

REVISITING 25 YEARS OF
YOUM-E-TAKBEER

Fostering National Security
and Development



Center for International Strategic Studies
Islamabad

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**Revisiting 25 Years of Youm-e-Takbeer
&
Fostering National Security and
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Foreword

The 28th May 2023 marks a momentous occasion in Pakistan's history – the Silver Jubilee anniversary of our nation's response to India's resumption of nuclear weapons tests in 1998. On this day, we commemorate the remarkable achievements of our scientists, engineers, staff, technicians, and leadership, who made Pakistan self-reliant in strategic defense. Their untiring efforts, dedication, vast knowledge, determination, and the blessings of Allah have allowed

“On this day, we commemorate the remarkable achievements of our scientists, engineers, staff, technicians, and leadership, who made Pakistan self-reliant in strategic defense.”

us to establish a credible deterrent against any potential aggression by India that could threaten our territorial integrity and sovereignty.

This Special Edition by CISS serves as a testament to our gratitude and admiration for these unsung heroes of our nation. Despite

resource constraints, these heroes have made Pakistan's defense impregnable. Their hard work and sacrifices have ensured our resilience and safeguarded our nation's security. We stand united as Pakistanis in extending our heartfelt thanks for their invaluable contributions.

The fundamental purpose of Pakistan's nuclear program has

“Pakistan actively contributes to multilateral forums aimed at strengthening arms control, nonproliferation, and disarmament norms.”

consistently been defensive, focused on restoring regional deterrence stability. The 1974 and 1998 nuclear tests conducted by India heightened

the importance of establishing a credible deterrent. Presently, there are apprehensions regarding India's potential testing of thermonuclear weapons, posing a risk of escalating strategic instability. It is crucial to highlight that Pakistan's nuclear weapons program has always been dedicated to preserving peace and stability.

Pakistan's nuclear program stands as a testament to extraordinary achievement, defying all obstacles. This state-of-the-art capability serves as a powerful inspiration, demonstrating that success in defense can be replicated across various national endeavors. The enhancement of Pakistan's traditional and non-traditional security is an attainable goal that lies within our grasp.

Youm-e-Takbeer represents our collective will and resilience, transcending political boundaries. Today, as we celebrate this momentous achievement, we must also acknowledge the broader context

in which our nation operates. India's fast-growing nuclear and conventional military program poses significant challenges while countering hybrid warfare tactics and support for proxies in Pakistan. The biggest concern is that nuclear command and control in India is in the hands of Hindu nationalists having a revisionist agenda in the region. Kashmir remains a nuclear flash point unless this major conflict is resolved between the two nuclear states of South Asia.

As a self-assured and responsible nuclear power, Pakistan is dedicated to nurturing a secure and peaceful regional environment, ensuring effective deterrence, and harnessing nuclear energy for peaceful purposes. Pakistan actively contributes to multilateral forums aimed at strengthening arms control, nonproliferation, and disarmament norms. At the national level, we adhere strictly to international standards concerning export controls, nuclear safety, and security.

Youm-e-Takbeer is a celebration of our resilience and a testament to the blessings bestowed upon us by Allah Almighty. It reminds us of the vital significance of a secure and stable environment in overcoming economic difficulties. May Allah Almighty continue to grant us success, strengthen our resolve to defend Pakistan, and empower us to contribute to the socio-economic development of our country.

Lieutenant General (R) Mazhar Jamil
Advisor, National Command Authority
of Pakistan

Genesis of Pakistan's Nuclear Program

Ambassador (R) Ali Sarwar Naqvi

The 28th day of May this year marked the 25th anniversary of Pakistan's response to India's resumption of nuclear weapons tests. India nuclearized South Asia by conducting its first nuclear test in 1974 and resumed testing in 1998. There are indications that India may again test thermonuclear weapons, increasing strategic instability in the region.

The primary objective of Pakistan's nuclear program has always been to establish a credible deterrent against any potential aggression from India that could threaten our territorial integrity and sovereignty. The destabilizing effect caused by India's nuclear tests further reinforced the need for Pakistan to restore a state of mutual deterrence in the region. It is crucial to emphasize that Pakistan's nuclear weapons program has been primarily oriented toward defensive purposes.

Unlike countries such as Israel and North Korea, Pakistan did not begin its nuclear journey with a classified security program. Instead, Pakistan initially pursued a nuclear program overtly for the country's socio-economic development. It benefitted from the 'Atoms for Peace' program initiated by the United States. Pakistan became one of the first three countries, alongside Turkey and Israel, to benefit from this initiative. Intriguingly, India was not included in this initial list of beneficiaries.

“The primary objective of Pakistan’s nuclear program has always been to establish a credible deterrent against any potential aggression from India that could threaten our territorial integrity and sovereignty.”

This resulted in an excellent opportunity for young Pakistani people at that time, including Pakistani scientists and engineers, to go to Western centers of learning and acquire knowledge in the peaceful uses of nuclear energy. It was the time when the International Atomic Energy Agency (IAEA) and Pakistan Atomic Energy Commission (PAEC) were established. Pakistan sent hundreds of young students who later became big names in the country's atomic program. It also resulted in the development of power generators, agriculture, and advanced medical facilities in Pakistan.

At the same time, Pakistan carried out a set of actions in the United Nations at the multilateral level. Pakistan sponsored two resolutions - one on nuclear weapons-free zone in South Asia and the other on negative security assurances with non-nuclear weapons states (NNWS). Pakistan continued to support those resolutions till the 1980s. Even though India had already held its first nuclear test

in 1974, Pakistan continued on the path of using nuclear energy for peaceful purposes by setting up a whole range of facilities in agriculture and medicine sectors all over Pakistan, from Karachi to Khushab.

Pakistan did not resort to developing nuclear weapons capability even when the war of 1965 with India happened and

“Pakistan’s nuclear program is the backbone of its national security and the guarantor of peace and stability in the region.”

continued the path of harnessing nuclear energy for peaceful uses. However, when the second war

with India in 1971 occurred, Pakistan realized that its sovereignty was threatened, and apprehended the importance of having a nuclear deterrent. Pakistan then embarked on the path of developing its nuclear weapons program as a defensive measure. There exists a prevailing narrative, propagated by the Western and Indian media, that portrays Pakistan’s nuclear program as inherently dangerous. In reality, Pakistan’s pursuit of nuclear weapons was driven by the imbalanced security dynamics prevailing in South Asia, compelling it to reluctantly acquire nuclear weapons capability.

Pakistan pursued a classified program and successfully developed nuclear capabilities. It involved the development of advanced materials for weapons, which were of weapons-grade nature. Despite having the potential to pursue a classified military weapons program, Pakistan exercised restraint till India conducted its second round of nuclear tests on 11 May 1998. Pakistan effectively demonstrated its own nuclear weapons capability on the 28th day of May. Over the years, Pakistan’s deterrence has proven resilient despite

the constant presence of various threats. Pakistan has successfully maintained parity with India in military programs, ensuring its pursuit of nuclear capabilities remains strong.

Now, after the passage of many years and the successful preservation of deterrence, Pakistan finds itself in a position to refocus on the broader and original objective of its nuclear program – the development of peaceful nuclear technology to better the country's socio-economic conditions.

On Youm-e-Takbeer, two key aspects of Pakistan's comprehensive security are recalled – the creation of deterrence in South Asia and the exceptional accomplishments and scientific developments its experts and scientists have been making for a span of more than six decades.

Pakistan's nuclear program is the backbone of its national security and the guarantor of peace and stability in the region. Pakistan has been a great supporter of nuclear non-proliferation, a stance it still maintains, and has practically exhibited by utilizing nuclear energy for peaceful purposes. The imbalanced security environment in South Asia compelled Pakistan to develop nuclear weapons. This step was needed to restore mutual deterrence in the region, which India had destabilized by its nuclear weapons tests.

