Educational Administration: Theory and Practice
2024,30(5), 2408 - 2415
ISSN:2148-2403
https://kuey.net/

Research Article

India's Nuclear Policy: Evolution And Perspectives

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Citation: Vijeeta Anand, et al. (2024), India's Nuclear Policy: Evolution And Perspectives, *Educational Administration: Theory And Practice*, *30*(5), 2408 - 2415
Doi: 10.53555/kuey.v30i5.3298

ARTICLE INFO

ABSTRACT

The establishment of the Indian nuclear energy program, which serves both covert military applications and overt civilian purposes, may be attributed mostly to a favorable confluence of individuals, events, locations, and global trends. India must have an unquenchable ambition to meet its energy needs, given its ambitious development plans. Energy-driven policies always hover around the question of how to raise energy production and consumption. Nuclear energy appears to be a promising option for matching India's energy deficit. India is in the most dangerous, unstable, and anarchic region of the world due to social unrest, political unrest, economic violence, and religious and political warfare in a number of failed or collapsing neighboring governments, which has driven India to pursue the development of nuclear weapons. The main argument of this paper is to study and analyze India's nuclear legal framework, various regulatory mechanisms, energy programs and overall assessment of the nuclear continuity and change over time under various political parties.

Methodology- In order to study India's unwavering drive to meet its energy needs in both the civilian and military domains, we will be dealing with value-based posers, hence the proposed topic cannot afford to be constrained by the restrictions of scientific or behavioral research. Here, we shall mostly stick to a philosophical, historical, and analytical perspective. Data, facts and historical evidence already available will also be used freely and judiciously wherever necessary. In this context, it would be better to begin with an open mind and use all possible means of research to find the truth and the viability of the purposes.

Keywords- Nuclear energy, Indo-US Nuclear Deal, Energy production, Energy deficit, Political leaders

Introduction

India embarked on the nuclear path through research and active electricity generation long before independence. Ashok Kapur, an eminent scholar, claims that it was in the early 1930s that the Indian attitude to science policy in general, and nuclear power in particular, emerged (Kapur, 2001). The Indian nuclear program was launched before March 1944, more than three years before India gained independence from the British (Salik, 2009). It got an impetus in 1944 with the establishment of the Tata Institute of Fundamental Research under the guidance of Dr. Homi J. Bhabha who also happened to be the first Head of Atomic Energy Commission (Sharma, 1986). The Atomic Energy Commission was established in 1948 responsible for control of technological as well as administrative particulars of nuclear research activities with an intent to make India self-sufficient in the area of energy. The years 1947 to 1964 are extremely significant for the study of India's Nuclear history. Indian attitudes and policies were formed at this time and these shaped the contours of India's Nuclear strategy in the coming decades. India's nuclear policy is primarily civilian focusing on power as well as non-power application of nuclear energy and subsequently, changed its contour due to security threats stemming from China and Pakistan thus the addition of military aspect became inevitable (Kapur, 2001). The period also witnessed the establishment of the Department of Atomic Energy (DAE) in 1954. By 1958, significant and quick progress had been made in research and development (R&D) for the peaceful use of atomic energy. DAE includes every field pertaining to atomic energy applications, both power and non-power. The department's mission is to develop nuclear energy technology, including waste management, construction

and operation of nuclear power plants, heavy water production, identification and processing of atomic minerals and uranium resources, nuclear fuel fabrication and production of reprocessed nuclear fuel. The DAE is also responsible for R&D in the fields of advanced instrumentation and electronics, biological sciences, materials science, fast reactor and fusion technologies, accelerator and laser technologies, etc. In non-energy applications of atomic energy, the department carries out leading-edge R&D into the use of radiation technologies and isotopes in the fields of food and agriculture, health, environment and industry.
DAE is at the forefront of R&D because of the powerful synergy that exists between technological development and R&D in several important core disciplines that are both national and global in scope. For societal uses including food preservation, clean water, advanced crop and seed types, urban waste management, etc., DAE kept developing and implementing spin-off technologies.
In the context of India's Nuclear policy, there have historically been elements of both continuity and change, which are discernable once we go through the various phases. At the level of setting up the necessary infrastructure and the activities of the scientific and technological establishment, one can observe continuity and a stable development over the decades, spearheaded by different Prime Ministers from various political parties. This paper highlights the various phases in order to understand the policies and mechanisms for meeting energy demand, with a specific focus on Nuclear Energy.
The various phases under different Prime Ministers are given as under:

