The Evolution of India's Nuclear Program: From Peaceful Atom to Nuclear Weapons

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Taking into account the fact that the use of nuclear energy for peaceful purposes is today a key way to optimize and solve energy security issues, as well as a factor which contributes to an improvement of the state's environmental situation, India emphasizes the importance of using nuclear energy not only as a strategic tool to ensure nuclear deterrence, but also as a source of clean and powerful energy that simplifies an achievement of key goals of decarbonizing its energy sector and improving the situation with electrification in the country. However, to achieve the opportunity of direct cooperation with key actors in the global atomic energy market and effectively develop its nuclear industry, India had to go through a series of diplomatic, legal, and geopolitical challenges and prove that it is a responsible nuclear power that recognizes international norms related to the nuclear nonproliferation regime. Thus, having begun to rapidly develop nuclear energy for peaceful purposes in the 1940s, India gradually started to perceive the peaceful atom as a guarantor of modernization, prestige, and national security. However, due to military conflicts with its main regional adversaries — China and Pakistan, as well as the increase in China's nuclear ambitions, especially after it successfully detonated an atomic bomb in 1964, India, in pursuit of military security, had to conduct a nuclear test (codenamed "Smiling Buddha") which not only predetermined the future of Indian civil nuclear power, but also had a significant impact on the formation of the country's foreign policy and foreign economic course. The aim of the research is to study the objective reasons for the formation of Indian nuclear industry and the intentions of acquiring nuclear weapons in the middle of the twentieth century, which is now especially relevant as India has become a significant nuclear power.

Keywords: India, nuclear energy, diplomacy, NPT, Jawaharlal Nehru, Homi J. Bhabha, atomic bomb.

Introduction

Having started developing nuclear energy in the name of science and socio-economic well-being of its citizens in the 1940s, and not pursuing military goals, as did the pioneering countries that later became the Nuclear Club, India immediately predetermined its long-term approach to the atom as a source capable of bringing huge economic and energy advantages to the country, while reinforcing India's technological autarky and increasing its strategic position on political arena. Also, by forming its nuclear energy vision, India laid the foundation for its further diplomatic course based on the desire to develop only a peaceful atom, while seeking the elimination of nuclear weapons and the establish-

ment of a ban on testing nuclear explosive devices whose power could easily exterminate humanity.

Based on these conceptual attitudes, India began to build the technological and institutional framework necessary for the successful development of the nuclear program. With the help of France, Canada, the USA, the UK and the USSR, India gradually improved its nuclear technologies, building first research nuclear reactors, and then full-fledged nuclear power plants. However, stable, and active development of nuclear energy used to discontinue due to the military conflicts with India's neighbors and its main regional adversaries — China and Pakistan, especially during the 1960s. Having made several unsuccessful diplomatic attempts expressed by the global rejection of J. Nehru's proposal on the introduction of a comprehensive ban on nuclear testing, the refusal of the PRC to sign the 1963 Moscow Treaty and the 1968 Non-Proliferation Treaty (NPT), and finally the refusal of the United States, the USSR and the United Kingdom to provide India with international nuclear guarantees, and aimed at slowing down the development of China's nuclear potential, especially after it successfully exploded an atomic bomb in 1964, India began to work out the possibility of its own nuclear test, but only at a theoretical level.

Thus, starting in the mid-1960s, when US President Lyndon Johnson announced the provision of American support to all countries against which China would use nuclear blackmail, and when defense cooperation with the USSR significantly intensified, India tried to enlist the support of superpowers capable of providing India with protection from a potential nuclear attack. At the same time, not forgetting its commitment to the principle of non-alignment, India tried not to increase its dependence on any country by actively participating in the negotiations on the signing of a treaty on the non-proliferation of nuclear weapons. However, having failed with their diplomatic attempts, which only led to the consolidation of the status quo between the developed nuclear powers, and having met an increasing nuclear threat from Beijing, which had already tested a hydrogen bomb in 1967 and also actively cooperated with Pakistan in the military sphere, it was decided to carry out a secret nuclear test (Pokhran I), but exclusively for peaceful purposes, which was repeatedly emphasized by the government of India.