We have always maintained that our nuclear program is focused mainly on deterring India from targeting our sovereignty. India's intransigence in resolving the Kashmir dispute and its conventional and nuclear capabilities were other significant factors influencing the decision of nuclear testing.

On the peaceful side, our nuclear and space programs are

playing an important role in the national socio-economic development process in the fields of medicine, agriculture, research, and energy. It helps us leapfrog toward achieving United Nations' Sustainable Development Goals efficiently and sustainably. All proponents of a peaceful, stable, and developed region, as well as the world must join hands with Pakistan and endorse its endeavors for using nuclear energy for peaceful purposes.

Youm-e-Takbeer 2023

Dr Atia Ali Kazmi

Youm-e-Takbeer punctuates the one nuclear weapon test Pakistan conducted on 30 May 1998. It was reportedly an implosion-type boosted-fission plutonium device with a yield of 25 kilotons. To recall, Pakistan conducted five nuclear tests with a total reported yield of 40 kilotons and emphatically established a deterrence regime on this day exactly 25 years ago. The 28th and 30th of May 1998 thus have a central place in our history, representing our resolve to defend our motherland.

Pakistan's nuclear program is an island of excellence. Despite all odds, if this cutting-edge capability could be achieved, it can also be replicated in other spheres of national endeavors to beef up Pakistan's traditional and non-traditional security.

Youm-e-Takbeer represents our collective will and resilience that transcends the political spectrum, and everyone stands united in gratitude to our scientists, engineers, leadership, and other guardians of our security to make Pakistan's defense impregnable.

The 1971 war waged by India on us and their first test of nuclear weapons in 1974 created a security dilemma for Pakistan. India's ongoing vertical proliferation, dangerous doctrines, and drift towards extremism and fundamentalism have made this a pulsating and pacing threat for Pakistan.

“Pakistan’s nuclear program is an island of excellence. Despite all odds, if this cutting-edge capability could be achieved, it can also be replicated in other spheres of national endeavors to beef up Pakistan’s traditional and non-traditional security.”

Moreover, India's nuclearization of the Indian Ocean region by introducing nuclear attack (SSNs) and nuclear ballistic missile submarines (SSBNs) is a threat to Pakistan and the thirty-three other littoral states of the region. Pakistan must respond by developing an assured second-strike capability to stabilize deterrence.

Some extra-regional states have vitiated South Asian strategic stability by proliferating submarine and missile technology to India. For instance, Russia shared nuclear submarine technology, provided S-400 missiles, and co-developed nuclear-capable BrahMos super-sonic cruise missiles. Russia has also supplied Su-30 aircraft to India. They might be doing it as a business imperative, i.e., India has money, and others need business, but that exacerbates Pakistan's security dilemma. Similarly, France has supplied nuclear-capable Rafale aircraft to India.

India has also weaponized space and tested an anti-satellite weapon in 2019. It did not even get a slap on the wrist for this ir-

responsible behavior. The US secured India a special trade waiver from the Nuclear Suppliers Group (NSG) in 2008. This has allowed India to import thousands of tons of uranium from NSG members, which has freed their domestic uranium reserves for use in making bombs.

India has the fastest growing nuclear and conventional military program in the world. New Delhi seeks space for limited conventional war with Pakistan under a nuclear overhang. It is actively involved in terrorism and sowing separatism in Pakistan but claims to be its victim. Likewise, India is engaged in hybrid information warfare, cyber, and lawfare. They are reportedly interested in developing Lethal Autonomous Weapon Systems (LAWS) and have tried to change the reality of Indian Illegally Occupied Jammu and Kashmir (IIOJ&K), which they continue to illegally occupy today.

India's state-sponsored drift into extremism and Hindu fundamentalism is a threat the world shall have to deal with soon. Due to political reasons, some powers are looking the other way and are feeding the Frankenstein monster in Pakistan's neighborhood.

In sum, India poses an existential threat to Pakistan. Our nuclear capability has deterred India. As we have focused on our traditional security, we must pay undivided and sustainable attention to non-traditional security and invest in the knowledge economy. Sustainable development is a crucial imperative for Pakistan's security, and our nuclear program also contributes to agriculture, power, medicine, and other sectors. It is a best practice, a great story, and an excellent example worth emulating in other sectors.

Pakistan's Entrance into the Global Nuclear Club

Huma Rehman

Every year, 28 May evokes the memory of the tough decisions Pakistan had to take to ensure its security and territorial integrity. It has acquired special significance for Pakistan, as twenty-five years ago, Pakistan demonstrated its nuclear weapons capability overtly, confirmed its status as a nuclear power, and firmly established a deterrence relationship with India.

This year marks the Silver Jubilee of Pakistan's detonations, a strategic response to Indian nuclear tests called Operation Shakti of 11 and 13 May 1998. These tests by India significantly altered the regional strategic landscape and created a severe security dilemma for Pakistan. Given the fragile security environment in South Asia, Pakistan was compelled to test to ensure its security against the much bigger and more powerful adversary in geographical and military terms, respectively. Pakistan was left with no choice but to achieve a deterrent against India, which also served to curtail India's instinc-

tive urge for escalation in a crisis situation.

After the 1998 tests, Pakistan fully integrated nuclear weapons into its security forces and strategic doctrine. In subsequent years, it enhanced the range of its nuclear capabilities and delivery systems, besides developing a survivable second-strike capability to deter India credibly. Pakistan restored mutual deterrence in the region, which India had destabilized by its nuclear tests and overt nuclearization of South Asia.

The India-Pakistan relationship is characterized by unmitigated rivalry and the eruption of intense crises at irregular intervals. Since independence, both countries fought three conventional wars in 1947, 1965, and 1971, over the unresolved Kashmir dispute, except the last one, before acquiring nuclear weapons. However, in 1999 the Kargil crisis re-

remained limited and confined. Both countries had then come to blows but avoided further escalation.

“Pakistan was left with no choice but to achieve a deterrent against India, which also served to curtail India’s instinctive urge for escalation in a crisis situation.”

Since Pakistan's emergence as a nuclear power, nuclear weapons have played a significant role in deterring aggression from India by controlling the trajectory of escalation. Crises, such as the 2019 Balakot incident and the recent Indian missile fiasco when a supersonic BrahMos missile was irresponsibly fired from Suratgarh in India into Pakistani territory in March 2022, could escalate to a major war. The existence of nuclear weapons, however, played a crucial role in stemming the probability of escalation, mainly because the

two countries are cognizant of the consequences of mutually assured destruction (MAD), which makes military victory meaningless. It is pertinent to mention that nuclear deterrence, Pakistan's responsible behavior during the two crises mentioned earlier, and its nuclear restraint saved South Asia from the destruction of a major war.

Pakistan's acquisition of strategic capabilities bridged the conventional disparity gap with India and established a deterrence

"Pakistan has actively contributed to international endeavors aimed at enhancing arms control, nonproliferation, and disarmament norms."

framework that contributed to a balance of power. It granted Pakistan a strategic advantage and ensured regional

stability. On the one hand, both countries' possession of nuclear capabilities has hindered the escalation of adversarial bilateral relations and maintained deterrence stability. On the other hand, crisis stability has remained consistently strained due to Indian military adventurism.

Pakistan's nuclear deterrence has also brought stability to the region by reducing the Indian nuclear threat. For instance, during Operation Parakram in 2001, India sent more than 500,000 troops to Pakistan's eastern border but did not venture to cross the Pakistani border. Indian coercive tactics had lost fangs after 1998. Similarly, India designed the Cold Start Doctrine (CSD) to seize Pakistan's territory through a conventional war without risking a nuclear conflict. However, Pakistan's development of Nasr in 2011, a short-range ballistic missile that is meant to deny space to India for a conventional war, neutralized CSD.