JawaharLal Nehru Phase (1947-1964)

Being the first Prime Minister of India, Pt. J L Nehru made the sincere effort to make India self-sufficient soon after independence. The dawn of India's Nuclear program coincided with the kicking off of the industrial infrastructure in the country. India's nuclear policy took a concrete shape in the year 1948, when the Atomic Energy Bill was piloted. In April 1948, while proposing the Atomic Energy Bill in the Constituent Assembly, Jawaharlal Nehru stated that atomic energy was a vast source of power and if we were to remain abreast with the world as a nation, we should develop atomic energy and use it peacefully (Sharma, 1986). The underdeveloped countries cannot afford to forego an opportunity to develop nuclear energy for industrial purposes, nor can they allow any international body dominated by the industrially advanced countries to decide their activities in regard to the development of fission energy (Sharma, 1986). In May 1954, Nehru restated in the Lok Sabha that it was important for a power-starved nation like India or most other Asian and African nations to make maximum utilization of atomic energy for peaceful purposes (Sharma, 1986). Nehru emphasized upon the expansion of atomic energy in India and associated it with the building of a free and self-reliant India (Raja, 2016). Nehru insisted on the utilization of nuclear energy for the development of human life and happiness. Nehru identified India with the spirit of humanity and was convinced that in the world of opposite uses that nuclear power represents, India would always prefer the spirit of humanity over the building up of an atom bomb.
Pt. Nehru and Dr. Homi Bhabha were the persons who spearheaded the development of India's nuclear power program in its early years, highlighting the importance of nuclear energy for the nation's prosperity and development and advocating for its use for peaceful purposes only. Bhabha adamantly said that, should it want to do so, India could produce an atomic bomb in two years. Though its philosophical and scientific challenges were the main driving forces behind the creation of the first Atomic Energy Act of 1948, Bhabha never lost sight of the military benefits of nuclear energy and was greatly fascinated by its destructive power. Dr. Bhabha also stated that coal and hydropower resources alone would not be able to meet India's energy needs. In 1958, he proved that the most important consideration for evaluating atomic energy's relative usefulness was "not the relative cost of power plants, but the relative total cost to the economy as a whole of providing progressively larger amounts of new power." (Bhabha, 1958).
Nehru had committed all future governments of India to the use of nuclear energy exclusively for peaceful purposes.
Establishment of Civilian Nuclear facilities -- Serious development started in 1954 with the start of construction on the Bhabha Atomic Research Centre (BARC) at Trombay. BARC served as India's primary research facility for its nuclear program. In addition, there was a significant increase in government support for atomic research during this period, and there was also a greater push for international scientific collaboration.
In 1955, the Bhabha Atomic Research Centre (BARC) designed the APSARA research reactor, which was built with the assistance of the United Kingdom. The purpose of constructing the 1 MWt APSARA research reactor was to launch research into reactor physics and engineering. In 1954, Canada supplied India with the Canada India Reactor Utility Services (CIRUS), 'a heavy-water (deuterium oxide) moderated research reactor' for which the US accepted to provide heavy water under the auspices of the "Atoms for Peace" program. The CIRUS reactor was the first source of fissile material to attain criticality in July, 1960. Despite being presented as peaceful, CIRUS was used to produce most of the weapons-grade plutonium that was used in the first nuclear test in India.

Some of the early Power Reactors

Tarapur Atomic Power Station (TAPS- 1 & 2) India benefited in the early 1950s from its first international collaboration in the nuclear sector, when it was given the chance to train its engineers and scientists in the US.

Bhabha then expressed interest in expanding Indo-US collaboration to the eventual supply of US power reactors to India. It became evident that India's interest in nuclear power production was driven more by a desire to secure the best financial conditions from the US and to bring nuclear power production into the nation as quickly as feasible than by a preference for light-water reactor (LWR) technology.

