the reality of double standards. China is the world's most significant contributor to climate change and India is not far behind. It is for that very reason that the US has tried to justify its civilian nuclear cooperation agreement with India and NSG waiver on the pretext that it will enable India to move toward nuclear energy. The argument can be made on both sides. Your article didn't get the attraction it deserved due to double standards. They have bypassed the argument that Pakistan is suffering from the ravages of climate change without having contributed to it. They now assert that you

are next door to a country that is an emitter of carbon dioxide – since you live next to a crook, you are also a crook. This argument stems from countries that rank higher on the scale of carbon emitters.

Q: Pakistan is the most vulnerable country to climate change but is least responsible for it. Additionally, it is being denied access to nuclear technology. In this scenario, how can Pakistan continue to play an important role in climate change mitigation?

A: We can increase the percentage of nuclear energy in the energy mix to automatically mitigate greenhouse gases. Removing hurdles in the way of achieving this is up to the government.

Q: It is said that after the incident with Canada, Pakistan developed its nuclear power plants with Chinese assistance. Why is Pakistan not acquiring technology from other countries, such as Russia?

A: It is a matter of NSG membership and of interest shown by other states. Pakistan welcomed China for setting up these plants and is open to any other country's offer for peacefully using and harnessing this technology which is the harbinger of a greater good. So far, negotiations with states like Russia have been more focused on culture and health issues.

Concluding Remarks

Ambassador (R) Ali Sarwar Naqvi
Executive Director, CISS

The seminar is another reflection of our continued pursuit of excellence at the Center for International Strategic Studies through quality outreach and advocacy. The discussions have brought a critical point to the forefront that Pakistan is using nuclear energy for peaceful purposes exceptionally. Climate change was not a challenge about twenty years ago but has now taken a very serios form as a grave challenge for the entire planet. Pakistan has the expertise, abilities, motivation, and desire to use nuclear energy to mitigate climate change. Nuclear energy is also used to achieve socio-economic development through a range of peaceful applications in various sectors, including agriculture, medicine, biosciences, biotechnology, and industry. I am confident that the takeaways of this seminar will be usefully integrated in our public discourse and academic pursuits.

Profiles of Speakers

Ambassador (R) Ali Sarwar Naqvi served in various diplomatic assignments during the thirty-six years of his diplomatic career. These include the United Nations (New York and Vienna) and other capitals, including Washington DC, London, Paris, and Brussels. After his retirement from Foreign Services of Pakistan, he was appointed as Member Chairman's Advisory Council of the Pakistan Atomic Energy Commission. Ambassador Naqvi is the founding Executive Director of CISS, established in 2010.

Professor Ahsan Iqbal is the Federal Minister of Planning, Development and Special Initiatives. He is also Deputy Secretary General of Pakistan Muslim League-N and Chairman of Better Pakistan Foundation, a non-profit organization. His previous appointments include Deputy Chairman of Planning Commission (1998-99); Chief Coordinator/Minister of State Pakistan 2010 Program (1997-99); Chairman Good Governance Group, GoP (1997-99); Chairman Pakistan Engineering Board; and Chairman National Steering Committees on Information Technology and TQM and Productivity (1998-99). He is an MBA from the Wharton School, University of Pennsylvania, USA (1984-86) and BSc in Mechanical Engineering from the University of Engineering and Technology, Lahore, Pakistan.

Dr Rafael Mariano Grossi has been serving as Director General IAEA since 2019. He is a diplomat with over 35 years of experience in non-proliferation and disarmament. His other appointments include President Nuclear Suppliers Group (2016); Ambassador to Austria and Argentinian Representative to IAEA and other Vienna-based International Organizations (2013); Chief of Staff of IAEA and Organization for the Prohibition of Chemical Weapons (2002 to 2007); and President of the UN Group of Government Experts on International Weapons Registry and Advisor to UN Assistant Secretary General on Disarmament (1997- 2000). He holds a PhD in International Relations, International History, and Politics from the University of Geneva, Graduate Institute of International and Development Studies.