Pakistan's defense has become invincible since it acquired nuclear capability. Pakistan has always acted as a responsible nuclear power and has used the nuclear option as a deterrent against Indian threats, whether conventional or nuclear. Hence, it is safe to say that the rationale behind Pakistan's nuclear program has remained unchanged since 1998, i.e., to counter Indian conventional military superiority and insurance against nuclear blackmail.

Being a confident nuclear power, Pakistan remains committed to fostering a secure and peaceful regional environment through peaceful uses of nuclear energy. Pakistan has actively contributed to international endeavors aimed at enhancing arms control, nonproliferation, and disarmament norms. At the national level, Pakistan adheres to international standards concerning export controls and nuclear safety and security.

Imperatives of Strategic Stability in South Asia

Dr Rahat Iqbal & Dr Muhammadi

“There is no power on earth that can undo Pakistan.”
- Quaid-e-Azam Muhammad Ali Jinnah

On 28 May this year, Pakistan observed the Silver Jubilee of Youm-e-Takbeer with national zeal and dedication to commemorate the historic nuclear tests conducted on 28 and 30 May 1998 in direct response to India’s overt nuclear weapon tests. The test demonstrated not only the determination of the Pakistani nation to defend Pakistan’s territorial integrity, independence, and sovereignty but also the desire to maintain South Asian strategic stability.

The ‘Atoms for Peace’ program announced by Dwight Eisenhower in 1953, marked the beginning of Pakistan’s civil nucle-

ar program which commenced for its peaceful applications in 1956. The Indian nuclear test in 1974, under the garb of peaceful uses of nuclear technology, changed the strategic calculus of South Asia. It compelled Pakistan to work for developing its own nuclear weapon capability. This led to the introduction of nuclear deterrence in the South Asian region.

Pakistan's quest for nuclear weapon capability has significantly prevented conventional wars with India and maintained a strategic balance in South Asia. During the Kargil crisis of 1999, India and Pakistan adopted the ladder of de-escalation from escalation, as both

were nuclear states by then. It has been almost 25 years since both the states

“Pakistan’s quest for nuclear weapon capability has significantly prevented conventional wars with India and maintained a strategic balance in South Asia.”

ventured into a full-fledged war. The Balakot crisis in February 2019 is another case in point, after which Indian officials have informally claimed to have changed their nuclear policy from no first-use (NFU) to first-use (FU). However, initiating any adventure will be risky, given the chances of retaliation. An example is Pakistan's Operation Swift Retort in response to India's Balakot misadventure.

To some extent, the ongoing Russia-Ukraine crisis can be gauged for the significance of nuclear deterrence. As a newly independent country, Ukraine was the third-largest nuclear-weapon state in 1991, but by 1996, it had given up its nuclear weapons for security assurances and economic assistance. Pertinent to the Budapest agreement on the Memorandum of Security Assurances in 1994, the US, UK, and Russia were key players in ensuring security

against any emerging threats from within and outside the boundaries of Ukraine. However, the countries that promised security assurance to Ukraine failed to comply with the memorandum.

Indian false flag operations and its adventurism, such as the Balakot incident, revocation of Articles 370 and 35A in Indian Illegally Occupied Jammu and Kashmir (IIOJ&K), and BrahMos missile incident, affect regional peace and strategic stability. Pakistan has proven to be a mature and responsible nuclear state. For instance, Pakistan urged the international community to play a part in de-escalating the Balakot crisis and returned the Indian Airforce pilot Abhinandan captured during Operation Swift Retort.

Pakistan gained independence with limited resources and a disputed border. It has confronted three full-fledged wars with India. Pakistan has been facing several challenges, but it is determined to progress through self-reliance. While discussing Pakistan's nuclear weapons program, one must not forget the remarkable efforts and contributions made by all concerned stakeholders and authorities, including scientists, engineers, and military personnel, in making the program successful for peaceful and defense purposes.

Contemporary Dynamics of the Export Control Regime

Anum A Khan

For decades, the international community has been concerned with nuclear weapons knowledge and technology proliferation. Since World War II, there have been collective efforts to control this technology. The First Nuclear Age (1950-1990) focused on the Cold War between two major powers. The Second Nuclear Age (1990 to 2020) witnessed a change in the homolog of nuclear threats when the West perceived smaller states acquiring nuclear weapons as threats to international security. It was also the time when India tested nuclear weapons in 1998. This forced Pakistan to opt for developing nuclear weapons to restore strategic equilibrium in South Asia.

28 May marks the Silver Jubilee of Pakistan becoming a reluctant entrant into the nuclear group of fewer than ten states in response to Indian nuclear tests. It was a rational decision of Pakistan

to nullify the Indian attempt to shift the balance of power in its favor.

Presently, academics and policy-makers term beyond 2020 as the Third Nuclear Age, where the threats are more dynamic, and vulnerabilities have increased due to emerging technologies and strategic conventional weapons. These have resulted in a need for the world nuclear order revolution. Eroding arms control between

“Pakistan – a country most affected by Indian designs affecting strategic stability mainly since the 1998 nuclear tests – is left out of the mainstream due to fabricated narratives and politically motivated policies.”

major powers, nuclear exceptionalism in nuclear non-proliferation regime, and disregard of dialogue by regional states having hegemonic aspirations are some of the perils facing the Third Nuclear Age.

According to social constructivism, the nuclear export control regime still tends to promote, protect and defend major powers and their commercial and strategic interests. For instance, the Indo-US nuclear deal was a bilateral agreement signed in 2005 that aimed to allow India to access global nuclear technology and materials for its civilian nuclear program. As a result of this deal and the 2008 Nuclear Suppliers Group (NSG) waiver, India has been able to enter into 16-plus nuclear cooperation agreements with other countries. Here are a few examples:

- In 2008, India signed a nuclear cooperation agreement with France, which allowed French companies to export nuclear technology and materials to India.

- In 2010, India signed a nuclear cooperation agreement with Canada, which allowed Canadian companies to export nuclear technology and materials to India for use in its civilian nuclear program.
- In 2011, India signed a nuclear cooperation agreement with Russia, which allowed Russian companies to export nuclear technology and materials to India.
- In 2015, India signed a nuclear cooperation agreement with the United Kingdom, which allowed British companies to export nuclear technology and materials to India.
- In 2017, India signed a nuclear cooperation agreement with Australia, which allowed Australian companies to export nuclear technology and materials to India. Also, in 2017, the India-Japan nuclear deal was signed and seen as significant because it marked the first time that Japan, which has traditionally had strict nuclear export controls due to its pacifist constitution, had signed a nuclear cooperation agreement with a country that is not a party to the NPT.

These are just a few examples of the nuclear deals India has entered into due to the Indo-US nuclear deal. Overall, the agreement has allowed India to access a wide range of nuclear technology and materials from various countries. Nevertheless, Pakistan – a country most affected by Indian designs affecting strategic stability mainly since the 1998 nuclear tests – is left out of the mainstream due to fabricated narratives and politically motivated policies.

If uranium supplier states are deterred from accounting for their uranium in India, that would inform all NPT parties that have

pledged to renounce nuclear weapons that it does not matter whether nuclear goods, sold on the condition that they will be used peacefully, might be used to make deadly arms.

The reason for the special treatment of India is the deepening strategic partnership of the US with India, where the latter is seen as a counterweight to China. It is interesting to note that on the one hand, the US State Department reaffirmed that there was no requirement, as far as Washington was concerned, for other countries to choose between the US and China. On the other hand, Pakistan has been openly chastised with political means by the West because China came forward and offered a civil nuclear deal for socio-economic development in Pakistan.