Rajasthan Atomic Power Station (RAPS- 1&2)- Approximately concurrently with its negotiations with the United States, Bhabha had also begun exploring the possibility of building nuclear reactors in collaboration with Canada. India had already gained from Indo-Canadian cooperation on the CIRUS Project, particularly in the field of heavy-water reactor technology. A nuclear program between India and Canada was discussed as a result of this interaction and the fact that heavy water reactors were the initial phase of the Bhabha plan. The establishment of a 200MWe PHWR power plant in Rajasthan was agreed upon by India and Canada in April 1964.

Madras Atomic Power Station (MAPS-1 & 2) -The DAE's PPED was designing a win-reactor station to be built at the Madras Atomic Power Station (MAPS-1 & 2) in south India, concurrently with the development of the Rajasthan Power Station. Apart from a few significant modifications made by the DAE experts, the MAPS reactors were essentially quite identical to the RAPS units.

Narora Atomic Power Station (NAPS-1&2).

Reactor safety enhancements that were lacking in the design of the Canadian reactor were among the modifications implemented in NAPS. NAPS-1 was commissioned in January 1991 and NAPS-2 in July 1992.

Kakrapar Atomic Power Station (KAPS)

In May 1993, KAPS-1 entered into commercial service. It was decided that the Indian 220MWe (gross) PHWR system had reached full maturity when KAPS-2 achieved a comparable level in May 1995. Alongside its other accomplishments, India built eight heavy water production facilities by 1995, making it self-sufficient in this essential component for the PHWR program.

Kaiga Station and the RAPS Extension.

The Indian nuclear power program eventually came out of the shadows of international sanctions after more than twenty years of resolute work, primarily to keep India from achieving this capability level. The government's excitement for authorizing more 220 Mwe PHWR stations and funding future advanced reactor projects became apparent as the program approached this milestone. In response, the Kaiga Atomic Power Station (KGS-1 & 2) and two further reactors in Rajasthan with a similar rating (RAPS-3 & 4) were established. These four reactors began to operate commercially in March and December of 2000.

Lal Bahadur Shastri Phase (1964-1966)

The 2nd phase of India's nuclear trajectory coincided with Lal Bahadur Shastri's reign, and during this period the demand for having nuclear India got a boost, particularly following India's debacle in 1962, and Chinese explosion in 1964. This period witnessed the emergence of two schools of thought, with one warning against the diversion of economic resources to the manufacture of nuclear weapons. Adherents of this school of thought echoed the necessity of general and complete disarmament on a comprehensive basis. The second school of thought clamored for a more deterrent role for India**.** Consequently, a ginger group emerged within the congress party under the premiership of Mr. K.C. Pant, urging India to revisit its traditional Nuclear Policy. The group also demanded choosing the nuclear option under compelling backgrounds like the Indo- China War, the Chinese explosion in 1964, the Indo- Pak War of 1965, and the growing collaboration of Pakistan with China, which became vehement. The mounting pressure forced Shastri to switch from the traditional stance of developing and using nuclear energy solely for 'peaceful ends' to a change in government policy from 'no bomb ever' to 'no bomb now' (Chakma, 2005). Hence, the Subterranean Nuclear Explosion Project (SNEP) as proposed by Homi. J. Bhabha was approved by Lal Bahadur Shastri. The line of action after the sudden death of a strong-willed political leader was further strengthened and enabled the entire Indian nuclear program to continue.

