

# On energy, it can no more be business as usual

The Tribune  
National Security Forum



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The problem of India's energy security is that it will become progressively acute over time. The writer calls for a slew of unconventional options, including greater reliance on natural gas, faster development of renewable energy and an innovative transport policy.

**T**WO major aspects of energy policy in India have not received the kind of attention that they merit. The first relates to energy access and the second to the issue of security of energy supply. As far as energy access is concerned, it is sad that around 200 million people in the country still do not have access to electricity, and perhaps an even larger number is subjected to erratic, irregular and unreliable supply in their households. What is even more serious is the use of poor-quality biomass for cooking in some 600 million households in the country.

## Harmful pollution

The use of kerosene and other combustion-based lighting, prevalent in rural parts of India, leads to harmful pollution, especially affecting women and children. But what is even more serious is the health impact of cooking using poor quality biomass such as twigs, cow dung and agricultural residue, which leads to high levels of indoor pollution, especially harmful to the health of those who are exposed. Some efforts are now in hand to address these problems. The programme on "Lighting a Billion Lives," launched by TERI has covered almost 3,000 villages in the country and has brought modernised lanterns, which use LED systems, to homes in the villages which have been covered. The introduction of improved cookstoves is also moving ahead with designs that essentially provide a flame as clean as that of LPG or natural gas stoves, even with wood as a fuel. The big benefit of these improved cookstoves is a substantial reduction in the use of firewood and, of course, deforestation in homes which is the result of unsustainable combustion and cooking. The Government of India and several state governments are also now focusing on this widespread problem of traditional lighting and cooking, which not only has harmful health and environmental impacts, but is also wasteful in the use of funds.

## Fossil fuels

The problem of energy security is one that is likely to become progressively more acute with time. Fossil fuels account for about 76 per cent of the primary energy supply in India. Import dependence in the case of oil was 76 per cent in 2011-12 and even coal is now being imported in substantial quantities. If this scenario continues as the path of energy consumption that represents business as usual, then oil imports alone would be around 18 million barrels per day by 2031-32, rising from around 2.5 million barrels per day in 2011-12. That would make India a major consumer of oil in the world, and with this substantial demand, India would also have an impact on the global price of oil in that year.

## Coal imports

Actual coal imports were around 180 million tonnes (MT) in 2011-12, but on the business-as-usual basis they would rise to 947 MT in 2031-32. The import bill for these volumes would be 0.3 times the current level in real terms and could prove to be a major burden for the Indian economy. In the case of oil, India is largely dependent on imports from a small region of the globe whose geopolitical developments could influence the physical supply. If a price increase of 30 per cent was to take place, which cannot be ruled out as unlikely, the Indian economy could suffer seriously. Similarly, with rising imports of coal these



**FOR A SUSTAINABLE FUTURE:** Tapping renewable sources of energy like solar energy is a safer and sustainable option to bank on rather than fossil fuels.

would not only be possible restrictions in exporting nations, but also price increases that would naturally reflect increases in oil prices. As it is, with the devaluation of the Rupee over the last four years, oil prices in effect have gone up by 34 per cent for this country.

## Improving efficiency

A careful analysis of where we are heading would clearly suggest that we need to rapidly improve the efficiency of energy use in every sector of the economy. Initiatives for improving energy efficiency are required in the major energy-consuming sectors, such as transportation, buildings, as well as industrial and commercial establishments. Households would also need to bring about changes which would not on changes in lifestyles as well as the use of energy-efficient appliances. On the supply side, there is a need to move rapidly towards greater use of renewable energy sources, given the fact that India has a large endowment of these in the form of high and extensive insolation, areas with attractive wind potential as well as substantial quantities of agricultural residue and other biomass which could be harvested on a sustainable basis.

Evaluation of future options and strategic imperatives requires very detailed and rigorous assessment of how economic activities can grow and what would be the implications for energy use for different scenarios. TERI has been carrying out extensive modelling of energy economy developments in India, and has a set of quantitative models which are very elaborate, incorporating all the relationships between different sectors of the economy, technological characteristics and implications for the energy cycle associated with different pathways of economic development. Using these models and running them for the future, driven by specific assumptions related to growth of the economy as a whole and the mix of growth that can be envisaged, a number

of scenarios have been developed for the future in order to evaluate the choices that India has for ensuring satisfactory level of energy security.

