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India's Quest for Energy Security: A Management Perspective

Sanjeev Devasthali *

PhD Scholar, School of Management Studies, IGNOU University, Delhi, India.
E-mail: sanjeevdevasthali@gmail.com

Abstract

India's concept of Energy Security envisions a reliable, assured and an uninterrupted supply of energy - mainly the fossil fuels. India's indigenous energy sources are insufficient to meet its growing needs. It therefore resorts to importing most of its energy from abroad, especially oil and gas from Middle East. By 2025, India will be the second largest consumer of global energy resources. By 2030, 90% of the country's energy will be imported. The regions, Middle East and CARs, from where India sources its energy supplies, are in a state of constant turmoil. Thus, India's import supply chain is vulnerable to disruptions, trade barriers and international business alignments. The imbalance between total energy consumption & production, threat of the ultimate depletion of fossil fuels and geopolitical issues are among the most significant determinants of India's energy security. India has taken tangible initiatives to meet its growing energy demands through various processes. However, there is no concrete strategic framework to harmonise these initiatives to achieve its energy security as part of a synchronised international business strategy. Therefore there is a need for a comprehensive management of India's policies to enhance India's stakes in the international energy business.

Keywords: Energy Research; Energy Technology; Energy Security of India; Strategic Management; Fossil Fuels

1. INTRODUCTION

Energy is at the forefront of all international business management and geopolitical discussions. Rapid economic and population growth have stimulated the demand for cheap, clean and secure sources of energy, yet diminishing fossil fuel supplies have led to fears of energy shortages. India's concept of Energy Security envisions a reliable, assured and an uninterrupted supply of energy - mainly the fossil fuels. India's indigenous energy sources are insufficient to meet its growing needs. It therefore resorts to importing most of its energy from abroad, especially crude oil and natural gas from Middle East. By 2025, India will be the second largest consumer of global energy resources. The regions, Middle East and CARs, from where India sources its energy supplies, are in a state of constant turmoil. Thus, India's import supply chain is vulnerable to disruptions, trade barriers and international business alignments. The imbalance between total energy consumption & production, threat of the ultimate depletion of fossil fuels and geopolitical issues are among the most significant determinants of India's energy security. There is a need to analyze these aspects from a management perspective to identify key strategies for ensuring India's energy security.

2. CONCEPT OF ENERGY SECURITY

2.1 Over time, 'Energy Security' has become a developing concept that varies from country to country. Countries not only differ in their definition of the energy security challenge but also on how to address it. The concept of energy security evolved in the 1970s. Willrich [1] noted that "energy security is a matter of greatest concern to international politics" and it was purely about oil supply. It emerged as a policy response to the 1973 Arab oil embargo. Most of the earlier research focused on the security of oil resources, mainly related to the risk of oil supply chain rupture. Deese & Joseph [2] concur that energy security implies the continuation of oil supplies at affordable prices without associated "foreign policy costs," such as war. Yergin [3] held that the goal of energy security was to guarantee sufficient and reliable crude oil (energy) supply at a reasonable price. The International Energy Agency (IEA), established in 1974 in the wake of the 1973 oil crisis, proposed a national energy security concept centred on stabilizing crude oil prices and its uninterrupted supply [4].

2.2 The connotation of energy security expanded beyond oil with the changes in the global energy structure and emerging concerns on the energy security of more countries. Some researchers gradually raised concerns about the security of coal, electricity and the whole energy supply system. However, most of the literature in this field is mainly centred on the relationship between supply and demand; from a "quantity" point of view [5]. Yet, scholars, considering the differences in energy systems between different countries, have assessed energy security from different perspectives too. Australian Government [6] has defined energy security as the adequate, reliable and competitive supply of energy to support the functioning of the economy and social development. The IEA [7] has developed a Model of Short-term Energy Security (MOSES) for analysing energy security by grouping together countries with similar "energy security profiles". MOSES represents the energy security setting of IEA countries. Muñoz, García-Verdugo and San-Martín [8] held that energy security is a multidimensional and mutually interdependent concept comprising technical, economic, social, political, environmental and geopolitical aspects. Government of India, in its report on India Vision 2020 [9], has envisioned that for future growth to be both rapid and sustainable the energy source needs to be as resource-efficient and environmentally benign as possible.