Indira Gandhi Phase: Pokhran I & India's Entry into the Nuclear Club (1966-1977)

Lal Bahadur Shastri was succeeded by Indira Gandhi in January 1966. Indira Gandhi, after assuming office, clearly indicated that she would not go for the nuclear weapon option and even shelved her predecessor's project Subterranean Nuclear Explosion Project (SNEP), but soon after her assumption of the office, China went for its third nuclear explosion. Thus, echoing the domestic demand for having our own nuclear bomb. In reaction to these tests, Indira Gandhi said in the Lok Sabha that India will expand its nuclear technological know-how and "other competencies" in addition to using atomic power for "peaceful" purposes. Bhumitra Chakma remarked that her initial policy stance was soon changed as developments with huge ramifications occurred beyond India's border (Chakma, 2005). The nuclear narrative in India from 1964 to 1974 was highly remarkable because of the heightened interplay and tension between exterior and interior pressures in Indian nuclear decision-making. During this period, the Indian government was faced with three main concerns namely: -

I) Whether India should sign the NPT (1967-68). After an internal debate, India refused to sign the NPT due to its discriminatory nature. It seeks to deny the freedom to Non-Nuclear Weapon States (NNWS) to acquire nuclear weapons and does not ask Nuclear Weapon States to destroy or restrict their armaments.

II) Whether India should accept the weak US-Soviet security assurances through the UN Security Council (1968) and
III) Whether to have a Peaceful Nuclear Explosion (this concern has been in debate since 1965).

Smiling Buddha - India's first Nuclear Explosion (1974)

The first peaceful nuclear explosion, popularly known as Operation Smiling Buddha, took place in May 1974 and was a step towards weaponization. Nevertheless, this explosion enabled India to become a de facto member of the Nuclear club. The international response to India's nuclear explosion varied from gentle to harsh. Canada, the US and Pakistan launched a scathing attack and condemned the explosion in the strongest words. Canada stopped funding India's nuclear program (Alam, 1988) and brought Rajasthan II and Kota heavy water plants to halt. The US regarded the action as a breach of the terms on which aid had been provided to India.

Morarji Desai (1977-1979)

The 1977 General Elections brought the Janata Party-led coalition into power. The new Prime Minister, Morarji Desai, was an old Congress hand committed to the Gandhian principles of non-violence and known to be instinctively anti-nuclear. Morarji Desai, a senior Gandhian follower, was an opponent of nuclear weapons on moral grounds and considered them as evil. He had a firm belief that cottage industry was more useful to India than its nuclear program (Karnad, 2008). He publicly promised that India would not conduct nuclear tests during his tenure and would focus on a peaceful nuclear explosion. Desai's coalition government collapsed in 1979. He was adamant that India would not sign the NPT because it was unfair, and he was vehemently opposed to nuclear weapons. Both stances represented India's moral self-image and its aim to publicly declare and illustrate its moral superiority over the Cold War nations. Even though Pakistan was preparing to begin building the Kahuta uranium enrichment plant, the pro-bomb Jana Sangh leaders, including the then-foreign minister AB Vajpayee, supported this nuclear program (Perkovich, 1999).

Charan Singh (1979-1980)

It was Pakistan's covert atomic ventures and Afghanistan's invasion by the Soviet in 1979 which led Prime Minister Charan Singh to alter Desai's ironclad commitment not to acquire nuclear weapons. Hence it signaled a change in the policy.

Indira Gandhi comeback (1980-1984)

Shortly after taking office again in 1980, Indira Gandhi disregarded Desai's pledge to refrain from testing nuclear explosives and chastised him for disobeying the nuclear establishment's interests and recommendations (Perkovich, 1999). Meanwhile, India was relegated to the backbench in South Asia and had lost all strategic and nuclear relevance in 1981, as the US moved closer to the two countries (Pakistan and China) in an attempt to encircle India (Cohen, 2001). A stronger stance may have been justified by external security concerns, which included the following: the Soviet Union was well into its war in Afghanistan; Pakistan was steadily moving towards the development of a nuclear weapon program; the United States was giving Pakistan significant military support; and China was strengthening its relations with Pakistan, partly in response to the Soviet Union's advance into Southwest Asia. Nevertheless, a significant portion of the focus that Indian officials placed on nuclear policy during this period was on negotiating with Washington to avoid the congressionally mandated shutdown of nuclear fuel for the Tarapur reactors (Perkovich, 1999). India amplified its reliance on Russia by indulging in the largest conventional arms-buying spree in the sub-continent history. Simultaneously, India started developing an Integrated Guided Missile Program (IGMP) in 1983 (Charynsh, 2006). Similarly, the 80's and 90's witnessed increased numbers of nuclear weapons and the introduction of sophisticated delivery systems in India's neighborhood as a result of missile and nuclear proliferation, which deteriorated India's security environment (Ganguly, 1999).

