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# India and nuclear power: examining socio-political challenges to energy security

## Introduction

The energy security of a country is undeniably influenced by various challenges from within and outside its geographical borders. India, being a country dependent heavily on imported petroleum fuels, faces various challenges to its energy security, on both the domestic and external fronts. The political volatility in the Persian Gulf is a major concern as three-fourths of the country's oil consumption is imported from outside sources, primarily from the Persian Gulf. With the increasing price of global petroleum fuels, India's energy bill has been growing remarkably, placing a heavy burden on the domestic economy. Domestic oil companies are making losses as they are compelled to sell petroleum fuels at subsidised rates. On the urban front, as economic activities increase, demand for energy has been increasing significantly. Demand for energy from industry, transportation, and household sectors has witnessed exponential growth since the beginning of the 1980s. The growing vehicle ownership contributes to demand for liquid and gaseous fuels. On the other hand, disparities in urban and rural energy consumption have been increasing. While urban India continues to access the modern forms of energy, the majority of people in rural areas, which constitute above 60 per cent of the total population of India, are still dependent on conventional biomass burning to meet their increasing demand for energy. If rural demand reaches the same level as urban consumption the total energy demand in India would grow by leaps and bounds in the years ahead.

At this juncture, achieving socio-economic targets [1], fuel security, and ensuring environmental health are the key goals for the country. These goals are of strategic importance to India as they would play a significant role in building the country's economy, human resources and most importantly its strategic position in the region. Among these, energy security is the key pillar as it is directly linked to the success of all other targets. This has necessitated diversification of energy supplies as well as energy sources. Nuclear energy, being a proven technology, could potentially meet the growing electricity demand from various sectors in the country and has great significance in India's energy landscape. For a country aspiring to achieve a 10 per cent growth in gross domestic product, India would need an annual 15 per cent growth in its power generating capacity. Hydro and thermal power remain the current primary energy sources, which might not be sustainable in the long run [2]. Hence, the 2005 India-US civil nuclear energy cooperation agreement is of great relevance to India, as this would unlock India's cooperation with the global nuclear community in gaining advanced technology and an assured fuel supply to run its reactors.

There are various challenges to nuclear energy development in the country. These can be categorised into domestic and external challenges. Being a non-NPT nuclear power, there has been limited technological cooperation between India and the nuclear power countries regarding technology transfer, supply of equipment and fuel, and other key tie-ups that are necessary in the development of a domestic nuclear energy sector. On the other hand, the country faces various domestic challenges due to social, political and economic factors. While the India-US civil nuclear cooperation agreement appears to minimise the external challenges, many of the domestic challenges would continue to be issues of concern to the country.

This paper will look into the domestic challenges to India's energy security which primarily include an array of social and political factors that hinder achievement of the energy security goals of the country, especially regarding nuclear energy development. Often these domestic challenges play a more crucial role in adversely affecting the country's energy ambitions than external challenges do. This paper argues that domestic challenges are more critical than external challenges to the development of nuclear power in India.

## 1. Nuclear power in the energy security of India

On the conventional hydrocarbon front, the energy security debate gained only limited attention in the domestic political and public spheres in India prior to the 1970s. A heavy reliance on domestically available

coal, assumptions about the huge prospects for domestic petroleum reserves and the traditionally good relations with petroleum producing countries in the Arab world have undermined the need for any such public debate in the country. However, the impact of the Arab oil embargo of 1973 on the global energy market was a concern to India as well, particularly when the translation of goodwill relations to oil supply assurances from the Persian Gulf proved more difficult than expected. Subsequently, the incidents of political volatility which followed in the Persian Gulf region have ignited various debates on how the country can insulate itself from the global energy challenges. This has led academic, policy and strategic think tanks to focus on energy as one of the key issues concerning the national security of India. As the country's economic activities gained momentum following the liberalisation, globalisation and privatisation efforts in early 1990s the issue of energy security also gained significant attention in the country.