2.3 Lesser [10], on behalf of the Rand Corporation, contends that the proliferation of transit routes for energy has created new opportunities for interdependence and conflict and has changed the nature of the energy security question from one focused largely on relations between producers and

consumers to a more complex equation in which transit states and non-state actors also play a more important role. Post-industrial economies in the developed world are now less reliant on energy inputs. Though United States and Europe import more oil, bulk of it comes from outside the Middle East, while Asia looms large as a growing importer of energy from the Gulf and the Caspian. For larger part of Europe, energy security is now equally as much about gas as it is about oil. In short, the parameters of the energy security debate have changed substantially, yet many of the images from earlier decades shaping the perceptions and behavior of leaderships in the region, in the West, and elsewhere remain unchanged. Analysts and industry experts may be confident about the essential fungibility of oil supplies in a globalized market, and the ability of the market to compensate for regional supply crises, but strategists and policymakers often seem unconvinced. Oil maintains its importance as a strategic commodity, while gas is progressively seen in this light as well. Not least, energy trade continues to shape the regional interests and policies of extra-regional actors—the United States, Europe, Russia, and China, among others—and can affect the prospects for conflict and cooperation among outside powers.

2.4 Contemporary energy security distinguishes between the main sources of energy. Fossil fuels – oil, natural gas, and coal – provide the bulk of the world's energy, accounting for over 85% of total primary energy consumption. Nuclear and hydropower account for more than 10%, while alternative energy sources though growing rapidly account for less than 5% of total energy consumption. Non-fossil fuel energy sources have insignificant geopolitical consequences compared to fossil fuels. Alternative energy sources are generally produced and consumed within national borders, limiting their influence on international relations. Securing reliable and economical oil and gas are key national interests of the modern nation-state, and because of the tremendous volume of oil and gas that must cross international borders to reach their end-user, they are direct concerns of energy security of nations. Stone [11] in his report "Gas & Geopolitics: The Foreign Policy Implications of Energy Import Dependency" asserts that Coal also carries little geopolitical sensitivity, despite its widespread use and critical place in the global economy. Though international coal trade has grown significantly over the past decade, it still accounts for less than 20 percent of all coal consumed. Coal trade is limited by the high costs of transporting the heavy resource, and it appears the great majority of coal will continue to be consumed in the country where it is mined for the indefinite future. Oil and gas, on the other hand, move across borders in large quantities. Most of the G7 economies, China and India depend on imports for the majority of their oil, gas, or both, and could face economic ruin if these sources were impaired for a long duration. Yet, Müller-Kraenner & Sascha [12] while professing use of atomic and renewable energy as alternatives to fossil fuels argue, in the context of Energy Security, that in times of international terrorism and heightened concerns of nuclear proliferation the future must belong to renewable energy.

2.5 It is evident that Nations have a varying interpretation of energy security as a concept; yet, the underlying factor universal to the countries world over is a reliable, assured and an uninterrupted supply of energy- mainly the fossil fuels. Three common interests in the objective of importing countries in accessing external energy resources are sufficiency of energy, uninterrupted supplies and reasonable prices of energy imports.

3. GEOPOLITICS OF ENERGY

3.1 Geopolitics manifests, in terms of energy security, in the dynamic and static factors of spatial distribution of energy resources, which boils down to the interplay amongst the regional energy supply and demand centres and the manner in which the geographical contributors affect the stakeholders in their pursuit to achieve energy security goals. The fact that the centres of supply and demand do not correlate implies importance of the issue of **transit routes** security. Yet another geopolitical determinant of energy security is closely related to the characteristics of oil and gas markets and that is; first, the oil & gas market is global; second, crude oil and natural gas are fungible commodities, which means that they are fully exchangeable or replaceable [13].

3.2 Campos & Fernandes [14] also echo that one of the major challenges for consuming countries is the control of energy corridors apart from access to external energy resources. This challenge is integral to the energy security of the State and has implications in the relations among the diverse actors in the energy scenario. While in classical energy geopolitics, the actors were basically the States and their armies, today they are multiple and varied, encompassing governments, international and national companies (public and private). Some energy markets are also characterised by the formation of cartels, monopolies and oligopolies, which still retain much of the global energy system away from perfect competition and/or subject to strict regulation. Thus the energy security impinges on the interactions between all the actors involved in the global energy scenario, as well as the influence of energy and all the variables of the complex energy system (such as geographic location, supply lines, technology and processing facilities, and factors that impact supply and demand, such as the analysis of reserves, processing, new discoveries, increased consumption and research and energy technology) in the decision-making process at political, economic, military and social levels.