This Indian nuclear exceptionalism has played a significant role in derailing the India-Pakistan dialogue on nuclear issues. Moreover, the Indian nuclear program is not divided into civilian and military facilities. It also has a third category of unsafeguarded civilian facilities. Some civilian facilities, even when operating under certain provisions of India's safeguards agreement with the IAEA, will contribute to India's stockpile of unsafeguarded weapons-usable nuclear material. There is a possibility that through all 16 plus nuclear deals, India will be able to use safeguarded and unsafeguarded fuel in its unsafeguarded Fast Breeder Reactors.

Most of the uranium supplier states do not completely account for their uranium supply to India as they dismiss these controls as inconvenient for their business. Similarly, Indian membership of the Missile Technology Control Regime (MTCR), Australia Group (AG), and Wassenaar Arrangement (WA) has given it unfettered access to certain technologies and materials that are otherwise restricted. For instance, in 2016, the MTCR issued a waiver to allow India to import

Unmanned Aerial Vehicles (UAVs) related technology from the US, which was seen as a significant step in deepening the defense cooperation between the two countries.

Moreover, in 2017, the WA issued a waiver to allow India to import technology related to the production of small arms and light weapons. On another account, in 2018, the AG issued a waiver to allow India to import technology related to the production of biological agents. This can give a negative message to all NPT parties that have vowed not to acquire or build nuclear weapons, that it is

“Pakistan has an advanced nuclear program, the necessary infrastructure, and all the required credentials to become a member of the export control regime.”

acceptable if uranium imports of one country under the banner of peaceful uses also aid nuclear weapons of the other country.

In 1998, after Pakistan’s nuclear tests in response to Indian tests, there began deliberate propaganda about heightened misperceptions regarding Pakistan’s nuclear safety and security among the international community. Presently, after Pakistan showcased its impeccable record of nuclear safety and security, no concerns have been raised by any of the international forums regarding Pakistan as a Nuclear Weapon State. On more than one occasion, the IAEA has expressed satisfaction with Pakistan’s nuclear safety and security regime.

Pakistan has an advanced nuclear program, the necessary infrastructure, and all the required credentials to become a member of the export control regimes (ECR). It has forty years of experience

running safe and secure nuclear power plants (NPPs). Pakistan is a party to several international non-proliferation and disarmament-related treaties. It has a robust and comprehensive export control regime and an independent and autonomous regulatory body. Pakistan cooperates internationally with IAEA, CERN, and SES-AME with regard to exploring the peaceful application of nuclear technology. Pakistan's Strategic Export Control Division (SECDIV), created under the Export Control Act of 2004, maintains comprehensive Export Control Lists, formulated in 2005, which have catch-all provisions incorporated in them. Pakistan's national Control Lists classification is based on the Europe Union (EU) model. The review of Control Lists (CLs) is done regularly. Pakistan's CLs are in complete harmony with the control lists maintained by the NSG, MTCR, and AG.

If the regional effects of such nuclear cooperation are ignored, the already weak global non-proliferation system will come to the verge of collapse in this Third Nuclear Age. To counter this concern, there is a need to promote international cooperation vis-à-vis civil nuclear technology via a criteria-based approach and resumption of dialogue between regional and major powers. It is important for the international community to carefully consider the potential effects of India's participation in the global nuclear trade on nuclear export controls and the non-proliferation regime. The policy of giving special nuclear treatments to India may need a revision. Pakistan's nuclear deterrence will stay. Nevertheless, this reversal of Indian special treatment will help Pakistan to refocus more on peaceful uses of nuclear power. If no action is taken, the regional strategic stability in South Asia will be further challenged, and, thus, generate ripple effects on global peace and security.

Pakistan's Nuclear Journey: A Success Story

Murad Ali & Muhammad Ali Baig

Over time, states have learned to operate nuclear technology, whether for deterrence or civil use, with a reasonably accurate assessment of the nature of learning based on experience. Such manifestations can also be found in Pakistan's nuclear discourse since it embraced nuclear technology in the 1950s. Pakistan's civil and nuclear weapons program did not follow a linear progression. Instead, it has been dynamic.

The peaceful nuclear program of Pakistan started in the early 1950s to explore nuclear energy for socio-economic benefits. In 1974, India conducted its first nuclear weapons test, known as 'Smiling Buddha,' which violated international norms regarding acquiring nuclear weapons. Pakistan's nuclear program gained significant momentum against clear and present national security threats from India. Indian acquisition of nuclear weapons posed a challenge to

Pakistan's existence as it lacked its capability. It created a security dilemma for Pakistan and fueled strategic instability in the region. Pakistan reluctantly established a program for the development and research of nuclear weapons. Later, in response to India's second round of nuclear weapons tests in May 1998, Pakistan conducted a series of nuclear weapons tests at Chaghai, marking the overt beginning of its strategic journey.

“Pakistan’s civil and nuclear weapons program did not follow a linear progression. Instead, it has been dynamic.”

Thus, Pakistan's nuclear weapon program is security driven and has

evolved to ensure peace and stability in the region through maintaining deterrence stability. Pakistan believes in the principle of credible minimum deterrence (CMD), and its capability is designed to cater to the entire spectrum of conventional and nuclear threats. To counter India's Cold Start Doctrine (CSD), Pakistan tested Short-Range Low-Yield (SRLY) nuclear weapons, showcasing its operational capabilities. Pakistan's nuclear program, therefore, serves as a deterrent for strategic stability in a volatile security landscape.

Islamabad aims to maintain full spectrum deterrence (FSD) to deter all levels of aggression from India. This entails having the capability of nuclear technology, including nuclear weapons, and reliable delivery systems capable of inflicting unacceptable damage on the adversary. For instance, in response to changing security dynamics and India's CSD, which involved rapid offensive operations in seeking war under the nuclear overhang and the use of integrated battle groups (IBGs) in a limited timeframe and space, Pakistan tested short-range nuclear capable missiles, demonstrating the op-

erational mechanism of the latter's nuclear doctrine and ability to respond.

Similarly, Pakistan's use of nuclear energy for peaceful purposes contributing to socio-economic growth is older than becoming a nuclear weapon state. However, the fact misses the limelight due to India-led misperceptions and propaganda to malign Pakistan's nuclear program. The fact is that Pakistan seeks to achieve UN Sustainable Development Goals (SDGs) by responsibly harnessing nuclear technology and collaborating globally while simultaneously promoting non-proliferation efforts.

The Pakistan Atomic Energy Commission (PAEC) was established in 1956 to harness nuclear energy for socio-economic development. The construction of KANUPP, the first Nuclear Power Plant (NPP) in a developing nation, was a significant milestone in the early 1970s. The establishment of CHASNUPP-1, CHASNUPP-2, CHASNUPP-3, and CHASNUPP-4 NPPs in Chashma followed this. These initiatives demonstrate Pakistan's commitment to utilizing nuclear energy to meet energy needs and gain economic progress.

Pakistan's energy goals include constructing cutting-edge K-2 and K-3 NPPs in Karachi and Muzaffargarh. These projects, initiated in 2015 and 2016, aim to generate around 40,000 Megawatts of electricity by 2050. Pakistan is among the selected 30 countries with operational nuclear facilities and stands among ten nations with a fully operational nuclear fuel cycle. This achievement highlights Pakistan's commitment to self-sufficiency and technological advancement, shaping a prosperous and energy-rich future.

In medicine, nuclear technology has proven to be practical and invaluable, particularly in diagnosing and treating cancer. With un-

wavering dedication, the PAEC has established nineteen state-of-the-art cancer treatment facilities over the years, offering hope and healing to around one million patients battling this formidable disease. PAEC's commitment to improving cancer care goes beyond national borders as it collaborates with renowned inter-

national institutions like the World Health Organization (WHO), International Union Against Cancer

“Pakistan is among the selected 30 countries with operational nuclear facilities and stands among ten nations with a fully operational nuclear fuel cycle.”