This event became a turning point in the development of peaceful atom in the country, after which, until the second half of the 2000s, India was under severe sanctions, which turned the country into an international outcast in the global atomic market. India had to rely only on its own nuclear resources and technologies, thus, on one hand, decelerating the speed of its nuclear development, on the other hand, strengthening its political and technological self-sufficiency in the field of nuclear energy exploration and use.

Given the priority of the development of environmentally friendly energy sources today, India emphasizes the special importance of the development of nuclear energy in the country and plans to increase electricity production at the expense of the atom to 63 thousand megawatts by 2032. However, if it were not for the scientific and technical achievements of Dr. Bhabha and the political support of J. Nehru at the dawn of the establishment of civil nuclear power in India, today such an opportunity of the energy sector decarbonization would be practically impossible. In this regard, the study of the influence of political, economic and social factors that took place during the key period for Indian nuclear energy, when the three-stage nuclear program had just begun to be implemented, and the atomic bomb test became a necessary measure to prevent open conflict with Chi-

na and Pakistan, is more relevant than ever, especially given the complexity and intricacy of modern, extremely unstable geopolitical situation both in South Asia and around the world.

A certain scientific novelty is given to this work by a comprehensive review of the political factors that have influenced and continue to influence India's relations with key actors in the global nuclear energy market and motivate them to cooperate, while the process of complicated evolution of the relations between India and official nuclear powers is also considered from the point of view of political, economic and legal aspects of cooperation on peaceful atom, its distinct features and characteristics are revealed.

The methodological framework of the research is based on such general scientific methods of cognition as induction, synthesis of the studied data in accordance with the set goal, comparative, descriptive, system and political economic analysis. When studying the state of the Indian nuclear energy complex, the structure of the competitive environment, the method of system-structural analysis was also applied. The institutional approach was used to analyze the political and corporate institutions created in India for the successful implementation of the theoretical foundations of the nuclear program. The research is also based on such a paradigm in the theory of international relations as political realism. India's cooperation with nuclear powers is examined from the point of view of the principle of national interest and the concept of securitization.

Prerequisites and reasons for the development of nuclear energy in India

Talking about the evolution of nuclear energy development in India in pre-war period, we should primarily outline the scientific nature of first studies dedicated to the exploration of atom. In particular, we should emphasize the role of Homi Jehangir Bhabha, future father of Indian nuclear program, who studied in 1930s at Cambridge University under the supervision of the founding father of nuclear physics, The Lord Rutherford of Nelson, and later used to study in several European laboratories where his mentors were such distinguished Noble Prize-winning physicists as Wolfgang Pauli, Niels Bohr and Enrico Fermi. This Bhabha's European education period certainly had a profound impact on the formation of Indian three-stage nuclear power program and predetermined India's further cooperation with France, the UK, Canada, and the USA in the sphere of peaceful atom.

At the next stage (in the 1940s), which became a turning point for Indian nuclear energy development, Indian scientists began to participate in international scientific research in the field of nuclear energy. For example, the Indian physicist Homi J. Bhabha was one of the participants in the Manhattan Project in the United States, which included work on nuclear weapons during World War II.

An important event at this stage was the foundation of the Tata Institute of Fundamental Research (TIFR) in Mumbai in 1945. It became a center for sophisticated and advanced explorations in the field of nuclear physics, where it was possible to experiment with atomic nuclei and study the interaction of particles. Thanks to their work at TIFR, Indian scientists gained access to cutting-edge research in the field of nuclear physics and actively implemented their knowledge in various fields. However, it is worth noting that during the 1940s of the twentieth century, the Indian nuclear program was still at an early stage.

As for the post-war period of the development of nuclear energy in India, three main pillars should be noted: social, economic, and political ones. These pillars represent three key tasks of India's national security approach, approved after its independence in 1947. These tasks were related to the resolution of the problems of social inequality and poverty; stabilizing economic growth using import-substitution and industrialization measures; and finally, yet importantly — ensuring military security while achieving real independence in the field of foreign policy [1].