3.3 If those who portend that energy geopolitics is essentially zero-sum or conflictual are to be believed, then energy can be seen as a factor that affects power balances in the international system. Since the military and economic power equations that exist between the major international powers depend on the security of access to energy resources in the world, then the emergence of new powers would naturally imply more pressure on resources that are geo-physically limited in nature. The ability of the great and rising powers of the international system to secure sources and routes to energy resources in the world would be competitive, if not conflictual, and would mean a reformulation of power equations in the world. Energy-rich countries that are trading partners of emerging or great powers in the international

system would wield a certain degree of influence over the latter, given the competitive nature of demand and supply. For example, Russia can threaten the energy security of its Western European buyers if the geopolitical equations between Russia and its Eastern European neighours sour, as in the case of Ukraine in 2009. Similarly, countries that are important for transit (between energy producing and importing countries) can also leverage their power, even though they are merely conduits [15].

3.4 Energy Geopolitics has implied, in conceptual terms, a new world map dominated by a growing consumer market for energy in Asia and a growing market for production in the United States. Malik [16] observes that Asia has become 'ground zero' for growth. While the Indo-Pacific region is becoming more energy dependent on the Middle East, the United States is emerging as a global energy producing giant. US shale oil production is likely to triple between 2010 and 2020. Oil production in the US and Canada could eventually equal the consumption in both countries, should the US open up the Atlantic and Pacific coastlines to drilling. Already, within a decade, shale gas has risen from 2 percent to 37 percent of US natural gas production. The United States has also surpassed Russia as the world's biggest natural gas producer. Some bold estimates put the United States as overtaking Saudi Arabia as the world's largest oil producer by the end of the current decade. Therefore, these shifts have the potential to make the Americas into the "new Middle East" of the 21st century.

3.5 At the same time, Kaplan [17] examines, Russia is increasingly shifting its focus of energy exports to East Asia. China is on track to perhaps become Russia's biggest export market for oil before the end of the decade, even as Russian energy firms are now developing a closer relationship with Japan in order to hedge against their growing emphasis on China. We can thus deduce that all energy routes are leading to the Indo-Pacific region. The Middle East and Russia will be exporting more and more fossil fuels there. And North America will soon be looking more and more to the Indo-Pacific region to export its own energy, especially natural gas.

3.6 It can be visualised that as the Indo-Pacific waters, mainly the Indian Ocean and South China Sea, become the world's energy cauldron, maritime tensions are rising in the South China Sea and in the adjacent East China Sea. It may be fair to anticipate that territorial tensions will also rise around the sea lanes and choke points in the Central Indo-Pacific because of the evolving geopolitical landscape of the world energy market. The Europe-centric world of the past millennium may finally be passing as North America and the Greater Indian Ocean take centre stage [17].

3.7 Luft & Korin [18] ponder on the feasibility of the most elementary energy security strategy: the use of force. The militarization of energy security is not a theoretical notion. History is marred with examples of countries that resorted to bullets in order to acquire barrels. India's quest for energy security also has a military dimension. Given its reliance on the Middle East for its oil supplies and the Persian Gulf for its gas needs, India is serious about the security of its transit corridors ie the sea lanes in the Indian Ocean Region. The Strait of Hormuz in the Persian Gulf is a strategic chokepoint that must be kept open to ensure smooth supplies of oil and gas. India's acquisition of energy fields in the Russian Far East and Vietnam mean that India is also interested in the security of the Strait of Malacca. New Delhi has identified this oceanic expanse as an area of vital concern for India's energy security and it is likely to expand its naval capabilities to make this region secure. India's Maritime Doctrine that was published in 2004 calls for a blue water navy to protect India's trade and energy interests in the Indian Ocean Region [19].

3.8 Concept of energy security drives the study of energy geopolitics. Energy geopolitics points to two distinct aspects, first is the access to external energy sources and second is the determinant of securing the transit corridors.

4. INDIA'S ENERGY MIX AND VULNERABILITY OF IMPORTS

4.1 **India's Energy Mix**. In 2005, Government of India articulated an Integrated Energy Policy (IEP) [20] with the aim of ensuring reliable and efficient energy for sustaining economic growth. Around that time, in 2007, India's yearly consumption of primary energy was 423 mmtoe. Out of this, oil, coal and gas (fossil fuels) accounted for 92% while nuclear and renewable sources of energy accounted for 8%. 70% of India's oil requirements were met from imports, of which 91% was imported from the Middle East [21,22]. Now, nearly after a decade of implementation of the IEP, India's energy mix of primary energy (753 mmtoe) remains similar, with fossil fuels accounting for 90% while nuclear and renewable sources accounting 10% [23]. India still imports 80% of its oil and 80% of the imports are from Middle East, CAR and West Asia. West Asia alone accounts for 58% of India's oil imports [24].

