

## Towards a broader definition of ‘energy security’ for a growing India

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India is the fourth-largest energy consumer in the world, with an annual primary energy consumption of over 700 million tonnes oil equivalent (Mtoe). It could soon also become the world’s largest energy importer. Estimates from McKinsey & Company suggest that by 2030, in a ‘business as usual’ scenario, India will consume over 1,500 Mtoe of primary energy each year, and will need to import over 50 per cent of this requirement. Not surprisingly then, energy supply security is high on the agenda of Indian policymakers and industry. Opportunities to supply India have also caught the attention of global energy exporters looking for stable markets, especially as surpluses in oil and coal grow.

While ‘supply security’ (or the reliability of supplies) is a critical factor, energy security for India involves more than just supply. The country has nearly a fifth of the world’s population, and its per capita energy consumption is less than one third of the global average (614 kilograms oil equivalent (kgoe) for India versus a global average of 1,890 kgoe in 2011). As India strives towards its target of 8–10 per cent economic growth and its aspiration of becoming a manufacturing powerhouse, the country is likely to see massive growth in energy demand, which in turn will require large investments in upstream energy, refining, power generation, transportation, and consumption infrastructure.

In India’s context, therefore, ensuring energy security will require a focus on three factors in addition to the reliability of supply, namely: energy access, economic viability, and environmental sustainability. As described below, India has made some notable progress in recent years on some of these dimensions, but on the whole faces a grave set of challenges to its energy security as defined above.

- *Supply reliability.* The development of India’s domestic energy resources has simply not kept pace with demand. Exploration in oil, gas, and coal has been extremely slow. This is evident in India’s reserve-to-production ratios, which have declined from 19 years for oil and 435 years for coal in 2000 to 17 years for oil and 185 years for coal. As a result, India’s energy imports have grown from 20 per cent of consumption in 2000 to over 30 per cent today. India has also been unable to diversify its import sources. The majority of its crude oil imports of roughly 3 million barrels per day (mb/d) continue to be sourced from the Arabian Gulf, and its rapidly growing coal imports have largely been from Indonesia, South Africa, and Australia. Meanwhile, fossil fuel safety stocks have steadily decreased over the past three years, although they are expected to increase going forward, given lower crude oil prices and the commissioning of India’s crude strategic storage facilities, currently about 5 million tonnes (Mt), or roughly 38 million barrels.
- *Energy access.* This has been steadily improving every year. Household access to electricity has increased from around 60 per cent in 2000 to nearly 80 per cent today. In the same period, household access to modern cooking fuels (LPG, gas, kerosene, and biogas) increased from 23 per cent to 35 per cent. Despite the improvement, however, the shortfall is staggering – over 200 million Indians do not have access to electricity, and nearly 700 million still use non-commercial energy for cooking. This remains one of India’s largest energy security challenges.
- *Economic viability for stakeholders.* High global energy prices and a sluggish Indian economy resulted in India’s energy imports growing from a figure

representing 26 per cent of its total exports in 2010 to one of nearly 40 per cent in 2012. In the same period, energy subsidies rose from under 3 per cent of government expenditure to nearly 5 five per cent. While India’s economic indicators for energy will improve dramatically with the recent fall in global prices and reduction in subsidies, the lesson is clear: India needs to make its economy less vulnerable to global energy shocks. However, financial returns to investors in India’s energy sector continue to be a serious concern. Return on capital at India’s top 20 energy companies has hovered around 10–12 per cent, well below the cost of capital of around 15 per cent.

- *Environmental sustainability.* India’s share of renewables in primary energy has more than doubled from 1.6 per cent in 2000 to 3.7 per cent today. India has also set new global benchmarks for low-cost renewable power generation, receiving bids for solar development at 11–12 US cents per kilowatt hour (kWh). The energy intensity of the Indian economy has also improved, from 0.77 Mtoe/GDP (US\$ bn) to 0.57 Mtoe/GDP (US\$ bn), thanks partly to concerted efforts on energy efficiency. However, CO<sub>2</sub> emissions continue to rise due to the increasing share of coal in primary energy, as the country consumes more electricity. An environmentally sustainable energy sector with benchmark energy efficiency, cleaner hydrocarbons, and reliable, affordable renewables will be crucial for India’s energy security.