These national security's tasks were incredibly important to be outlined due to the direct interrelation and interconnectedness with the Indian approach to nuclear power. As for social dimension, that presupposed formation of national accord, Indian society in the first two decades after independence used to have common views on the main domestic and foreign policy issues aimed at conducting modernization and transforming India into a great world power. This unity of views, a great trust in the first Prime Minister of India Jawaharlal Nehru (Pandit Nehru) and in the great Indian nuclear physicists contributed to the active support of India's population for nuclear energy development which was viewed not just as part of scientific technological progress but as a symbol of prestige and modernity, the energy source capable of eliminating numerous socio-economic problems of the state [2]. The quest for technological, industrial, and scientific leadership of India also united Dr.Bhabha and Pandit Nehru both of whom were entirely convinced that to improve the quality of life in the country and achieve all the ambitious goals, it was essentially important to rely only on India's capabilities, it was discovered that self-sufficiency and technological autarky were the keys for bright Indian future.

That attempt to reach autarky in technological and later nuclear sphere has also been directly reflected on the course of foreign policy, which was predominantly based on the Nehru's intention to avoid India's alignment with any kind of military blocks and involvement in possible new world war. Moreover, being extremely shocked after the atomic bombing of Hiroshima and Nagasaki by the USA in 1945, Nehru did his best to persuade the countries about the necessity of abandoning nuclear weapons and about the fact that there would be no winners in the nuclear war [3]. The foreign policy course of J. Nehru also identified India's role as an unobvious intermediary in the relations between the USSR and the United States during the Cold War. Thus, by putting forward the ideas of nuclear disarmament, India contributed to strengthening the confrontational stability that began formally in 1955, when the USSR took the initiative to stop nuclear tests, laying down the foundation for the future 1963 Partial Test Ban Treaty (PTBT). The curtail of arms would not only match with India's non-alignment policy and lead to a certain fragmentation of bipolar world order, increasing the role of developing countries in the international arena, but also could bring India more economic benefits by the intensification of trade with developed countries. Following these ideas, J. Nehru opposed the "Baruch Plan" which was proposed by the USA in 1946 and supposed the establishment of international control over nuclear energy. India was formally in favor of this international control but could not agree with the potential restriction of its peaceful atom research program and total monitoring of its use of nuclear resources.

After preparing the institutional foundation for the successful implementation of Indian civil nuclear energy program through the establishment of TIFR, the Atomic Energy Commission (AEC) and Department of Atomic Energy (DAE), it was time for a complex process that had to consider India's resource potential and the international situation.

In this period of 1950s, India developed nuclear energy only for peaceful, civil purposes, not military ones, as it was done in the People's Republic of China, the USA, and the USSR, mainly for two reasons.

Firstly, India just could not catch up with the developed states technologically due to the omission of industrial revolution phase and its beneficiary consequences, which made the Western states so modernized. This factor made India rely only on its own capabilities and on its own explorations in nuclear-related fields as physics, chemistry, biology, and engineering. Despite being rural economy and having great socio-economic problems related to literacy and poverty (in 1954–1955 the level of poverty in India reached 61.1 %, while the economic growth was on average 1.4 % per capita in 1950–1970-s) [4], India strived for the development of full nuclear fuel cycle technology that correlated with its self-sufficient approach.

Secondly, India has always suffered from the lack of uranium (9,600 tons in 2020) [5], which is of a substandard quality and must be enriched making it a costly procedure. However, India had massive quantities of thorium (25 % of the world thorium reserves, as for 2016 — 846,000 tons) [6], which could become the alternative for uranium, but it couldn't be used exactly as a fuel because of the necessity to be irradiated in the atomic reactor. That's why it was decided to move slowly but steadily from the natural uranium on the first stage, constructing Pressurized Heavy Water Reactors (PHWRs), then focus on the use of enriched uranium to be used in Fast Breeder Reactors (FBRs), and only on the third stage come back to the thorium-breeder reactors (TBR) [7].

These ideas as well as strategic goals of reaching a long-term self-sufficiency in nuclear power sector, training highly qualified nuclear research personnel in the country and finally, yet importantly improving socio-economic situation in the country using perspective atomic energy, were listed in Dr. Bhabha's three-stage nuclear power program, that was presented to J. Nehru in 1954 and approved in 1958. Nevertheless, it must be outlined that despite finishing the nuclear-related institutionalization and forming nuclear power program, India was not ready to create its own reactors in early 1950-s. However, due to Dr. Bhabha's ingenuity and close ties with the most distinguished nuclear specialists in Europe, India was able to get all the necessary materials and technologies, from France, Canada, the USA, and the UK [8].