## Shift towards services

The MARKAL model, which has been used primarily for this purpose — involved 200 different technologies and around 100,000 variables — representing various elements of the Indian economy. A healthy growth rate of 8 per cent per annum for the GDP has been assumed in running the model. At the same time, future scenarios are based on a structural shift towards services, but, of course, there is also a major increase in manufacturing and other sectors of the economy. For the year 2031-32, a population of 1.5 billion has been assumed with steady growth in the intervening period. Three different scenarios have been run to evaluate the outcome related to the economy and its energy implications. The first scenario is essentially a business-as-usual pathway, where no major policy interventions are made to change the current path of energy development. The second scenario deals with a moderate effort to bring about changes in energy mix with an increase of supply from renewable sources as well as penetration across the economy of some specific new technologies. The third scenario is driven by ambitious objectives aimed at a dramatic reduction of energy imports by the year 2031-32. This entails faster implementation of energy efficiency measures, rapid penetration of new technologies and increased electrification of the economy. The role of renewable energy technologies and their widespread use is crucial in this scenario.

## Unconventional options

Some of the unconventional energy options that are part of the future scenarios used in this modelling exercise include liquid biomass, tidal energy,

geothermal energy, conversion of waste to energy, power generation using biomass as a fuel and, of course, wind, solar, hydro and nuclear options. The unconventional options that are included are traditional biomass, natural gas, oil and coal.

## Future runs

The results of these future runs outlining the three distinct scenarios are particularly revealing. In the case of the business-as-usual scenario, exports in the year 2031-32 would be 407 MT of coal, 34 billion cubic meters (BCM) of gas and 470 MT of oil. The moderate scenario results in a significant reduction of these import levels with coal imports at 160 MT, gas 57 BCM and oil 122 MT. What is even more significant is the ambitious energy security scenario which reduces oil imports to a manageable 200 MT, gas imports increasing to 121 BCM and oil imports to 216 MT. It is, therefore, obvious that in the medium term, which extends to 2031-32, India should attempt to secure a larger quantity of natural gas, preferably increasing domestic production far beyond reasonable assumptions that are included in the model. In 2008, this author, along with Dr. Ashish Joshi and Dr. Isha, developed a forward-looking scheme for import of natural gas from Iran through Pakistan. Through a rigorous and elaborate exercise, a later stage of this proposal involved development of contractual and other institutional provisions by which all the parties to this arrangement would have been able to establish secure supply opportunities and remuneration of thousands of political, financial and other interests. For a variety of reasons this option did not take off and now, of course, there is interest on the part of India in generating the TAPI (Turkmenistan-Afghanistan-Pakistan-India pipeline). A series of irrational policies has also been responsible for inadequate increase in domestic production, particularly from offshore areas. It is, therefore, imperative that the Government focuses on improving

the prospects for energy security through greater reliance on natural gas.

## Benchmarks for contraction

At the same time, on the energy demand side, a substantially different transport policy than what is seen currently, far stronger regulation of standards and benchmarks for construction of new buildings, retrofitting of existing buildings, a far more energy-efficient industrial sector and some changes in lifestyles would be necessary to reduce the growth of energy demand without compromising on economic growth and welfare. Much greater attention to energy access for those who receive no modern energy supplies today is also overdue.

The most important element perhaps of future energy strategy would only be faster development of renewable energy options, involving a set of policies with a strong promotional element to start with and support for research, development and pilot activities. Emphasis in the past on looking at energy decisions within a short frame, and that too within sites related to coal, oil, renewables as distinctly different initiatives, has led to a situation which cannot continue along business as usual lines.

It is imperative that the Government of India and society at large in this country evaluate the direction in which we are going and the perils that we might face in respect of the security of energy supply. It would be prudent to heed Mahatma Gandhi's advice which stated "A technological society has two choices. First it may walk until catastrophic failures expose systemic deficiencies, distortions and self-destruction. Secondly, a culture can provide social checks and balances to consent for systemic distortion prior to catastrophic failures."

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## Demand & supply

- A greater attention to energy access for those who currently receive no energy supply today is overdue.
- Fuel bills account for about 70 per cent of the primary energy supply in India.
- If the country continues on the path of energy consumption as usual, then oil imports alone would be 470 MT by 2031-32.
- To scale down the demand for energy, a substantially different transport policy is needed.
- Stronger regulation of standards and benchmarks for construction of new buildings and retrofitting of existing buildings are also required.
- A far more energy-efficient industrial sector and some changes in lifestyles would be necessary to reduce the growth of energy demand without compromising on economic growth and welfare.