(UICC), International Atomic Energy Agency (IAEA), and International Red Cross (IRC). The PAEC works to advance medical practices and share its expertise worldwide.

The success story reflects Pakistan's commitment to achieving sustainable development and making a positive global impact through responsible utilization and cooperation regarding nuclear technology. Pakistan's nuclear endeavors span various domains, including civil and military programs, medical applications, energy targets, and agricultural advancements. Pakistan's adherence to international norms and practices regarding nuclear safety, security, and regulatory controls is a role model for all states that believe in self-reliance and keep striving for excellence.

Transformative Role of Nuclear and Space Technologies in Socio-Economic Development of Pakistan

Amna Saqib

Over the years, Pakistan's civilian nuclear energy program has contributed to its socio-economic uplift. There is still ample room for Pakistan to enhance its nuclear power generation capacity to meet growing energy demands. Pakistan has played a vital role in utilizing the peaceful nuclear energy sector in various domains. Peaceful applications are best utilized in power generation, mineral exploration, high-yield stress-tolerant crops, cancer treatment, designing and fabricating industrial plants and equipment, and human resource development.

Space technology is an invaluable asset for Pakistan's socio-economic development. With its growing aspirations, Pakistan

is leveraging space technology's potential to propel its progress and transform various sectors. From bridging the digital divide to revolutionizing agriculture, from disaster management to enhancing education and healthcare, water management, efficiency in transportation, security, and humanitarian assistance, its applications are diverse and far-reaching. In addition, it possesses the capacity to generate revenue through commercial means. Regarding this, Pakistan's Space Vision 2047 is the intermediary step aimed at peaceful space exploration to achieve UN Sustainable Development Goals (SDGs).

“Space technology is an invaluable asset for Pakistan’s socio-economic development. With its growing aspirations, Pakistan is leveraging space technology’s potential to propel its progress and transform various sectors.”

For military purposes, a satellite can be crucial in gathering intelligence, analyzing terrain, identifying targets, and even assessing post-damage situations in areas of interest. Likewise, satellites play a crucial role in guaranteeing the availability of critical resources during war, which is why they are preferred in such situations. Examples of their strategic and military applications include deploying strategic weapons and establishing secure communication systems by utilizing Intelligence, Surveillance, and Reconnaissance (ISR) systems. ISR refers to the satellite-based space reconnaissance system, and these are just a few domains where space applications are making significant impacts.

Among the countries involved in space exploration, Pakistan is considered an emerging space nation, while the US, Russia, and

China are recognized as advanced nations with established satellite launching capabilities. Pakistan currently allocates a modest budget of USD 21 million per year to its space program, but it is committed to rapidly advancing in this field to bridge the gap and make significant progress in the future.

Pakistan's Space Program

Pakistan places significant importance on space and its practical applications on ground. The Space and Upper Atmosphere Research Commission (SUPARCO) was initially established as a committee in 1961 and later elevated to the status of a commission in 1981. The national vision revolves around leveraging space sciences and technology for strategic purposes, maximizing socio-economic development, and enhancing national security. The objectives include satellite launches, remote sensing, communication, weather monitoring, and navigation satellites. SUPARCO is also part of international collaboration on disaster management, such as the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER).

At present, Pakistan has three assets deployed in space: PAK-SAT 1 (a communication satellite launched in 2011), PRSS-1 (an Earth observatory satellite launched in 2018), and PakTES-1A (an indigenously built satellite). These assets enable the production of valuable outputs from satellite imagery, including digital elevation models, 3D views, and digital surface models. One of the significant advantages of satellite images is that they allow researchers to measure an object's size, dimensions, and notable changes in its composition without leaving the confines of their laboratories.

The comprehensive national space program received approv-

al in 2019 and consisted of two distinct phases: 2017 to 2030 and 2031 to 2047. In the initial phase, the program focused on developing communication satellites and implementing remote sensing and a regional navigation system.

Within the next two to three years, plans are underway to establish a space launch facility and the Pakistan Space Center. Additionally, Pakistan has an extended program aimed at participating in the international lunar space mission and conducting lunar probes and a Mars mission, which are part of the second phase of the National Space Program in 2047.

Space Technology Applications

The fundamental concern lies in the utilization of space technology applications, which have the potential to play a substantial role in national development. 17 SDGs can benefit from the application of this technology. Satellites, due to their synoptic and repetitive nature, can swiftly capture a comprehensive view of ground activities, enabling direct and indirect measurements that can be further analyzed in laboratory settings. Virtually all SDGs can incorporate the use of these technologies in various ways.

One of the core areas of concern for Pakistan is the agriculture sector, which faces several techno-economic challenges, including the reliable and timely availability of crop statistics. There needs to be more understanding on the part of provincial and central governments, where decisions are made on opinion-based data. There is a need to gather evidence-based data to make and utilize the right decision effectively. At SUPARCO, some crop calendars are made in synchronization with an image calendar.

Similarly, forestry is another sector where space technologies

can be used for monitoring and data scanning to plan new dam sites and set other parameters. In the environment sector, mobile laboratories and environmental data set to understand the environment in a better way. Satellite-based monitoring systems have bolstered disaster management efforts, facilitating timely responses to natural calamities and providing crucial data for climate change research. The results of satellite monitoring are being constantly provided to National Disaster Management Authority (NDMA) for disaster management and risk reduction.

Pakistan's relentless pursuit of nuclear and space technologies has transformed the nation's socio-economic landscape. By harnessing the power of nuclear energy, Pakistan has diversified its energy mix, addressed power shortages, and revolutionized healthcare and agriculture.

Simultaneously, space technology has enabled the country to bridge the digital divide, strengthen disaster management, monitor natural resources, and enhance agricultural productivity. The synergy between nuclear and space technologies has created a virtuous cycle, propelling Pakistan towards a sustainable and prosperous future. More funds have to be allocated to space, nuclear, and other enabling technologies to compete with other countries worldwide. It is the time to work hard and set the direction by making pragmatic decisions, acquiring new ways of risk reduction, and developing Pakistan as a modern country.

Reliance on Nuclear Energy and Pakistan

Maryyum Masood

Nuclear technology possesses dual potential. It is not only a source of destruction but can also benefit humanity significantly. Nuclear technology, often associated with military connotations, has also contributed to the socio-economic development of various states reliant on clean energy. Pakistan has a notable history of utilizing nuclear technology for peaceful purposes, which has played a significant role in the country's socio-economic progress.

On 23 March 2021, the K-2 nuclear power plant was successfully connected to the national grid and commenced commercial operations on 21 May the same year. Additionally, in February 2023, the K-3 power plant was introduced to the national grid. Using nuclear power contributes cleaner, more dependable, and affordable electricity to the national energy mix, aiding in the pursuit of UN

Sustainable Development Goals (SDGs). Beyond power generation, Pakistan has harnessed nuclear technology across various sectors, including cancer diagnosis and treatment, public health, agriculture, environmental protection, and industry.

Combat Energy Crises

Pakistan is collaborating with the International Atomic Energy Agency (IAEA) to expand its civilian nuclear programs, aiming to address Pakistan's energy crises and contribute to lower global temperatures by two degrees in the next three decades. Nuclear energy is environmentally friendly since it emits zero carbon dioxide. Hence, it is a viable alternative to fossil fuels. This makes nuclear energy the

“Pakistan is collaborating with the International Atomic Energy Agency (IAEA) to expand its civilian nuclear programs, aiming to address Pakistan's energy crises and contribute to lower global temperatures.”

most cost-effective, reliable, and eco-friendly. Pakistan, IAEA, and the UN Food and Agriculture Organization (FAO) are working together to make advancements in Pakistan's cotton and textile industry. The Nuclear Institute of Agriculture and Biology (NIAB) has introduced new and improved cotton varieties resistant to harsh weather conditions, resulting in a 30 percent increase in cotton production since 2016.