4.2 **Oil Vulnerabilities.** Oil imports are likely to go up to 90% by 2020 with the current trends [25]. Ahmed A Saif [26] observes that Middle East, CAR and West Asia are unstable regions as they are vulnerable to terrorism and internal political upheavals. Moreover, Middle East contains some of the highest-risk countries in the world with heightened political risk and elevated political violence spilling over to neighbours and undermining trade while economic strains remain even in the region's richer economies, notably the Gulf Cooperation Council [27]. The imports will always be hostage to volatility of global crude oil prices [28]. Further, Rodrigue, Jean-Paul, Notteboom & Theo [29] point out that the Persian Gulf, which is a major trade route accounting for 30% of global oil supply, has two major choke points - Strait of Hormuz and Strait of Malacca. A disruption in these straits would impede the shipments of oil.

4.3 **Vulnerabilities in Gas and Coal**. India relies on imports even for coal and natural gas (30% and 55% respectively). Coal import has major issues of rising costs and depleting reserves [30,31]. India plans to import gas through pipelines from Turkmenistan, Iran, Bangladesh and Myanmar [32]. Since a pipeline traverses through several countries, it entails a complex contractual framework and has an important bearing on geopolitics [33]. Various pipeline projects since

1990s are the Turkmenistan-Afghanistan-Pakistan-India (TAPI), Iran-Pakistan-India (IPI), Myanmar-Bangladesh-India (MBI) pipelines. All these projects have run into numerous troubles due to regional tensions and geopolitical considerations [34,35,36]. Progress on the TAPI and IPI is marred by political and security instability in Afghanistan, volatile relations between India and Pakistan and ongoing unrest in Baluchistan [37]. The MBI pipeline is hostage to New Delhi's relations with its sub-continental neighbours. American pressure is also a source of concern in New Delhi's dealings with Iran and Myanmar [19].

4.4 Issues in Nuclear Power. Nuclear power constitutes about 8.6 mmtoe ie 1.3% of India's energy mix. India's nuclear reactors are operating at suboptimal levels due to meagre uranium reserves and poor quality of ores [38]. Arunachalam, Tongia and Bharadwaj [39] assert that if nuclear energy has to increase upto 10% in the energy mix then the nuclear power sector would need to increase dramatically. Nuclear power would need to exceed the earlier forecasts, which were based on domestic uranium. A rapid growth of nuclear power is thus feasible with imported uranium. The "123" civilian nuclear landmark agreement between India and the United States on civilian nuclear power reactors signed in 2006 was a step towards that direction. However, as on 11 Sep 18, only 2% (6,780 MW) of Indian electricity is being produced by Nuclear sources [40]. Nevertheless, Atomic Minerals Directorate for Exploration and Research (AMD) [41], a unit of Department of Atomic Energy (DAE), claims that India has large thorium reserves. India's thorium deposits, estimated at 0.98 million ton, far outweigh its natural uranium deposits at 0.207 million ton. The country's thorium reserves make up 25% of the global reserves [42]. Thus India can reduce the import of Uranium provided Thorium could be used as fuel in lieu of Uranium. However, Thorium is not being a fissile material, must first be converted to Uranium-233 before being used as a fuel [43]. Though it would take decades for this technology to be commercialized, in the long term, beyond 2050, India's substantial thorium reserves would enable self-sufficiency in electricity production. This process can be fast-tracked if India can access civil nuclear technologies from foreign sources that accelerate the process of converting thorium supplies into fissile material [44].

4.5 Thus it is reasoned that India's indigenous energy sources are insufficient to meet its growing needs. It therefore resorts to importing most of its energy from abroad, especially crude oil and natural gas from Middle East. By 2025, India will be the second largest consumer of global energy resources after China. By 2032, over 91% of the country's energy needs will need to be imported [33]. The imbalance between total energy consumption & production, risk of the ultimate depletion of fossil fuels and threat of supply chain disruptions are among the most significant determinants of energy security [19]. India's National Energy Policy should also transcribe into individual Corporate Energy Policy to enable a successful Energy Management part of a wider corporate social responsibility [45,46,47].