Rajiv Gandhi (1984-1989)

India preferred global nuclear disarmament over nuclear weapons. In his view, the nuclear establishment had likewise failed terribly to deliver on its pledge to supply cheap and plentiful electricity to support India's economic growth. India's caution was partly motivated by a desire to maintain high-tech collaboration with the United States without interference. He felt that developing technological know-how and resources across the board, with American assistance, would be more important to India's eventual prosperity and power than concentrating on nuclear weapons (Perkovich, 1999). India's challenge to being in a position of strategic irrelevance was met through political and conventional military instruments. It was during his tenure as Prime Minister that India embarked on a program of defense modernization and military expansion (Zaman, 2009).

From 1974 Nuclear Test to Pre-May 1998 Period

The period between 1974 nuclear test and pre-May 1998 has not witnessed any significant decision making concerning nuclear and missile activity. The period has been marked by a complex internal and international environment. Domestically speaking, the Indian political system was marked by unstable and weak coalitions which restrained the governments from taking any concrete step (for example, those of Prime Ministers

Narasimha Rao, V. P. Singh, Deve Gowda, and I. K. Gujral) and at the same time, in the international arena, arms control arrangements-NPT, Missile Technology Control Regime (MTCR), Comprehensive Test Ban Treaty (CTBT), and Fissile Material Production Ban- were taking shape, but as they were politically and technically discriminatory in nature, India remained aloof from them.

P V Narasimha Rao (1991-1996)- A coordinated nuclear weapons production program was not approved by Rao. India's nuclear policy remained neutral, but its nuclear capacity remained limited, clandestine, and so unclear (Perkovich, 1999). To strengthen India, the Rao administration considered economic growth and integration into the world economy to be more crucial than nuclear weapons (Perkovich, 1999).

A B Vajpayee (1998-2004)- Crossing the Nuclear Rubicon

It was only in 1998 when BJP returned to power, that it declared India to be a nuclear weapon State. Following the 1998 nuclear tests, India announced a nuclear doctrine based on the principles of no-first use, command and control and credible minimum deterrence. The Pokhran tests in May 1998 marked a dramatic shift in India's nuclear posture. It brought India's nuclear capability from the realm of a quiet and covert military program to that of a public status. The tests were not well received by the international community and were condemned by various countries. Huge economic sanctions were imposed on India by the US and international pressure increased for India to join the discriminatory Non-Proliferation Treaty (NPT) and the Comprehensive Test Ban Treaty (CTBT) were on rise.

Manmohan Singh UPA-I and II (2005-2014)

Harison Brown, an American Nuclear expert, wrote in the Introduction to the Report on the Regional Economic Development of Nuclear Power in India: It seems clear that India's ultimate energy resources are insufficient to permit it to successfully negotiate the industrial transition. This means that if India is to succeed in its development plans, it must eventually shift from a dependence upon coal, petroleum and water power as energy resources to a dependence upon nuclear energy. India with teeming millions of populations having no connectivity to the power grid, has a lot of work to do to bridge its energy deficit. The Niti Aayog of India has projected that by 2032, India's total primary energy demand would increase threefold of 2010 supply. Under the current policy structure, India is going to face an eminent energy crisis in the next decade in order to sustain targeted Economic Growth of 8 to 10 percent required for eradicating poverty and meeting the sustainable development goals. The boulevard of energy centric policies will be the determining force of India's rapid growth. Meeting energy requirements, be it nuclear energy or any other form of energy, is considered as a leading stimulant for raising the modus vivendi of citizens of any country being inextricably linked with the index of human development (HDI). Nuclear energy can be considered as an important source of energy for India if its additional advantages of huge growth potential and carbon neutrality are taken into account. In order to achieve this objective, it becomes imperative for any country to establish nuclear cooperation relations with other countries, and India is no exception. Nuclear relationships are essential for achieving India's development goals. The countries that most often have nuclear relationships with India are the US, Canada, Russian Federation, the UK, Japan, France, Australia, South Korea, Argentina, Kazakhstan, and Namibia. India started its nuclear program with the intention to use it for peaceful purposes, and Canada and the US were the first countries that helped India with this program.