Economic Growth

Contrary to the pessimistic belief that investing in nuclear technology is futile, Pakistan has successfully utilized nuclear technology for peaceful purposes, resulting in a significant boost of PKR

1,200 billion (USD 7.4 billion) to its national treasury.

Exports play a vital role in Pakistan's economic growth, with agriculture accounting for 70 percent of the country's exports. Recognizing this, the Pakistan Atomic Energy Commission (PAEC) has harnessed nuclear technology to enhance the efficiency and productivity of the agriculture sector.

The PAEC has implemented various initiatives to improve different aspects of agriculture, including introducing new crop varieties, pest control technologies, advancements in plant nutrition and water management, enhancements in animal health and productivity, and innovations in food decontamination and preservation. Notably, the PAEC has successfully developed approximately 125 stress-tolerant crop varieties that exhibit adaptability to adverse weather conditions, thereby contributing to the fulfillment of the SDG of eradicating hunger and malnutrition.

Furthermore, the PAEC actively provides educational programs to farmers, equipping them with knowledge and skills to enhance agricultural productivity. The agriculture and biotechnology institutes under the PAEC have also developed technologies that enable economic gains from saline lands and regions facing water scarcity. These advancements involve providing plant materials and implementing water-saving technologies to minimize water loss.

In collaboration with the IAEA, the PAEC has additionally established laboratories for insect breeding to combat pests, thus reducing the reliance on pesticides. It helps in pest control and promotes environmentally friendly agricultural practices.

The PAEC also utilizes nuclear technology to improve the

health sector, resulting in significant advancements in this field. More than 0.7 million patients are treated annually at the Atomic Energy Cancer Hospitals (AECH), approximately 80 percent of total cancer patients in Pakistan. These hospitals raise awareness about cancer, emphasizing the importance of timely diagnosis for successful treatment.

The nuclear energy sector has also contributed to employment generation in various sectors, including medicine, agriculture, and industry, leading to the country's socio-economic growth. Pakistan's nuclear program effectively contributes to the welfare of its citizens

“Pakistan has the potential to benefit from global nuclear commerce greatly. Based on its remarkable achievements in the civil nuclear field, Pakistan deserves unrestricted access to it.”

and the achievement of the SDGs, which is a matter of immense national pride.

Nuclear Safety and Security Culture

Pakistan has a proven track record of maintaining the safety and security of its nuclear power plants. Being a responsible nuclear state, Pakistan has the potential to benefit from global nuclear commerce greatly. Based on its remarkable achievements in the civil nuclear field, Pakistan deserves unrestricted access to it.

Pakistan's civilian nuclear program collaborates with its three affiliated institutes to promote and exchange best practices in the nuclear security domain. The Pakistan Centre of Excellence for Nuclear Security (PCENS), the National Institute of Safety and Security

(NISAS), and the Pakistan Institute of Engineering and Applied Sciences (PIEAS) engage with the international community to enhance nuclear security and safety practices. These institutes arrange training sessions and programs for personnel from relevant domestic and regional organizations focusing on nuclear safety and security.

The PCENS provides nuclear safety and response training, NISAS provides comprehensive training for effective regulatory operations, and PIEAS offers academic courses to prepare future generations for nuclear security responsibilities. PIEAS and the IAEA work together in three essential areas: modeling and simulations with verification and validation capabilities, experimental nuclear engineering, and education and training. Member states are working with the IAEA to conduct research and training on nuclear technologies, nuclear science, and their security applications.

Pakistan has demonstrated remarkable potential in harnessing nuclear technology for peaceful purposes, which often goes unrecognized. While the focus tends to be on Pakistan's nuclear weapons program, it is worth noting that Pakistan is one of the 30 countries using its nuclear program for civilian purposes. Pakistan is using nuclear technology to drive its socio-economic development and progress, and it has the potential to extend assistance to other regional countries, enabling them to also benefit from the peaceful uses of nuclear technology.

Pakistan is steadily increasing its dependence on nuclear energy as a viable and environmentally friendly alternative. In line with this, the government is actively investing in research and development programs as part of the Nuclear Energy Vision 2050, aiming to expand infrastructure and promote the greater use of nuclear energy. An example of such efforts is the Karachi Coastal Power Proj-

ect, which aims to generate 40,000 MW of electric power by 2050.

The Nuclear Vision 2030 and 2050 have set the country on the right course to realize its potential. Pakistan actively seeks cooperation with the international community to explore various benefits of nuclear power, including sustainable energy, economic growth, advancements in medicine, agriculture, and environmental changes. Pakistan is inherently committed to the safe and practical uses of nuclear energy and will continue to invest in this sector. Therefore, Pakistan needs to work with the same dedication toward its civilian nuclear program in every sector, especially in the energy sector, where nuclear energy plays a vital role in mitigating supply and demand crises.

Nuclear Energy, Climate Change, and Energy Demands

Samran Ali

For Pakistan, nuclear technology means peace. Its nuclear weapons have ensured peace in the region for the last few decades by ensuring strategic balance against India. Additionally, the peaceful applications of nuclear technology contribute to its socio-economic development.

Pakistan's nuclear program started as a civilian program in the 1950s under the 'Atoms for Peace' program and is a founding member of the International Atomic Energy Agency (IAEA). It also enjoys an excellent record at the agency. Pakistan has been benefiting from nuclear technology since then. It has served in medicine, agriculture, research and development (R&D), industry, and energy. However, on the energy front, Pakistan has much room to benefit from nuclear technology. The challenges of the current century call for the increasing role of nuclear science and technology, for exam-

ple, climate change and its devastating consequences for people.

Pakistan is still struggling to deal with the aftermath of massive floods in the summer of 2022. The year has been devastating for Pakistan due to excessive monsoon rains and melting glaciers in the north. The floods affected over 33 million people, and more than 1,700 people died. It

also damaged or destroyed more than 2.2 million houses and more than USD 30 billion in

“Two of the most significant contributing factors behind the severity of floods are climate change and increasing reliance on fossil fuels to generate electricity.”

damages and economic losses. People are facing a range of humanitarian challenges, from the destruction of crops, food shortages, and malnutrition to the risks of permanent school dropouts and poverty.

The situation was largely complicated by factors including poor readiness to mitigate the effects of floods and ineffective handling due to resource constraints. Pakistan’s response and tackling of the humanitarian crisis was further hit by the country’s already weak economy and an unsatisfactory international response and aid.

Two of the most significant contributing factors behind the severity of floods are climate change and increasing reliance on fossil fuels to generate electricity. Nuclear energy can play a critical role in addressing both these challenges. Pakistan is among the ten most vulnerable countries on the Climate Risk Index despite being the least responsible for carbon emissions in the atmosphere. Climate change has also been termed a national security emergency.

The country faces the dual challenge of failing to produce

enough electricity from clean sources and increasing the risk of climate change from thermal sources. Pakistan is a developing country with a growing middle class and increasing energy demand. If more power is not produced, the country will continue to rely on expensive and environmentally unfriendly energy sources. The average consumer is also facing regular hikes in electricity prices due to increasing prices of oil and gas in the global market and the reduction in the value of the local currency, further increasing the risk of poverty. This has also led to frequent power shutdowns in the country, especially in the hot summers when the demand for energy peaks.

“Pakistan is a developing country with a growing middle class and increasing energy demand. If more power is not produced, the country will continue to rely on expensive and environmentally unfriendly energy sources.”

Nuclear energy is essential to meet the UN SDGs. Expensive and imported energy sources in Pakistan are not only failing to meet energy demands but also putting speed bumps in its Gross Domestic Product (GDP) growth and posing challenges to climate with floods and severe heat waves causing damage to the economy.