Thus, India, with the help of British fuel and its own design, electronics, and engineering, managed to create in 1956 one megawatt nuclear research reactor APSARA ("Celestial Nymph") [9]. The fact that it was the first critical research reactor in Asia, adding that it was done by Indians, except for the fuel, boosted the social support for nuclear energy development and improved India's international image as a country with great nuclear ambitions. The second Indian 40-megawatt (MW) CIRUS reactor was constructed in Trombay with the technical help of Canada and the USA and attained its criticality in 1960.

The unique experience gained by creating APSARA and CIRUS nuclear research reactors laid the foundation for the developing of all the others nuclear reactors in India, boosting its nuclear program, and contributing significantly to the creation of the 100 % indigenous ZERLINA (Zero Energy Reactor for Lattice Investigations and New Assemblies) research reactor that became critical in early 1961. After Indian technological success with ZERLINA and fruitful Indian cooperation with the USA and Canada, many European nations sought to develop their own relations with India in the field of peaceful

atom. During the autumn of 1961 India made agreements on developing nuclear energy for peaceful purposes with Sweden, France, Spain, Belgium, and the USSR, thus gaining not only technologies and equipment, but also highly necessary for its three-stage program nuclear fuel.

Inspired by the effectiveness of the first nuclear research reactors, which provided Indian scientists with accurate required data, expansion of India's contacts with American and European countries in field of peaceful atom and the improved institutional foundation, India was ready for the next phase of its nuclear development that could solve its electrification challenges — the creation of atomic power stations. Having signed the 123 agreement with International Atomic Energy Agency (IAEA) and the USA in 1963, India received two 210 MW boiling water reactors (BWRs), supplied by the US General Electric Company for its first commercial atomic power station in Tarapur [10]. When the construction of this atomic power station finished in 1964 and the reactors' operation started in 1969, India became the first Asian state that was effectively and reliably exploiting atomic power reactors at that time [11].

However, despite the achievements in nuclear energy projects, the total generation capacity of nuclear power plants was only 420 MW in the 1960s, and 640 MW in the 1980s [12]. This means that the initial idea of the possibility of using nuclear energy as a mean that could simplify the solution of many socio-economic problems and thereby reduce the technological and economic gap with developed countries did not meet its expectations to the proper extent. But despite the failure to achieve this stated goal, nuclear energy played a significant strategic role in strengthening India's energy security, opening up prospects for reducing dependence on hydrocarbon fuels, fostering development and industrialization, especially in terms of intensification of technical cooperation with Canada, the United States, the USSR and Europe, enhancing the country's regional security against the background of the international crises of the 1950s and 1960s and the deterioration of India's relations with Pakistan and China.

The failure of diplomacy and the "Smiling Buddha"

Before 1974 India expressed its interest in exploring only the peaceful atom and sticked to a policy of non-alignment, on the one hand, defending its sovereign right to develop civil nuclear energy effectively and independently, encouraging world superpowers to curtail arms production by promoting the idea of a nuclear-free world, on the other hand, not rejecting the possibility of creating nuclear weapons for defensive purposes in the future.

To strengthen the image of a peaceful nation J. Nehru used to perform in early 1950s diplomatic course aimed at the establishment of a ban on nuclear tests and rational level of international control over the use of fissile materials' stock, meanwhile seeking to increase India's role in disarmament process and expressing concerns about the US nuclear regulation proposals, as it was with the Baruch Plan in 1946 [13]. Probably that's why Nehru criticized the US President D. Eisenhower's initiative "Atom for Peace" in 1953, highlighting, that behind the US promise to support states which developed the peaceful atom with nuclear reactors and necessary fissile materials, there was the real American plan aimed at preventing these developing nations from becoming new nuclear powers thereby threatening the US dominance in nuclear energy sphere. Moreover, to decelerate the speed of

global superpowers' nuclear arms race, J. Nehru called for imposing a comprehensive ban on nuclear tests in 1954, making India the first country that publicly, de facto, contested the established nuclear regime [14].