On the nuclear energy front, the debate shows that due to the focus of the country's nuclear industry towards defence there has not been any significant progress in nuclear energy generation. A nuclear energy program has been on the agenda since Indian independence. The nuclear program of the country has been an ambitious one as it covers the entire fuel cycle including mining uranium, fabricating fuel, manufacturing heavy water, reprocessing spent fuel to extract plutonium and, more recently, enriching uranium [3]. Nuclear power was promoted for peaceful use by Homi J Bhabha, father of India's Atomic Energy Program. The plan was also given great significance by the government under Jawaharlal Nehru, the first Prime Minister of India. Subsequently, three incidents were the first indications of the shift from peaceful use to military use of nuclear power: development of reprocessing capability at Trombay and the development of CIRUS reactor; the demise of Nehru who opposed a complete weaponisation; and the development of the Chinese nuclear weapons test in 1964. Subsequently, India's peaceful nuclear test in 1974, its missile program (Integrated Guided Missile Development Program, IGMDP), the country's refusal to join "discriminatory" treaties such as CTBT or NPT, and the Pokhran test of 1998 have made clear India's focus on developing nuclear weapons capability. External factors such as tensions with China and Pakistan and the search for power in the region have also contributed to pro-defence nuclear sector development in the country. This continued until the late 1980s when the real concern about energy security and the urgency to develop nuclear electricity to address growing electricity demand came to the forefront.

The second debate in India is whether the development of nuclear power would be feasible in India as it has not in the past been a significant source of electricity nor can it be developed with the limited Indian technological expertise and uranium resource availability. The core argument is that over the past fifty years India was only able to generate less than 3 per cent of annual electricity production from its commercial nuclear power facilities. In the beginning of the nuclear energy industry, the nuclear establishment predicted a production of about 8000 MWe in 1980. As per a projection in 1962 nuclear energy capacity was to reach 25,000 MWe in 1987 and by the year 2000 to reach 43,500 MWe (all of this was before a single unit of nuclear electricity was produced in the country)[4]. Some experts feel that the projections which were made by the nuclear establishment from time to time have not been realistic. Though there are newer projections of potential escalation of capacity to 30,000 MWe in 2022 and 63,000 MWe by 2032 the major concern is that no details are available on where financing for this gigantic program would be found or how the accentuated problems of reactor safety or waste disposal would be addressed [5]. Apart from all these, India's weak uranium resource base also is used by many experts to argue that a nuclear energy program using uranium fuel would face the threat of shutdown in the near future.

On the other hand, there are two prominent groups which argue for nuclear energy development in India. The first group, which includes India's nuclear establishment, argues that nuclear energy is the only solution to satisfy the country's growing appetite for energy. The establishment asserts that with adequate technological support and international cooperation India would be able to boost its domestic nuclear energy capability. Though the country does not have extensive uranium reserves, the three stage program, which aims to utilise its thorium reserves would help develop a successful nuclear energy industry. The arguments of the second group revolve around the importance of nuclear energy to the overall energy security of the country and place nuclear energy as the key pillar in the country's energy security. With the

second largest population in the Asia region, India's energy consumption would grow significantly in the years to come. Nuclear energy would help the country minimise its reliance on other energy sources that would increase the energy related emissions. According to a leading Indian expert, India's population will rise to 1.5 billion by the year 2050, and there needs to be a corresponding increase in total electricity generation of 7500 billion kWh for a per capita supply of 5000 kWh to meet the development aspirations of India's people, which is about 12 times the generation in the fiscal year 2001-02. Electricity generation of this magnitude calls for careful examination of all issues related to sustainability, including diversity of energy supply sources and technologies, security of supply, self sufficiency, security of energy infrastructure, effect on local, regional and global environments and demand side management [6]. This undeniably necessitates a contribution from nuclear electricity to the country's energy mix.

The above mentioned are some of the key arguments and debates pertaining to the nuclear energy industry, which reflect the diversity of views towards development of nuclear energy in India. The domestic challenges which primarily include socio-political challenges are examined in the following section in order to understand the nature and severity of its influence on nuclear energy development in the country.

## 2. Socio-political challenges to nuclear energy development in India

The key challenge India faces with regard to nuclear energy development is from domestic socio-political factors. These include public opinion, radiation issues related to uranium mining, and, most importantly, the lack of consensus among the political sections in the government.