5. STRATEGIC MANAGEMENT OF ENERGY SECURITY

5.1 Meeting the growing demand for energy is a major challenge that is constantly confronting Indian leaders. Debasish [33] observes that India is trying to respond to this by expanding the base of domestic renewable energy and increasing its nuclear power capacity as also pursuing a strategy to diversify its suppliers. Further, Winzer [48] examines solutions such as making markets work, smoothly functioning international markets, having competitive markets and independent regulation. However, it is not a feasible task always to make the markets competitive or work smoothly as the markets are not perfect. Nonetheless, Pervaiz [49] asserts that India will continue to do business with Middle East/ CAR for bulk of its fossil fuel requirements for reasons of geography and cost.

5.2 Energy demand and supply shape international politics – and vice versa. It can also be seen that there is a strong relation between foreign policy and energy security. Energy politics will determine how a country manages its international strategies. The foreign relation strategies range from mutual dependence and cooperation to a total dependence on a certain ally. Embargoes and sanctions reduce energy security, whereas energy treaties and agreements enhance energy security by fostering political strength and stability [50]. Therefore there is a need to for management of India's strategic policies to shape the international energy business transactions of India. One good example of how a good foreign policy strategy has supported India's energy imports is its successfully negotiating the adverse ramifications of the recent US sanctions against Iran. US President Donald Trump has imposed an embargo on the import of Iranian oil, apart from sanctions against a range of industries, from 04 Nov 2018 [51]. The executive order re-imposes sanctions on any foreign company that continues to do business with Iran [52]. However, USA has considered a waiver to India. James Mattis and Mike Pompeo [53], US Secretaries of Defense and State, released a statement, "We will consider waivers where appropriate ... So we'll work with the Indians, we committed that we will do that".

5.4 India's relations with Gulf countries and West Asia are very old and the region (including CAR) is rich in hydrocarbons. Nandy [33] opines that India should aim for close linkage with this region. To further cement the energy cooperation it is suggested that the current buyer-seller relationship needs to change into a partnership of criss-cross investments in Indian businesses and the West Asian oil-exporting countries. This policy will facilitate greater interdependence thus addressing India's energy considerations.

5.5 Although Iraq is a high-risk proposition and Iran a problematic one, to ensure its future stable energy supply, India should work on long-term plans to expand its energy cooperation with Iraq and Iran. Food security is a big issue in the West Asian region [54]. Hence, energy versus food trade-off with these countries can be considered as a policy option. India is perceived by the regional countries as an emerging global power with rising stature and therefore expected to play

a larger role not only in the economic sector but also in security arena. Therefore, to address the new challenges which are still unfolding, India needs to revisit its policy towards this strategically important region. The new approach could explore possibility of looking at the region beyond energy, as new opportunities of cooperation open up for India in other areas. This could be done by developing stronger bilateral engagements followed by cooperation at regional level with its Asian partners and pronouncing a 'New West Asia Policy' [55].

5.6 India's two immediate neighbours, Myanmar and Bangladesh, have good volume of natural gas reserves. It makes a great business sense to import natural gas from both Bangladesh and Myanmar. According to India's Act East Policy [56], these two countries are also strategically important for direct access to markets of South-East Asian countries. Thus India will have to play a greater role in its immediate neighborhood for its energy security.

5.7 India needs to obtain civil nuclear technologies from foreign sources that accelerate the process of converting thorium supplies into fissile material in order to increase the proportion of Nuclear power in India's energy mix. A deliberate management of strategic policies would help shape the geopolitical climate favoring technology transfer to India [57].

5.8 India is also working towards energy independence by 2030 through a series of steps aimed at increasing supply or reducing demand. But, the country's energy sector is administered and managed via a multi-ministerial structure that includes the Ministries of Power, Coal, Petroleum and Natural Gas, New and Renewable Energy, Environments and Forests, the Department of Atomic Energy, and the Planning Commission, among others [58]. Instead of fragmented entities addressing the issues of energy sufficiency, the entry of geopolitics in the domain of energy security makes a case for strategic handling as a driving factor in achieving energy security for India.

6. CONCLUSION

Energy and development have a symbiotic relationship; without energy, there is no development and India is projected to grow at 6-7%. World's hunger for energy combined with the decline of fossil fuels will create a strong vortex of energy conflict. India has taken tangible initiatives to meet its growing energy demands through various processes. However, there is no concrete strategic framework found to harmonise these initiatives to achieve energy security of India as part of a synchronised national strategy. It may be prudent to expand the concept of energy security in two critical dimensions - globalization of the energy security system and the acknowledgment of the fact that the complete energy supply chain needs to be secured. Energy security has got to be achieved through revision of energy resource mix, enhancement of indigenous non-fossil resources and uninterrupted energy imports à propos India's geopolitical climate as part of its National Strategy.

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