Despite global powers' arguments about the impossibility of accomplishing such an ambitious initiative, particularly due to the difficulty of performing complete verification on nuclear tests' conduction, two years later, in 1956 Prime Minister Nehru reinforced its proposal formulating an official protest against the nuclear safeguards system exempting nuclear states from any grave restrictions and control over their nuclear power, while preventing the nonnuclear nations from developing their nuclear programs independently [15].

Nevertheless, India's approach to the development of nuclear energy in the country changed dramatically in the late 1950s, when Prime Minister Nehru found out secret information about China's plans to create a nuclear bomb. That is why in 1962 two months before the war with China, Atomic Energy Act was adopted, giving the Indian government all the control over nuclear energy use, and guaranteeing secrecy regarding the possible construction of a nuclear explosive device. However, the defeat in Sino-Indian War of 1962 only boosted the nuclear concerns of India towards the necessity of creating a nuclear arsenal. For this reason, J. Nehru, and H. Bhabha decided to expand nuclear program set in 1950s and accumulate a huge amount of plutonium within 1,5 years, so that to be ready to carry out nuclear explosion of peaceful nature and show China nuclear capabilities of India. This was achieved in 1964, when Dr. H. N. Sethna found out the way for conducting the plutonium separation facility that was used not only as an essential element for nuclear weapons' production but also as a necessary fuel for first Indian NPPs.

In response to the rising security threat coming from the geopolitical rapprochement between China and Pakistan, India decided to cooperate with the global superpowers in military field by signing the air defense agreement with the USA in 1963, which presupposed regular military exercises between the USA, the UK and India, and by purchasing weaponry and military jets from the USSR.

In addition to this, India continued to develop its nuclear diplomacy, that is why it signed the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (or Partial Test Ban Treaty — PTBT). However, India was disappointed with the fact that this treaty did not ban underground nuclear tests, and that France and, what was even more important, China refused to sign it, making the nuclear regime unchangeable.

The subsequent China's detonation of the atomic 22-kiloton bomb under the Project 596 at Lop Nur in October 1964 and the Indo-Pakistani War of 1965 made India respond to this existential treat using military and non-military-based actions. The military measures included the beginning of Indian Subterranean Nuclear Explosion Project (SNEP) aimed at exploration and production of nuclear weapons, laying the foundation for 1974 nuclear test [16]. As for non-military activities, they encompassed two main aspects: India's search for "nuclear umbrella"[1] and a change in Indian foreign policy course in the direction of achieving comprehensive nuclear disarmament.

[1] A nuclear umbrella is a term denoting a guarantee of protection that a nuclear-weapon state provides to a country or territory where such means are not available.

Talking about the first factor, we should primarily outline the implicit nature of Indian nuclear umbrella due to its non-alignment policy adherence, which complicated the provision of full guarantees of protection from nuclear powers to non-nuclear India at that time. Moreover, India used to rely only on the oral guarantees, made by President of the USA Lyndon Johnson exactly on the same day of October 16, 1964, when China tested its atomic bomb, and included the provision of support in case of Chinese nuclear blackmail attempts. In order to fortify US assurances and to obtain nuclear support from other global powers, the second Prime Minister of India Lal Bahadur Shastri in 1964 called for tangible guarantees for non-nuclear states [17]. However, Shastri did not get any clear response from the nuclear powers, that's why he allowed Indian nuclear physicists to continue their studies aimed at potential conduction of underground nuclear test, though not giving any permission to perform it.

In addition to this, during the war with Pakistan in 1965 India was dissatisfied with the US initial restrained reaction and cold calculation, which was based on the provision of military sales to both confronting parties and was caused by agreement on military cooperation with Pakistan, signed in 1959. Nevertheless, when there was a high risk of China resorting to nuclear blackmail, the two world superpowers decided to intervene and warn China about the consequences of its potential participation in this conflict, fixing this notion in UN resolution 211 and finally in Tashkent Agreement, promoted by the Soviet Union and signed in 1966 [18]. That's why India still hoped to get practical foundation of nuclear guarantees and during 1967–1968, when the Indian Prime Minister was J. Nehru's daughter Indira Gandhi, there were numerous visits of I. Gandhi's principal secretary Lakshmi Kant Jha to the USA, the UK, France and even the USSR in order to obtain international political and consolidated assurances and diminish Chinese threat. However, none of these actions reached success, increasing India's concerns about the US reliability, especially after Nixon doctrine of 1969, which was based on US disengagement policy showing the lack of American interest in securing its Asian allies.