The first United Progressive Alliance (UPA) government under Manmohan Singh stewardship takes the civil nuclear deal of 2008 as the pinnacle moment not only in Indo-US relations, but also in the Nuclear history of contemporary India. By virtue of the agreement, India has been recognized as a de-facto nuclear power, and the United States has set aside its semicentennial old policy of subduing New Delhi's nuclear weapons program. For India, the nuclear agreement has significant strategic, political, and economic implications. India became a significant actor in the global politico-strategic paradigm by signing this agreement. India's fold gains from the pact are as follows: a) India was acknowledged in the agreement as a de facto nuclear power state, even though it had not ratified the Non-Proliferation Treaty. It amounted to an endorsement and virtual acknowledgment of India's nuclear weapons status (Chari, 2012). (b) India's strategic standing across the world was raised when it inked this agreement with the strongest country in the world. It suggested that India would be crucial to forming and maintaining the equilibrium of the new global order in the twenty-first century (Chari, 2012). (c) The agreement cleared the path for India to obtain advanced technologies without sacrificing the independence of its weapons program, ending the thirty-year nuclear trade embargo that had been placed on the country following the 1974 nuclear test. The agreement permits the recycling of wasted fuel, which is a significant issue for regenerated facilities in India. The International Atomic Energy Agency (IAEA) will inspect this as well, but not US inspectors (Chari, 2012). (d) India's military nuclear development remains unaffected by the agreement. Additionally, it gives India the chance to fortify its nuclear weapons program by constructing reactors with larger capacities and improving the accuracy with which its nuclear arsenals can be targeted. The agreement even validated India's nuclear weapons program. Additionally, the agreement gave India the chance to uphold the security of its nuclear arsenals, maintain its extraordinary record of non-proliferation, and maintain its moratorium on nuclear testing.

This agreement removes the existing prohibitions under the NSG and IAEA regulations that prevented other nuclear supplier nations from conducting nuclear business with India. By 2020, India hoped to operate 12

additional reactors, adding 1,500 tons of uranium to its annual use. Furthermore, over the next 20 years, India plans to invest between $25 billion and $50 billion in additional civilian nuclear initiatives. The mining industries in Kazakhstan, Canada, and Australia produce roughly 63% of the uranium produced worldwide. In addition to signing civil nuclear cooperation agreements with the United States, France, Russia, Kazakhstan, Namibia, Mongolia, Argentina, Canada, and Australia, India has also finalized a nuclear accord with the United States. As a result, the agreement will prove to be crucial in forging India's strategic alliance with other significant figures in global power politics. f) Regarding energy needs, it is anticipated that the agreement will alleviate India's energy scarcity, which is essential to maintaining the GDP growth rate of 8%. Owing to India's isolation from the world's nuclear commerce mainstream, the country's nuclear reactors are currently only operating at half of their installed capacity, which results in an inadequate supply of nuclear fuel (Chari, 2012). (g) The first shipments of nuclear fuel from France, Russia, and Kazakhstan reached the Rajasthan Atomic Power Station (RAPS), Rawatbhata, marking the start of the outcomes of the Indo-US nuclear agreement. 472-fuel bundles were included in the first shipment. At India's Rajasthan Atomic Power Project, the sixth nuclear reactor was completed, two months after the fifth unit, marking another significant achievement. When the sixth nuclear reactor at the RAPP began to operate, India had 22 nuclear power reactors operational, and their total generating capacity had increased to 6780 MWe. (i) India's reliance on traditional energy sources like coal, oil, and other fossil fuels will be lessened as a result. The decrease in hydrocarbons is a contentious issue that divides industrialized and developing nations (Chari, 2012). (j) Finally, from a strategic standpoint, the deal offered India tremendous worldwide clout as an ally of the United States, particularly when it came to guaranteeing India's security in a volatile neighborhood (Chari, 2012). The agreement is a big step toward India becoming more powerful and influential and playing a bigger part in both regional and global politics.