Ambassador (R) Shafqat Kakakhel is a former Pakistani diplomat and high-ranking UN official. His diplomatic assignments included postings in Lebanon, Egypt, Saudi Arabia, India, and Kenya and positions at the Ministry of Foreign Affairs in Islamabad. He served as UN Assistant Secretary General and Deputy Executive Director of (UNEP) from 1998- 2007; High Commissioner to Kenya and Uganda, and Permanent Representative to the UN Environment Program (UNEP) from 1994-1998; and Deputy High Commissioner in New Delhi (1987-1992). Currently, he is Chairperson of the Sustainable Development Policy Institute (SDPI) Board of Governors and Board of Directors of the Mountain and Glacier Protection Organization (MGPO). He has written and lectured extensively on transboundary rivers in South Asia, Pakistan's water-related challenges, the Indus Waters Treaty, and climate change. He has actively participated in Track 2 dialogues between Pakistan, India, and Afghanistan to promote cooperation on water and climate issues.

Mr Muhammad Naeem is currently Advisor Strategic Plans Division on Pakistan Atomic Energy Commission Affairs. Previously, he served as Chairman PAEC, where his focus remained on strengthening teams and creating high-tech R&D. He was instrumental in completing commercial NPP Projects-3, C-4, K-2, and K-3, besides the upgradation of 18 existing cancer hospitals and remained instrumental in enhancing technical cooperation with international institutes like IAEA, WANO, CERN, and SESAME, thus promoting the softer image of Pakistan. He has been representing Pakistan as Governor for four years in IAEA Board of Governors. He has been conferred with Sitara-i Imtiaz, Hilal-i-Imtiaz, and Nishan-i-Imtiaz by the government of Pakistan for his valuable contributions to PAEC.

Ambassador (R) Zamir Akram is currently Advisor to the Strategic Plans Division. As Pakistan's Ambassador and Permanent Representative to the UN and other International Organizations in Geneva from 2008 to 2015, he played a leading role in disarmament, human rights, and humanitarian affairs, among others. In 2015, he was elected Chair-Rapporteur of the Human Rights Council`s Working Group on the Right to Development. As Additional Foreign Secretary in the Prime Minister's Office, he was responsible for Pakistan's foreign, security, economic, energy, health, and education policies from 2004 to 2008. He joined the Foreign Service in 1978 and served in the (former) Soviet Union, India, the US, and UN. Ambassador Akram holds a Master's in International Relations from the London School of Economics and Political Science. He served as the Honorary Dean of the Geneva School of Diplomacy in 2010, where he was awarded an Honorary Doctorate.

Gallery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Program

Inaugural Session

1530 hrs	Registration
1615 – 1618 hrs	Recitation
1618 – 1625 hrs	Welcome Remarks: Ambassador Ali Sarwar Naqvi, ED CISS
1625 – 1640 hrs	Keynote Speech: Prof Ahsan Iqbal, Federal Minister for PD&SI
1640 – 1700 hrs	Keynote Speech: HE Rafael Mariano Grossi, DG IAEA
1710 – 1715 hrs	Group Photograph
1715 – 1735 hrs	Coffee Break

Working Session

1735 – 1750 hrs	Challenges Posed by Climate Change for Sustainable Development of Pakistan & the Way Forward Speaker: Ambassador (R) Shafqat Kakakhel, Chairman BoG, SDPI
1750 – 1805 hrs	Pakistan's Energy Requirements, Available Resources & Nuclear Energy Speaker: Mr Muhammad Naeem, Former Chairman PAEC
1805 – 1820 hrs	The Role of Developed World in Promoting Nuclear Energy in Pakistan Speaker: Ambassador (R) Zamir Akram, Former Representative to UN
1820 – 1845 hrs	Discussion / Q&A Session
1845 – 1900 hrs	Concluding Remarks: Ambassador Ali Sarwar Naqvi, Executive Director, CISS
1900 hrs	High Tea

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