Only the USSR responded to India's request for security guarantees and proposed in June 1969 rather ambiguous initiative "System of collective security in Asia", which, despite its anti-Chinese orientation due to the Soviet-Chinese border conflicts of the late 1960s, also did not provide any practical guarantees that could protect India from China's regional ambitions [19]. Furthermore, India couldn't accept this initiative because it would go against its non-alignment course which India abided even after J. Nehru's death. However, India's government decided to continue and intensify its defense relations with the USSR hoping that it could ensure India the necessary nuclear umbrella and protect the country from Chinese threat, especially taking into account Sino-Soviet confrontation at that time. This cooperation between the Soviet Union and India was amplified with the Treaty of Peace, Friendship, and Cooperation, signed in August 1971. This treaty guaranteed that the USSR would not provide Pakistan with any weaponry as it was with massive arms sales in 1968, and that it would serve as a deterrent factor from potential Chinese threat. The efficiency of the Treaty was proved during the 1971 Indo-Pakistani war, when the USSR by blocking Western resolutions in the United Nations, contributed to India's successful military actions in the eastern part of Pakistan, which would become, because of the Indian victory, People's Republic of Bangladesh [20].

As for second non-military measure to deter China — nuclear diplomacy — India in 1965 began to participate actively in The Eighteen Nation Committee on Disarmament

(ENCD), hoping to establish a new and fair nuclear regime which would not discriminate non-nuclear states and would not limit the peaceful atom development. Even successful China's 3.3-megaton hydrogen bomb test did not stop India from its nuclear disarmament promotion diplomacy. However, when NPT was signed on July 1, 1968, by sixty-two states, including the UK, the USA and the USSR, India again had to face nearly the same situation as it was in 1963 with PTBT, when China and France also didn't sign the treaty, while the conditions were also very discriminative for India. India's refusal to sign NPT, based on all the Indian political factions' support, was mainly caused by two key aspects: firstly, by nuclear status inequality — to be officially nuclear-weapons states, you had to test nuclear explosive device before the 1st of January 1967, secondly, by the containment of the states without nuclear weapons from the effective and independent development of nuclear energy for peaceful purposes [21].

The failure of India's nuclear disarmament policy and its desire not to be dependent on global superpower's nuclear umbrella, led to the preparation for nuclear test realization, which began by the Indira Gandhi's order in 1972. Most of the Indians, who viewed atomic bomb as a symbol of prestige and power, as well as political parties were not against nuclear weapon's development due to the existing Indian security threat from China and Pakistan, which at that time were actively cooperating in the field of nuclear energy, particularly in the sphere of uranium enrichment. Based on the socio-political support, regional and geopolitical concerns, caused not only by the nuclear capabilities of China and numerous conflicts with Pakistan, but also by the beginning of Bangladesh insurgency in 1972, which included the political assassinations and regime change, and finally, yet importantly, due to the unfair Non-Proliferation Treaty, India successfully performed its first underground nuclear explosion (with a code name "Operation Smiling Buddha") of an 8-kiloton nuclear bomb at Pokhran on May 18, 1974. It should be highlighted that the atomic bomb, which was exploded officially for peaceful purposes, could not be used as a nuclear weapon primarily because of its low yield, that, as some experts contend, was two times lower — only 3–4 kilotons of TNT [22].

However, despite this peaceful nature of the explosion, nearly all the western states were shocked by the fact that India, having rather poor resources of nuclear fuel and technologies, and developing all these years, starting from 1940s, nuclear energy necessary for only civilian use, could conduct such a complicated nuclear test on its own without direct assistance of any nuclear-weapons state. In addition to this, many western countries, especially, the USA and Canada, which were mostly infuriated by the fact that their supply of nuclear fuel and technology for the construction of Indian atomic power plants partly contributed to the Indian nuclear test, rescinded all the signed contracts on nuclear energy cooperation with India, and imposed sanctions to isolate India from the obtainment of nuclear fissile materials and western nuclear technologies.