## 3. Public opinion

There has been little doubt among experts in India on the proven potential of nuclear power as an alternative to the conventional thermal fuels for electricity generation. Many experts maintain that, if adequately developed, nuclear power could be of significant importance in India, which would have enormous electricity demand in the years to come. However, public opinion has been largely divided on the issue of the overall social costs and benefits of nuclear energy. Among the general population there is a visible lack of adequate knowledge about the advantages and disadvantages related to nuclear energy development. Some believe that the nuclear establishment and the various governments in power have kept the public in the dark regarding issues concerning the nuclear sector. Some of the issues related to nuclear waste management have been used by some sections of the political community to project their anti-nuclear agenda.

Another major factor in the campaign of the anti-nuclear sections is the lack of economic feasibility of nuclear power. As mentioned earlier, though nuclear reactor fuel is cost competitive, the expenses of capital costs, decommissioning and waste management are considered as additional burdens to nuclear power generation. Often these factors are utilised by anti-nuclear campaigners within the country to suggest that nuclear is not economically feasible. Moulding favourable public opinion in India appears to be a difficult task. It is a scenario far different from that of a well informed community in a nuclear power country where the use of nuclear energy has already become an integral part of the daily life.

## 4. Radiation and waste management issues

India has an excellent track record with regard to non-proliferation. Safety measures in all the Indian nuclear facilities conform to international standards. However, some of the issues related to domestic nuclear radiation and waste management have engendered negative perceptions of the nuclear industry. The major factor that shaped anti-nuclear feeling among some sections of people in India is the inefficient handling by the government of radiation problems in uranium mining and milling sites. Though there have been reports of the leakage of radioactive waste from the milling plants of Uranium Corporation of India Limited (UCIL) in Jaduguda, the nuclear establishment has allegedly not taken adequate measures to contain it. "The company allegedly dumps waste from the mines in open fields and transports uranium ore in uncovered dumpers. The company even supplied mine tailings as construction material to the villagers. Though in

December 2006, a pipe burst spilling radioactive waste, since there was no warning system in place the authorities took about nine hours to respond."[7] According to another survey there were 60 people with congenital deformities born near Jaduguda in recent years. High incidents of tuberculosis, skin and lung cancer and other diseases also are found in the village [8].

The campaigns against the inefficiency of the officials managing the radiation issues often turn into protests against the nuclear establishment and facilities. Certain political sections capitalise on these issues to propagate their anti-nuclear agenda. Other uranium mining/milling sites in India also face such issues. The Domiasiat projects of Meghalaya State and the Lambapur-Peddagattu Project in Nalgonda, Andhra Pradesh, are among the other places where public concerns often overspill to form anti-nuclear sentiments. The aforementioned factors play significant roles in shaping public perceptions and they are often used as political weapons against the ruling government, which ultimately affects the nuclear industry development in the country. The government can possibly address these challenges by strengthening adequate measures for radiation prevention and waste management. Without the Government's pro-active response to radiation and waste management issues, the anti-nuclear campaigns would gain further momentum.

## 5. Domestic political challenges

The political debates about nuclear energy development in India were intensified after the July 2005 agreement between India and the US on nuclear energy cooperation. This has led to a clear-cut division of political sections into supporting and opposing parties. Though the ruling Indian government has considered the nuclear energy deal with the US as a big step towards addressing the energy concerns of the country, few other political parties resorted to opposing the deal. Interestingly, the major opposition to the deal came from Left political parties[1] which were the coalition partner of the ruling United Progressive Alliance (UPA)-led government. Over these years three major factors made way for the domestic political challenges to take shape. These were a frugal assessment about the potential of nuclear energy, concerns about political stature and strategic independence, and ideological opposition.

First, the long term feasibility concerns about nuclear energy development have been one of the major factors that have played a significant role in the nuclear energy debate in the country. Despite the fact that nuclear energy is a proven technology worldwide as well as in India, the progress of the nuclear energy sector in India has not been very remarkable. Though there are various factors such as the lack of sufficient availability of uranium and the lack of technological support from the international community, some experts feel that "the failed past indicates a dubious future" for India's nuclear energy sector [4]. Such arguments emerged from India's limited electricity generation from the nuclear facilities which were established decades ago, while the electricity generation from alternative sources supplied more than nuclear power. Undeniably this reason has been used by many political sections to justify their stance against the nuclear energy development in the country.