Narendra Modi- NDA-I and II (2014- Till date) – A Paradigmatic Shift.

In 2014, the BJP led NDA Government emerged victorious, and Narendra Modi became the Prime Minister**.** For him, nuclear energy constituted an important part of India's energy security. NDA government under Sh. Narendra Modi uncovered a paradigm shift in the nuclear program by announcing a policy that reflects a strong security culture. The Prime Minister continued the nuclear diplomacy that was initiated by the UPA government and signed civil nuclear deals with many countries, like the US, Japan, France, and Russia. The Indo-US bilateral relationship forged during the UPA was not destined to have smooth sailing for long, and it turned for conspicuous transformation. The passing of the Civil Liability for Nuclear Damage Act (CLND) soon became a bone of contention between the two. The civil liability regime for nuclear damage established in India has a unique provision that enables an Operator to exercise a right of recourse against a Supplier in the event of an accident (Grover, 2017). This piece of legislation incriminated suppliers of nuclear materials culpable for nuclear accidents, thus holding the US nuclear industry responsible from cradle to grave in the event of a major disaster in the future. The liability clause holding the supplier accountable appeared to be the major irritant between the two countries. The two nations attempted to restore normalcy during the first bilateral summit after Narendra Modi became Prime Minister, and as a result, a Contact Group was formed to discuss the implementation of civil nuclear energy cooperation (Einhorn and Sidhu, 2017). The Contact Group focused on India's nuclear liability law passed in 2010 which holds suppliers of nuclear equipment accountable in the event of a nuclear accident. This law also prevented US companies like Westinghouse and General Electric from investing in India's nuclear industry. Amendments to the act were not possible, so the Indian government adopted a bipartite approach.

First, it was suggested that a pool of insurance be established by the Indian Government to cover potential nuclear losses incurred by providers. Second, the Indian Government assured the United States that, in particular, article 46 of the Civil Liability Nuclear Damages Act would hold operators accountable rather than suppliers, saying that "the provisions of this Act shall be in addition to, and not in derogation of, any other law for the time being in force, and nothing contained herein shall exempt the Operator from any proceeding which might, apart from this act, be instituted against such Operator" (Haider, 2015). These doable actions assisted in breaking the standoff between the two parties. A national insurance pool of Rs 1500 crores (about US$230 million) was subsequently established by the Indian government in June 2015. India approved the Convention on Supplementary Compensation for Nuclear Damage (CSC) in February 2016, and the General Insurance Corporation of India distributed nuclear insurance coverage for the Nuclear Power Corporation of India (NPCIL), a state-owned firm that runs nuclear power reactors in India, in June 2016. The fact that Westinghouse has begun preliminary work on the construction of six nuclear power plants in India during Narendra Modi's visit to the United States in June 2016 is evidence of the effectiveness of India's strategy in settling the contentious issue of nuclear liability.

Recently, three of the four main export control regimes admitted India as a member.

In 2016, it became a member of the Missile Technology Control Regime (MTCR); in 2017, it joined the Wassenaar Arrangement; and in 2018, it joined the Australia Group (MEAI, 2018, MEAI, 2016). India has been aggressively seeking NSG membership, and many present members, including the US, Russia, Switzerland, and Japan, have expressed their open support for India's admission (Press Trust of India, 2016, IANS, 2017, Chaudhary, 2018). India has presented itself as a responsible nuclear state in its case for NSG membership, citing its solid nonproliferation record and steadfast support for total nuclear disarmament (Dasguptal, 2016)