Pakistan has a lower share of renewable and clean sources in its energy mix, at 3 percent from renewable and 12 percent from nuclear power. According to Ministry of Energy documents, this is significantly lower compared to the 61 percent share of thermal sources. Pakistan plans to add 44,000 MW of electricity generation capacity from 32 nuclear power plants by 2050. Sustainable investment in new power plants is essential to mitigate the

effects of climate change and take a positive trajectory. Pakistan shares a common agenda with the IAEA of achieving the Net-Zero challenge and the SDGs by 2023. However, these goals still need a timely investment in nuclear power plants in the country.

Pakistan operates six nuclear power plants, including the recently completed K-3 in Karachi. The construction of K-2 and K-3 nuclear power plants took six years on average. For example, the work started in 2015 and 2016 and was completed in 2021 and 2022, respectively. The contract for these plants was signed in 2013, which makes the whole process spanning over a decade. Pakistan plans to build Chasma-5-unit, K-4, and K-5 units in Karachi and M-1 and M-2 units in Muzaffargarh. If it starts the work on them tomorrow, they will connect with the national grid, not before 2030, only if the work on these starts immediately.

While Pakistan's limited capacity to develop more nuclear power plants is mainly linked to financial constraints and a lack of foreign investment, the country has maintained an excellent record of operating nuclear power plants. The IAEA Director General, Rafael Grossi, expressed confidence in the technical capacity and safety record of nuclear plants in Pakistan, including the small modular reactors (SMRs), which are less expensive and quicker to build than traditional plants.

To achieve its vision of producing 40,000 MW of electricity from nuclear power, Pakistan needs a timely start to construct new nuclear power plants. The developed world has a moral responsibility to invest in this sector as they have been primarily responsible for climate change, for which developing countries are paying the price.

Pakistan's Efforts to Strengthen the Global Nuclear Order

Mobeen Jafar Mir & Fakhar Alam

Pakistan has always supported multilateralism and advocated for a global nuclear order that is inclusive, non-discriminatory, and based on uniform criteria. To this end, even though Pakistan rejects the discrimination inbuilt in the Nuclear Non-Proliferation Treaty (NPT), it backs the principle of non-proliferation. As a responsible nuclear power, Pakistan deserves to be a mainstream power in the global nuclear order. Its outstanding record of safety, security, and nonproliferation regarded as 'world-class' by the Director General of International Atomic Energy Agency (IAEA) during his recent visit to Pakistan in February 2023.

Pakistan considers the Conference on Disarmament (CD) important, serving as an essential platform for negotiating international treaties that affect global, regional, and sub-regional security and stability. With that understanding, significant contributions to

the work of the CD have been made by Islamabad. It was involved in drafting the rules of procedures, expanding membership, and revising working methods. Additionally, Pakistan has had the honor of presiding over the CD on multiple occasions. Pakistan actively supports negotiations on various agenda items, including the Prevention of an Arms Race in Outer Space (PAROS), Negative Security Assurances (NSAs), Nuclear Disarmament, and Fissile Material Cutoff Treaty (FMCT), within the CD.

Pakistan consistently upholds the objective of achieving a world free from nuclear weapons. It advocates for the development of a universal, non-discriminatory, verifiable, and comprehensive Nuclear Weapons Convention. Along with that, Pakistan has consistently supported the resolution on PAROS, advocating for the early establishment of a working group to address the issue. Since 2013, Pakistan has also co-sponsored the resolution titled 'No First Placement of Weapons in Outer Space.' By doing so, Pakistan emphasizes the importance of preventing the placement of weapons in space.

Furthermore, Pakistan has consistently been an advocate and active participant in addressing the issue of NSAs. In 1979, Pakistan presented a draft proposal titled 'International Convention to Assure Non-Nuclear Weapon States against the Use or Threat of Use of Nuclear Weapons' at CD. Pakistan has submitted several working papers on NSAs between 1979 and 1981 and even in March 2023 to further contribute to this matter.

Regarding negotiating a treaty on fissile materials, Pakistan advocates for its scope to encompass not only future production but also existing stocks of fissile materials. Pakistan believes that a treaty solely focused on halting future production will not contribute sig-

nificantly to nuclear disarmament efforts. Therefore, Pakistan emphasizes on the Fissile Material Treaty (FMT) that comprehensively addresses the matter and directly contributes to nuclear disarmament.

While acknowledging the value of confidence building measures (CBMs) and other non-legally binding measures in fostering trust and confidence between states, Pakistan believes that voluntary measures cannot replace legally binding treaty-based obligations.

“As a responsible nuclear power, Pakistan deserves to be a mainstream power in the global nuclear order. Its outstanding record of safety, security, and nonproliferation regarded as ‘world-class’ by the Director General of International Atomic Energy Agency (IAEA) during his recent visit to Pakistan in February 2023.”

The absence of these obligations has accelerated the arms race and reversed gains in the realm of disarmament. Pakistan also maintains that it was compelled to develop nuclear weapons and was not the first to introduce them in the region. The conventional asymmetry vis-à-vis India, 1971 war lessons, and Indian hegemonic aspirations also obliged Pakistan to take bold decisions. Although, Pakistan proposed a Strategic Restraint Regime (SSR) to India with ambitions of lasting peace and stability in the region, its efforts were called off by India due to its ambitions of dominating the regional states and ultimately becoming a regional power.

Pakistan is actively participating in the international com-

munity's efforts to achieve non-proliferation objectives as an equal partner. Pakistan advocates for a global regime on non-proliferation that is principle-based, inclusive, and founded on the fundamental principle of equal and undiminished security for all states. The realization of meaningful disarmament progress requires not only a favorable regional and global security environment but also the resolution of longstanding disputes and conflicts.

Pakistan's commitment to non-proliferation is rooted in the belief that all states should be treated fairly and without discrimination. Pakistan emphasizes the need for a comprehensive and balanced approach that ensures equal security for all. Genuine progress in disarmament can only be achieved when there is an environment conducive to security and underlying disputes and conflicts are effectively addressed. Pakistan's dedication to non-proliferation aims at bringing peace and stability regionally as well as globally. By promoting equality and fairness in non-proliferation efforts, Pakistan aims to contribute to a safer and more secure world for all nations.

Discovering Clean and Reliable Solutions for Pakistan's Energy Needs

Syed Ali Abbas

With its growing energy demands and limited resources, Pakistan must meet its electricity requirements. The country's current power generation capacity stands at 44,786 MWe, with oil and gas accounting for 48.5 percent, hydro for 23.9 percent, and nuclear power for 8.1 percent. Pakistan is increasing its reliance on clean energy sources mainly for two reasons – to meet its energy demands and combat climate change crises. It is essential to highlight the vital role nuclear energy plays in Pakistan's energy mix and its potential for sustainably addressing the nation's energy needs.

Nuclear energy, with its low environmental impact and high baseload capacity, offers a reliable and clean source of electricity. In

December 2022, nuclear energy's share in the electricity generation mix increased to an impressive 27.2 percent, marking the highest energy production that month. This indicates the significant contribution nuclear power can make in meeting Pakistan's energy demands.

While Pakistan has multiple energy options, such as wind, solar, biomass, and hydro, these intermittent sources need more capacity and efficiency. On the other hand, nuclear power provides a continuous and sustainable source of electricity, ensuring energy security for the nation. With decades of operational experience, and a solid commitment to safety, Pakistan has established itself as a responsible nuclear power.

The reliance on nuclear energy also brings substantial economic benefits. Nuclear power plants offer high availability and capacity, surpassing other electricity sources. The unit price for nuclear energy in Pakistan is competitive, with rates as low as PKR 6.61 per unit for specific plants. In 2022, six nuclear power plants supplied 24 billion units of electricity to the national grid, significantly reducing the country's dependence on expensive oil, LNG, and coal imports.