Second, the lack of awareness about the Indo-US nuclear deal among various sections of the political parties as well as some experts has contributed to a wider perception that the deal would sacrifice India's political stature and strategic autonomy in deciding about future nuclear tests. Two major points of concern among opposing political parties were the clause of the deal which says that the US would withdraw fuel and equipment if India breached its unilateral moratorium on nuclear tests, and the plan of the retention of reprocessing rights with US. According to the Left political leader Prakash Karat the nuclear deal would force India to tune its policies according to US instructions and demands. He reiterated that, "to make India's foreign policy and strategic autonomy hostage to the potential benefits of nuclear energy does not make sense except for the American imperative to bind India to its strategic designs in Asia" [9]. On the other hand the initial stance of the Bharatiya Janata Party (BJP), the main opposition party, was that they would endorse the deal if the Prime Minister could ensure that the Indo-US nuclear deal would not endanger India's strategic nuclear deterrent [10]. However, later the BJP insisted that India must renegotiate the nuclear deal and the "123 agreement" as the deal compromises India's strategic interests.

[1] Communist parties that were part of UPA which formed the coalition government in India.

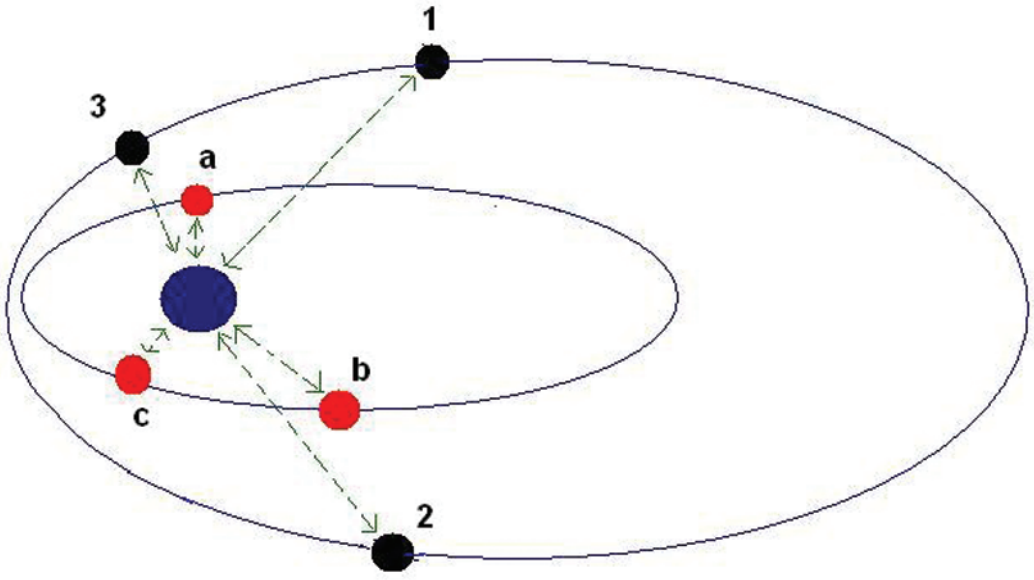
Third, though the major political opposition to the nuclear deal from the Left parties and the BJP arose in the name of protecting national interests, it would not be wrong to say that ideology and election-oriented political calculations have played the upper hand. For the communists it was necessary to oppose nuclear because of the party's perceived affinity with China and its fear of ideological degradation if the party agreed to a popular deal like a nuclear energy cooperation agreement. Many Left political leaders also feared that that the nuclear deal was nothing but an attempt by the US to counterbalance Chinese influence in the region by aligning with India. In fact opposition to the deal began within the UPA coalition from the Left political parties soon after the government joined hands with US on the Iran issue at the IAEA in September 2005, and acquired massive proportions by February 2006, when India voted against Iran again [11]. The Left's opposition to the deal finally led to its withdrawal of support for the government, and the government had to get a confidence motion passed in the Parliament on 22 July 2008 on this very issue. Though the government won the confidence vote in the Parliament, in the months ahead the government might possibly witness opposition from the Left parties as well as the third front coalition parties of which the Left is a major partner.