Despite the negative international reactions, the nuclear test caused pride and national admiration inside the country. Many Indians saw it as proof that India has the scientific and technical potential to develop its own nuclear technologies.

The conduct of nuclear tests in 1974 was an important stage in the development of Indian nuclear program. It served as an impetus for the country to develop its nuclear capabilities, and in the following decades, India continued to develop its nuclear infrastructure and fulfill its technological and nuclear potential.

Conclusion

In the history of the development of nuclear energy in India, there have been changes related to the course of policy, national priorities, and regional security, ranging from the peaceful use of atom and up to the creation of nuclear weapons. The state has come a long way: from the problems with nuclear fuel supplies and the desire to develop nuclear energy to ensure its economic growth to the focus on the warfare applications of atom. However, it should be noted that India's transition to nuclear weapons was driven by complex political and strategic considerations. This decision had a significant impact on regional security and caused a wave of concern in the international community.

India's experience shows that the development of nuclear energy carries both significant advantages and serious challenges. It is important to continue to ensure strict control and international cooperation in the field of nuclear energy and nuclear disarmament in order to prevent the proliferation of nuclear weapons and guarantee the safe use of nuclear energy for peaceful purposes.

India has shown the potential for the development of peaceful nuclear energy by developing its scientific and technical capabilities and making responsible decisions, including those related to cooperation with the international community to ensure stability and security at the regional and global levels.

References

1. Lunev S. I. Foreign policy of India and the impact of the endogenous factors. *MGIMO Review of International Relations*, 2010, no. 1, pp. 189–201. https://doi.org/10.24833/2071-8160-2010-1-10-189-201 (In Russian)

2. Mishra S. Social acceptance of nuclear power in India. *AIR POWER Journal,* 2012, vol. 7, iss. 3, pp. 55–82.

3. Mishra S. India's Tryst with Multilateral Nuclear Regimes. *National Security of India and International Law,* 2020, vol. 9, pp. 156–179. https://doi.org/10.1163/9789004427563_012

4. Datt G. Poverty in India 1951–1994: Trends and Decompositions. *World Bank Document*, 1997. Available at: https://documents1.worldbank.org/curated/en/253831468049773494/pdf/900360WP0Pover-00Box385299B00PUBLIC0.pdf (accessed: 15.10.2023).

5. Estimated world thorium resources. Supply of Uranium. *World Nuclear Association*, 2023. Available at: https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/uranium-resources/supply-of-uranium.aspx (accessed: 25.07.2023).

6. Estimated world thorium resources. *World Nuclear Association*, 2020. Available at: https://www.world-nuclear.org/information-library/current-and-future-generation/thorium.aspx (accessed: 30.07.2023).

7. Kumar A. Exploration of nuclear minerals: India's perspective. Atomic Minerals Directorate for Exploration and Research. *Conference Smarika-4, AMD*, 1994. Available at: https://www.researchgate.net/publication/339018534_paramanu_urja_evam_vikasa_eka_samiksa (accessed: 13.02.2024). (In Hindi)

8. Chopra D. Interviews with scientists. *University of Allahabad*, 2021. Available at: https://www.researchgate.net/publication/357333948_Vaigyanikon_Se_Sakshatkaar_vaijnanikom_se_saksatkara (accessed: 13.02.2024). (In Hindi)

9. Ramanna R. Development of nuclear energy in India: 1947–73. *INIS IAEA*, 1974. Available at: https://inis.iaea.org/search/search.aspx?orig_q=RN:6181271 (accessed: 30.07.23).

10. Powering the Nation — Research & Power Reactors. *Chapter 2. Department of Atomic Energy*, 2002. Available at: https://dae.gov.in/writereaddata/publ/saga/vol2/pdf2/Chapter%20-%2002.pdf (accessed: 13.09.2023).