Furthermore, nuclear energy is a clean alternative with zero greenhouse gas emissions, making it a crucial contributor to climate change mitigation. In contrast, other sources, such as coal, emit significant amounts of greenhouse gases, contributing to environmental degradation and health hazards. Nuclear power's minimal uranium fuel requirement demonstrates its efficiency compared to other conventional sources, like natural gas and coal.

While safety concerns are often raised regarding nuclear energy, Pakistan has demonstrated its commitment to maintaining robust safety measures. As a member of the World Organization for Nuclear Operations (WANO) and having engagements with the In-

ternational Atomic Energy Agency (IAEA), Pakistan's Nuclear Regulatory Authority (PNRA) ensures the strict regulation and oversight of nuclear power plants. The country's nuclear plants have a flawless safety record and operate under rigorous peer review processes. During his visit to Pakistan in February 2023, Rafael Mariano Grossi, Director General of the International Atomic Energy Agency (IAEA), visited Pakistan's civil nuclear program apparatus and praised Pakistan's efforts toward the peaceful uses of nuclear energy. He also applauded Pakistan's nuclear safety and security record.

“In December 2022, nuclear energy’s share in the electricity generation mix increased to an impressive 27.2 percent, marking the highest energy production that month. This indicates the significant contribution nuclear power can make in meeting Pakistan’s energy demands.”

To meet its future electricity demands, Pakistan must continue to pursue a diverse energy mix, including hydro, coal, renewable energy, and nuclear power. Moreover, it is crucial to acknowledge the unique advantages that nuclear energy brings through sustainability, high baseload capacity, low environmental impact, and economic viability. Pakistan's operational nuclear power plants have consistently proven their reliability and safety, paving the way for further developing and indigenizing this crucial energy source.

As Pakistan aims to secure its energy future, it must prioritize expanding its nuclear energy capacity. Pakistan has capacity, experience, and workforce where it provides a huge market. While continuing with proper planning, investment, and adherence to

stringent safety protocols, Pakistan can leverage nuclear power to achieve long-term energy security, economic stability, and sustainable development. By embracing nuclear energy, Pakistan can forge a cleaner, greener, and more prosperous future.

Pakistan and Nuclear Responsibility

Abdul Moiz Khan

Despite exemplary achievements in its peaceful uses of nuclear energy, Pakistan has long been a target of discriminatory discourse on nuclear weapons. A narrative was created by its adversary – India – supported by several Western states for their geopolitical goals to make Pakistan’s nuclear program controversial. President Biden, in a Democratic congressional fundraiser in 2022, gave an unanticipated statement that ‘Pakistan may be one of the most dangerous nations in the world for possessing nuclear weapons without any cohesion.’ Although seemingly an off-the-cuff and much-debated expression, this statement came on the heels of the F-16 equipment sales deal between Pakistan and the US. India showed much resentment toward the deal.

Interestingly, the fundraiser dinner in which Biden gave these remarks was laden with Indian donors. On solemn protest from Pakistan, the US President retracted his statement. However, this epi-

sode shows us how states use the narrative of nuclear responsibility as a tool for achieving their geopolitical goals. Deconstructing the narrative and discourse by contextualizing them can better help us reach an objective understanding. This can help separate facts from fiction and understand the actual reality, not the one based on propaganda.

Whether Pakistan is a responsible nuclear weapon state or not has been a topic of discussion in the nuclear community since 1998. To better understand the answer to this question is to identify an approach that can dissect the terms and is based on facts and not subjective narratives. Nuclear responsibilities are defined as a set of outstanding obligations and reasoning of the nuclear weapon states to exercise restraint in nuclear posturing and proliferation activities to avoid nuclear crises and avert a nuclear arms race.

Pakistan's nuclear safety and security record, strategic export control mechanism, safeguard commitments with the International Atomic Energy Agency (IAEA), and Strategic Restraint Regime (SRR) proposal are the benchmark based on which we can ascertain whether Pakistan is a responsible nuclear weapon state.

Pakistan's nuclear safety and security record reflects its commitment to being a responsible nuclear weapon state. The measures taken by Islamabad are of the best standards, and not a single incident of theft of nuclear material is proof of this. According to NTI Nuclear Security Index 2020, Pakistan's nuclear security is the most improved globally. Pakistan has improved its score by 'adopting new on-site physical protection and cybersecurity regulations, improving insider threat protection measures, and more.' Pakistan has also established a state-of-the-art facility, the Pakistan Center of Excellence for Nuclear Security (PCENS). This organization gives of-

fficers and personnel comprehensive training in nuclear safety and security. These are just a few examples highlighting Pakistan's impeccable nuclear safety and security record.

Pakistan enacted its Strategic Export Control Act in 2004, called SECA. Pakistan has a controlled list published in 2005, and then the Strategic Export Control Division (SECDIV) was established in 2007. The Oversight Board was established in

“States use the narrative of nuclear responsibility as a tool for achieving their geopolitical goals. Deconstructing the narrative and discourse by contextualizing them can better help us reach an objective understanding.”

2007, and Export Licensing and Enforcement Rules were published in 2009. The list of goods and technologies subject to regulatory control was reviewed and revised in 2011 and 2015-16.

International Compliance Program (ICP) guidelines were issued in 2013 that provided a method of routinely scrutinizing transaction contracts and dealings. The Export Control Order of 2013 prohibits the export of all goods banned and restricted in controlled lists and notified by the Ministry of Foreign Affairs (MOFA). These are the salient features of Pakistan's Export Control Act, and Pakistan is determined to safeguard its national security and foreign policy objectives.

Pakistan has exhibited its commitment to its international obligations as a responsible nuclear weapon state pursuing adequate export controls, keeping its commitment to the non-proliferation of

weapons of mass destruction (WMDs).

Pakistan is one of the IAEA's founding members and has been working closely with it ever since. Pakistan has signed agreements with the IAEA to show its commitment as a responsible nuclear weapon state. For example, Pakistan and the IAEA inked a safeguard agreement in 2005, allowing the latter to audit Pakistani nuclear sites used only for peaceful purposes.

The IAEA requested Pakistan to share its technical expertise to help other countries under the ambit of the IAEA. In September

“Pakistan’s nuclear safety and security record, strategic export control mechanism, safeguard commitments with the International Atomic Energy Agency (IAEA), and Strategic Restraint Regime (SRR) proposal are the benchmark based on which we can ascertain whether Pakistan is a responsible nuclear weapon state.”

2021, IAEA and Pakistan signed Practical Arrangements to enhance cooperation and share Pakistan's technical expertise with member states. It provides an IAEA-sponsored forum for African countries' agricultural collaboration, human health, training, and regulation. Recently DG IAEA, Rafael Grossi, on his visit to Pakistan, lauded Pakistan's nuclear safety record. At a conference organized by CISS Islamabad, he said, 'Pakistan has a world-class and impeccable nuclear safety record.' Given the central role of the IAEA in nuclear safety and security, these remarks are further proof of Pakistan's responsibility.

Regarding the management of the arms race, Pakistan has proposed a Strategic Restraint Regime, which is premised on three interlocking and mutually reinforcing elements of conflict resolution, nuclear and missile restraint, and conventional balance. If taken up in earnest, this proposal can lay the foundation for lasting peace and stability in the region. Islamabad has repeatedly proposed this offer to its adversary India, but there has not been any reciprocation.

Pakistan ticks all the boxes of being a responsible nuclear weapon state. The nuclear community is responsible for understanding the difference between objective realities and subjective geopolitical rhetoric. Any speculation regarding the safety and security of Pakistan's nuclear program is contrary to the facts and has to be contextualized in the geopolitical strategic matrix.

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