Though political opposition from BJP and Left parties has claimed that India would loose its strategic autonomy, many argue that these two sections were representing nothing but the conventional role of the opposition party in Parliament and were trying to gain "vote banks" in the forthcoming general election. It can also be seen that these political oppositions were primarily to take advantage of the lack of awareness of the majority of the Indian public about nuclear energy. There is a great necessity for the government and the nuclear establishment to generate awareness about nuclear energy among the public. This would weaken the anti-nuclear stance of major political sections which pose a challenge to the country's energy security strategy.

## 6. Orbits of energy security: a schematic analysis of the domestic challenges to energy security

A schematic representation of the challenges faced by India in its path to nuclear energy development is given below in the form of Orbits of Energy Security (*Figure 1*). The orbits model is a schematic representation of the factors that pose challenges to the energy security of a country. From the energy security point of view, India's nuclear energy development faces two main orbits of challenges. These orbits can be broadly divided into two: domestic challenges and external challenges. The external challenges to India's nuclear energy development are the lack of technological cooperation,

*Figure 1. Orbits of energy security*[1]




[1] Figure developed by the author in consultation with Ms Nikhila Menon (Indian Economic Service Officer, Planning Commission, Government of India) for the schematic representation of the domestic challenges to India's nuclear energy development in the context of energy security.

lack of uranium supply and legal factors (marked as 1, 2 and 3 respectively. The major domestic challenges are unfavourable public opinion, radiation and waste management issues, and political factors (marked as a, b and c respectively) .

Each point in the orbit represents a challenge; domestic challenges are represented in the inner orbit and external challenges are represented in outer orbit. The orbits are elliptical: the distance of each point from the centre is inversely proportional to the degree of severity of the challenge; the closer the points in the orbit to the centre (which represents energy security of a country) the greater the severity. Each point is dynamic in nature and may either move away or stay closer to the centre depending on the nature of the challenge.

## 7. Conclusion

The majority of the external challenges to nuclear development in India are largely dependent on the clearances from the IAEA board, the Nuclear Suppliers Group (NSG) and the US Congress on the India-US civilian nuclear cooperation deal. Hence the challenges would be adequately addressed if the deal sails through the above-mentioned hurdles. However, the domestic challenges, especially the political challenges, will continue to a greater extent in the coming period. As the Left parties in India already oppose India's nuclear energy development ambitions, the country will witness anti-nuclear political propaganda which might affect the realisation of building or developing new nuclear facilities.

A strong foundation for the development of nuclear energy in the country should be built on transparency, efficient technology and trust of the public. This requires promotion of nuclear energy debate in public, generation of awareness about nuclear energy, and creating an environment conducive to the global transfer of nuclear technologies and investment in the nuclear energy sector. India's current nuclear technology base is largely indigenous, and like many other strategic sectors it lacks a vibrant private sector or foreign participation - a lacuna intended to be redressed by the India-US nuclear deal. Besides the US, nuclear powers such as France, Russia and the United Kingdom are awaiting the opportunity to exploit this lucrative market once the NSG enables commercial civilian nuclear cooperation with India [2]. The presence of global companies and other international partnerships would help India to develop a vibrant nuclear energy industry for the country.

The development of nuclear energy faces complex social challenges especially in a diverse country like India. To develop an informed public opinion with regard to nuclear energy requires a proactive role by the government. India still has one quarter of its population illiterate and about 27% of the population living below poverty line. The Government has to play a key role in informing the public about the necessity for a strategic mix of fuels to ensure energy security in the future. While nuclear energy could meet the needs of the densely populated urban areas and mega cities, to cater to the demands of the rural areas which are widespread there has to be decentralised and distributed energy systems[2]. In the coming years the energy market is likely to be far more responsive to the user needs and accordingly the consumer's profile location and other social factors would have to be taken into consideration to evolve appropriate policy responses to ensure energy security.

Without the public confidence and support it would be a difficult task to build up the nuclear industry in a developing country like India where there are wide social inequalities and economic disparities. Hence promotion of nuclear energy debate in public and generation of awareness about the merits and demerits of nuclear power are imperative to overcome the socio-political domestic challenges which India faces vis-à-vis nuclear energy development.

The views expressed in this paper do not reflect the position of any organization or government. All the views expressed in this paper are of the author.

[2] Decentralized and distributed energy systems: For dispersed settlements in rural areas grid connected systems will not be feasible in India. Hence renewable and alternative sources of energy would be a more suitable option for these rural settlements.

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