11. Rabey S. L. Nuclear industry of India: State, perspectives, aspects of international cooperation. *Asia and Africa today,* 2016, vol. 4, pp. 20–26. (In Russian)

12. Nuclear Power in India. Indian Nuclear Energy. *World Nuclear Association,* January 2023. Available at: https://www.world-nuclear.org/information-library/country-profiles/countries-g-n/india.aspx (accessed: 10.08.2023).

13. Mishra S., Patil K. P. Politics: Indian Political Parties and Nuclear Weapons. *Indian Foreign Affairs Journal*, 2015. Available at: https://www.academia.edu/76351690/Parmanu_Politics_Indian_Political_Parties_and_Nuclear_Weapons (accessed: 12.08.2023).

14. Jawaharlal Nehru's Speeches, vol. 3 (1953–1957). *Publication Division, Government of India,* 2015. Available at: https://archive.org/details/in.ernet.dli.2015.107968 (accessed 12.08.2023).

15. Jayaprakash N. D. Nuclear Disarmament and India. *Economic and Political Weekly*, 2000, vol. 35 (7), pp. 525–533.

16. Chakma B. Toward Pokhran II: Explaining India's nuclearisation process. *Modern Asian Studies,* 2005, vol. 39 (1), pp. 189–236. https://doi.org/10.1017/S0026749X04001416

17. Noorani A. G. India's Quest for a Nuclear Guarantee. *Asian Survey*, 1967, vol. 7 (7), pp. 490–502. https://doi.org/10.2307/2642607

18. Kant N. Nuclear Proliferation in the World: Problems and Solutions. *Research Hub International Multidisciplinary Research Journal*, 2022, vol. 9, pp. 14–17. (In Hindi)

19. Noorani A. G. *Brezhnev Plan for Asian Security*. Bombay, Jaico Press, 1975. 447 p.

20. Horn R. C. *Soviet-Indian relations: issues and influence.* New York, Praeger, 1982. 231 p. https://doi.org/10.2307/1956092

21. Perkovich G. *India's Nuclear Bomb: The Impact on Global Proliferation*. Berkeley, University of California Press, 1999. 597 p. https://doi.org/10.2307/2659282

22. Tellis A. *Striking Asymmetries: Nuclear Transitions in Southern Asia.* Washington, Carnegie Endowment for International Peace, 2022. 305 p.

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Развитие ядерной энергетики в Индии: от мирного атома до ядерного оружия

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Принимая во внимание тот факт, что использование атомной энергии в мирных целях сегодня является ключевым способом оптимизации и решения вопросов энергетической безопасности, а также фактором улучшения экологической ситуации, Индия особенно подчеркивает важность использования ядерной энергии не только в качестве стратегического инструмента, обеспечивающего ядерное сдерживание, но и как источник чистой и мощной энергии, который может помочь стране достичь целей декарбонизации своей энергетики и улучшения ситуации с электрификацией в стране. Однако, чтобы добиться возможности напрямую сотрудничать с ключевыми игроками на мировом рынке атомной энергии и эффективно развивать свою атомную отрасль, Индии пришлось пройти через ряд дипломатических, правовых и геополитических испытаний и доказать мировому сообществу, что она является ответственной ядерной державой, признающей международные нормы, связанные с режимом нераспространения ядерного оружия. Таким образом, начав стремительно развивать ядерную энергетику в мирных целях в 1940-х гг., Индия постепенно стала воспринимать мирный атом как символ развития, престижа и национальной безопасности. Однако из-за во-

енных конфликтов с ее главными региональными противниками — Китаем и Пакистаном, а также в связи с увеличением ядерных амбиций Китая, особенно после того, как он успешно взорвал атомную бомбу в 1964 г., Индия, преследуя цель обеспечения военной безопасности, была вынуждена провести ядерное испытание (под кодовым названием «Улыбающийся Будда»), которое не только предопределило будущее индийской гражданской ядерной энергетики, но и оказало существенное влияние на формирование внешнеполитического и внешнеэкономического курса страны. Целью работы является исследование объективных причин становления атомной отрасли Индии и ее намерений обрести ядерное оружие в середине XX в., что имеет отношение к сегодняшнему времени, когда Индия стала ядерной державой.

Ключевые слова: Индия, ядерная энергетика, дипломатия, ДНЯО, политика Джавахарлала Неру, атомная бомба.

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