In a 2019 agreement, the United States promised to assist India in building at least six nuclear power reactors. India's government is promoting the building of additional nuclear power facilities in an effort to boost the nation's supply of greener electricity. Aiming to more than double the number of nuclear power plants in operation in the nation, officials have made some audacious statements, proposing the construction of up to 20 additional nuclear power facilities over the course of the next ten years. A 1,400-MW project is now being built in the northern Indian state of Haryana, close to Gorakhpur village, about 90 miles northwest of New Delhi, according to announcements made by officials in February. Two 700 MW pressurized heavy-water reactors (PHWR) using Indian designs will be installed at that plant. In a 2019 agreement, the United States promised to assist India in building at least six nuclear power plants. India had placed 26 reactors under IAEA safeguards by the year 2019 (IAEA, 2018). India has inked nuclear cooperation agreements with Russia, the United States, France, the United Kingdom, South Korea, Canada, Argentina, Kazakhstan, Mongolia, Australia, Sri Lanka, Japan, Vietnam, Bangladesh, the Czech Republic, and Namibia, thanks to the NSG waiver that was granted to it in 2008. Furthermore, India has agreements with Canada, Kazakhstan, and Australia to supply uranium for its civilian nuclear reactors, and it still engages in international nuclear trading. In order to increase the amount of electricity derived from cleaner sources and help India reach its goal of having no carbon emissions by 2070, Modi plans to more than triple the country's nuclear fleet over the next ten years. In an effort to accelerate the use of nuclear energy, the nation, which now produces roughly 70% of its electricity from coal and 3% from nuclear power, has opened its atomic business to state-controlled companies other than Nuclear Power Corp. of India Ltd. Over the next ten years, Modi intends to more than triple India's nuclear fleet as the nation strives to achieve zero carbon emissions by 2070. Currently, the country generates about 70% of its electricity from coal and 3% from nuclear power. It has opened up its atomic business to state-controlled businesses other than Nuclear Power Corp. of India Ltd. in an attempt to speed up the usage of nuclear energy.

Nuclear Power Program in 2020s

Currently, the present installed nuclear power capacity in the country is 7480 MW, comprising 23 nuclear power reactors. Dr Jitendra Singh had replied in writing in Rajya Sabha that nuclear power reactors generated 46982 Million Units of electricity (including infirm generation) in 2022-23. Dr Jitendra Singh also stated that the share of nuclear power in total electricity generation in the country was about 2.8% in the year 2022-23.

Conclusion

The establishment of the Indian nuclear energy program, which serves both covert military applications and overt civilian purposes, may be attributed mostly to a favorable confluence of individuals, events, locations, global what?. The dual program has now grown to 23 grid-connected reactors with an installed capacity of 7480 megawatts electric, a record, as Dr. Jitendra Singh, MOS disclosed in a written response in the Rajya Sabha. The present installed nuclear power capacity is set to increase from 7480 MW to 22480 MW by 2031 on the progressive completion of projects under construction and accorded sanction. It is realistic to assume that by then, the vision of Bhabha of an indigenous program of nuclear power will be well on the way to being realized, notwithstanding the delays imposed by the advocates of nuclear non-proliferation. Presently, India possesses advanced capabilities in PHWR technology, positioning the nation to potentially export such reactors, particularly to developing nations seeking to establish nuclear power or research facilities. It is safe to say, however, that India would encounter significant obstacles if it attempted nuclear exports currently, considering its nuclear conflicts with the West and non-compliance with the NPT. Therefore, it is undeniably in the global interest to address these issues by fairly normalizing nuclear relationships between India and other nations worldwide.

India has approached nuclear weapons with extreme caution since 1947 due to conflicting interests and principles. Numerous of these interests and values were domestic in nature, relating to elements like self-identity, rival personalities and parties, different institutional perspectives and goals, and the country's moral mission. There was also a conflict between India's principles and goals and those of the main outside nations and the world order. Even though India had the means to acquire nuclear weapons, its leaders and people had for many years honestly expressed existential and moral concerns about doing so.

In light of the above facts and discussions, it is clear that India's nuclear program was a long-term strategy. The growth of India's nuclear arsenals and energy industry was a priority for the post-Independence leadership, first under Pt. J.L Nehru and later under his successors. While facing political divisions within India and international pressures to refrain from acquiring nuclear arsenals, successive administrations in the twenty-first century significantly influenced the country's nuclear program and resolved **nuclear ambiguity** through the adoption of distinct policies and budget allocations.

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