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Energy security in India: A Review

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Abstract

The concept of "energy security" has gained prominence in both the scientific and political spheres. However, the applied notions of security of energy are usually fairly nebulous. The ideas of energy security from an Indian perspective are clarified in this study. We start by talking about energy security from a conceptual standpoint. After that, a succinct overview of current efforts to define and, consequently, quantify energy security is given. After examining the different issues, we have recommended a course of action for enhancing energy security. Our finding indicates that it is beneficial to evaluate both governmental stability and market structure.

Everyone agrees that one of the most crucial components for both human and economic progress is energy. Energy usage and economic development have a close relationship in a contradictory way. Economic development has been found to be influenced by energy demand, but an economy's ability to grow and remain globally competitive depends on an abundance of cost-effective, environmentally friendly energy sources.

Energy security involves various supply and price risk, which are influenced by both internal and external factors. Energy security is simply having a sufficient amount of supplies to meet demand at a certain cost. In order to reduce the dangers, long-term energy security entails a careful balance between domestic and foreign energy sources

and technology. Higher levels of energy production and consumption are necessary to support economic development, particularly in emerging nations like India. At the moment, "energy poverty" prevents a significant portion of the population from achieving economic and social advancement.

Compared to the global growth rate of 2%, India's primary energy demand is increasing at a comparatively quick rate of 4% annually. India is now more dependent on imports as a result of domestic production falling behind demand growth. Over the past ten years, energy imports have increased from 20 to 33 percent[1]. Regarding crude oil, where India is nearly 80% dependent on imports, the degree of dependence is fairly glaring[2]. When it comes to crude oil, India is around 80% dependent on imports, which is a rather glaring indicator of dependence. India imported 30% of its coal required during FY14[3], even though it has the fifth-largest coal reserves in the world. Because of higher domestic production and less demand, coal imports decreased in the previous year; but, even if consumption of coal later increases, these low levels must be maintained. The nation has yet to fully utilize its massive solar and wind resources.

When assessing the safety of energy supplies, a number of organizations—including the former Planning Commission[4]—take into account factors other than import dependency. According to this theory, a country is only regarded as energy secure if it can provide its inhabitants with inexpensive, sustainable energy. This goal involves much more than just lowering reliance on imports and safeguarding the power supply. It entails giving every home at least a "lifeline" amount of energy[5] in a method that doesn't negatively impact the natural surroundings and is reasonably priced or financially feasible for all parties involved.

[1] IEA Energy Balances; retrieved from http://www.iea.org; last accessed on 31st August 2015
[2] IEA Energy Balances; retrieved from http://www.iea.org; last accessed on 31st August 2015
[3] BP energy statistics 2015; retrieved from http://www.bp.com/en/global/corporate/energyeconomics/statistical-review-of-world-energy/downloads.html; last accessed on 1st February 2015
[4] The integrated energy policy of the Planning Commission shared a similar view
[5] The Planning Commission of India defines essential or lifeline energy for a household as 30 kWh of electricity and 6 kg of LPG per month

India, the second most populous country in the world with 1.1 billion people, ranks sixth globally in terms of consumption of primary energy, making up roughly 3.5 percent of global commercial energy demand. India's economy is currently among the fastest growing in the world, with a GDP growth rate of about 8% under the government's Tenth Five Year Plan. Thus, the future levels and trends of energy consumption in India will have significant ramifications both domestically, regarding the ecological impact of energy use, issues of equity and access, and internationally, regarding the geopolitics of energy supply and emissions of greenhouse gases associated with the burning of fossil fuels.

By 2031, India would need to boost the majority of its energy supply by at least three to four times and its ability of producing electricity by up to six time the levels of 2003–2004, according to various estimations.

The Integrated Energy Policy report brought out by the Planning Commission estimates that under an 8% GDP growth scenario, India's total energy requirements would be in the range of 1536 mtoe to 1887 mtoe by 2031 under alternative scenarios of fuel and technological diffusion. TERI's analysis based on the MARKAL model, indicates that under a 8% GDP growth scenario with current plans and policies of the Government, commercial energy needs would increase to 2108 mtoe by 2031/32[6]. In reality, the Government of India would like to achieve a GDP growth of above 10% per annum.

Now we will discuss imports of different energy sources with respect to their consumption and aggregate gross import. These specify the energy import dependency for particular sources. Energy import dependency for all conventional energy sources increases in 2020 with compare to 2006. We can see energy import dependency for crude oil, natural gas, coal and lignite are 88.6%,

[6] India's energy security, leena shrivastav and riru mathur page 3.

54.31%, 23.75% and 0.05% respectively in 2020[7]. Energy import dependency has been increased for all sources. Maximum increment has been seen in natural gas, signifies that for natural gas energy import dependency increases from 18.11% to 54.31% from 2006 to 2020 respectively. Maximum energy import dependency has been observed for crude oil. This signifies that 88.60% crude oil has been imported to meet the demand for consumption of crude oil.

India's reliance on imports has increased worries that it won't be able to maintain rapid economic expansion in the absence of affordable, dependable energy. India imports its three main sources of energy to differing degrees, and it is anticipated that its reliance on imported oil would only grow. Numerous things aggravate the situation:

1. Major oil suppliers are located in unstable parts of Africa and the Middle East.
2. High oil prices drive up gas prices.
3. Geopolitical unpredictability fuels concerns about a potential disruption in supply and oil price volatility.
4. Slow market reform has discouraged investment.
5. There are currently few or no viable energy alternatives. India's civilian nuclear project has frequently fallen behind schedule, and the country has prevented the establishment of large-scale hydroelectricity producing facilities. Although nonconventional energy sources have advanced in development, their application is still somewhat restricted.

Instead of a coherent energy policy, India has so far created a collection of energy-related attempts. The nation's search for energy has been made more difficult by politics, ideology, and procedures. Several organizations in charge of each kind of energy source and stove piped decisions on related matters like

[7] Mishra, B., Ghosh, S., & Kanjilal, K. (2023). Policies to reduce India's crude oil import dependence amidst clean energy transition. Energy Policy, 183, 113804. https://www.researchgate.net/publication/375826457

foreign policy, economy, and the environment have thwarted attempts to integrate energy programs. Additionally, leaders' inclination to make challenging yet essential judgments has been mitigated by socioeconomic problems and the internal political circumstances. The necessity for an efficient and varied energy strategy—or at the very least, a cohesive set of policies to combine economic, social, environmental, and foreign policy concerns with the growing demand for energy—is becoming more and more apparent to India's politicians at this crucial moment. India's demand for oil and other energy sources will undoubtedly continue to rise, even though opinions on the best course of action are divided. Fulfilling this demand will have a significant influence on the nation's actions in the energy sector as well as its attempts to accomplish its more general strategic objectives both domestically and internationally.

Concerns have been raised over India's energy future. One is that India is probably going to remain reliant on outside sources for its nuclear, gas, and oil needs. India appears to have relatively little energy security unless new technologies are shown to be commercially viable soon. It is susceptible to both supply and pricing shocks. Both "official" and "unofficial" India are well aware of the issues surrounding energy and possible remedies. Implementation, which has frequently been reactive and delayed (others prefer the term "measured"), is typically the roadblock to successful change. It is also unlikely that the energy sector will undergo significant changes in the future. Reform will go on, both out of need and personal preference. Political and social factors will be the main causes of the slow pace, but it will also be hampered by the challenge of creating an energy strategy rather than a collection of (often conflicting) energy policies. It is likely to be challenging to integrate these policies.

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21. Ibid., p. 4.

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