In order to improve its energy security, India will need to address all four dimensions in fairly short order. The magnitude and range of initiatives needed is vast, requiring efforts akin to a national movement rather than incremental policy



changes. There are many initiatives that India can consider, in particular, the following broad measures:

- Aligning policymakers around an aspiration of achieving *energy independence for India by 2030*, with energy imports no more than 15–20 per cent, through a combination of domestic resource development, energy efficiency, renewables, and global investments in resources and supply infrastructure. Garnering true commitment to an ambitious goal of this nature is perhaps a necessary first step for India, given the number of energy sources, initiatives, and decision makers in the country.
- Launching a comprehensive national initiative on *resource mapping, exploration, and resource development* across India's coalfields and oil and gas sedimentary basins. This would require government funding for the initial data gathering effort, and corporate investment once prospectivity is more firmly established.
- Moving towards *market pricing for coal and gas, and competitive pricing for power* (market pricing for crude oil and most refined products is already well established). This would help remove distortions in inter-fuel pricing, for example between coal and gas. Specific consumer segments can continue to be protected through the direct transfer of subsidies to consumers and by selectively applying caps on prices, as required. Competition in power distribution is also necessary to introduce efficiency and eliminate pricing anomalies. For example, millions of urban Indian households are forced to use expensive diesel generating sets for power supply during peak hours, even though it would be cheaper for power distribution companies to generate and supply peaking power using LNG, hydro, or solar resources.
- Creating '*local energy ecosystems*' for innovation, technology development, manufacturing, and services. An energy

ecosystem would be a cluster of energy companies, users, service providers, technology providers, and research institutions working in collaboration to achieve lower costs, higher productivity, access new resources, and establish local manufacturing. In particular, four types of ecosystems could be a priority to begin with:

- unconventional hydrocarbons (tight reservoirs, high pressure/high temperature reservoirs and deep water),
  - clean coal (underground mining, ultra-super-critical generation, ash control),
  - renewables (solar, wind, energy storage),
  - energy efficiency.
- The government can play a catalytic role in supporting these ecosystems through fiscal measures such as incentives for research, physical infrastructure (land, for example), grants to attract talent, and by creating demand for new innovation among its own energy companies.
  - Using the current surplus in global energy supply to *forge new international bilateral relationships and resource access arrangements* with Africa, the Middle East, Latin America, and the FSU countries. These could include new contractual arrangements, inventory holding and backup contracts, complementary upstream and downstream investments, and shared transportation and storage infrastructure. The current oil price downturn is a unique opportunity for India to create long-term sustainable infrastructure solutions with energy suppliers in the region and beyond.
  - *Accelerating rural energy access* through distributed systems as a priority initiative. Several companies are already experimenting with rural distributed renewable energy systems at a pilot scale. However, issues related to the eventual integration of these systems with the state grids, building

capability among rural communities to operate and maintain the systems, and catalysing industry partnerships (for instance, renewables developers and telecom operators) will need to be addressed.

- *Strengthening Indian energy institutions* across the board. India's state-owned enterprises, for instance, need to build stronger capabilities for global growth. They also need approximately five times their current investments in R&D and technology to be able to access tougher and deeper resources. Similarly, regulatory independence needs to be ensured in the power sector, especially in tariff-setting. The governance of the energy sector would also benefit from a greater degree of integration; currently more than 10 ministries have a material say on investments in the sector.
- Finally, *rallying public opinion and raising awareness on energy issues*, especially on pricing, will be necessary. The popular narrative on energy in India has so far largely related to subsidies, allocations, and patronage. The narrative needs to change to unlocking India's resource potential, improving quality of supply, and ensuring energy access, technological innovation, and energy efficiency.

The challenges for India's energy security are real but not insurmountable. There are several recent examples of countries that have succeeded in materially shifting their energy security outlook in a matter of 10–15 years. The shale oil and gas revolution in North America, Brazil's massive effort to develop its subsalt resources, and China's global energy acquisitions and diversification of supply routes all show what a clear strategic purpose, aligned policies, and the development of integrated energy systems can achieve.

*The author acknowledges Amit Khera (Partner, McKinsey & Company) and Ketav Mehta (Associate) for their contributions to this article.*