

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 2, February 2016

A Study on Energy Availability and Sustainable Development in India

Jaya Bhandari¹, Rajesh Kumar Dubey²

Asst. Professor, Jai Narayan Vyas University, Jodhpur, Rajasthan, India¹

Director, UGC-HRDC, Jai Narayan Vyas University Jodhpur, Rajasthan, India²

ABSTRACT: Energy is the prime mover of economic growth. Availability of energy with required quality of supply is not only key to sustainable development, but also the commercial energy has a direct impact and influence on the quality of service in the fields of education, health and, in fact, even food security. Inadequacy of energy supply would obviously affect very adversely these vital and essential requirements of any society. There is, therefore, an urgent need to enhance substantially the energy availability at a rapid pace so that aspirations of those who have remained insulated from such important inputs and services are fulfilled and they are enabled to have a reasonable access. There is a big divide between the developed and the developing countries in per capita availability of energy. The developed countries not only have a significantly higher per capita energy consumption but also mainly depend on commercial energy. On the other hand, developing countries are highly energy deficient and also the large proportion of energy consumed is comprised of non-commercial energy sources such as bio-mass. As per the projections made by International Energy Agency (IEA), most of the developing countries are not expected to reach, even by the year 2030, the level of Energy Development Index achieved by the OECD countries way back in 1971.

KEYWORDS: Sustainable Development, International Energy Agency (IEA), Energy Development Index, OECD countries

I. INTRODUCTION

India's energy security, at its broadest level, is primarily about ensuring the continuous availability of commercial energy at competitive prices to support its economic growth and meet the lifeline energy needs of its households with safe, clean and convenient forms of energy even if that entails directed subsidies. Reducing energy requirements and increasing efficiency are two very important measures to increase energy security. However, it is also necessary to recognise that India's growing dependence on energy imports exposes its energy needs to external price shocks. Hence, domestic energy resources must be expanded. For India it is not a question of choosing among alternate domestic energy resources but exploiting all available domestic energy resources to the maximum as long as they are competitive. Ensuring energy security requires dealing with various risks. The threat to energy security arises not just from supply risks and the uncertainty of availability of imported energy, but also from possible disruptions or shortfalls in domestic production. Supply risks from domestic sources, such as from a strike in CIL or the Railways, also need to be addressed. Even if there is no disruption of supply, there can be the market risk of a sudden increase in energy price. Even when the country has adequate energy resources, technical failures may disrupt the supply of energy to some people. Generators could fail, transmission lines may trip or oil pipelines may spring a leak. One needs to provide security against such technical risks. Risks can be reduced by lowering the requirement of energy by increasing efficiency in production and use; by substituting imported fuels with domestic fuels; by diversifying fuel choices (gas, ethanol, orimulsion tar sands etc.) and supply sources; and by expanding the domestic energy resource base. Risks can also be dealt with by increasing the ability to withstand supply shocks through creation of strategic reserves, the ability to import energy and face market risk by building hard currency reserves and by providing redundancy to address technical risks.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 2, February 2016

Following has been recommended:

Maintain a reserve, equivalent to 90 days of oil imports for strategic-cum-buffer stock purposes and/or buy options for emergency supplies from neighboring large storages such as those available in Singapore. Since 80 percent of global hydrocarbon reserves are controlled by national oil companies controlled by respective governments, oil diplomacy establishing bilateral economic, social and cultural ties can reduce supply risk.

Fact profile

With consumption of 530 kg of oil equivalent per person of primary energy in the year 2004 compared to 1240 kg of oil equivalent per person in China and the world average of 1770 kg of oil equivalent per person, India's per capita consumption of energy has been quite low, despite the fact that India is the sixth largest electricity market in terms of power generation. Per capita electricity consumption in India is only 615 Kwhr per year as compared to world average of 2516 Kwhr and 1585 Kwhr in China.

To deliver a sustained growth rate of 8% to 9% through next 25 years till 2031-32 and to meet the life line energy needs of all citizens, India needs, at the very least, to increase its primary energy supply by 3 to 4 times and its Electricity generation capacity by about 6 times.

Thus, if we take a conservative view, India's commercial energy supply would need to grow at the rate of 6% per annum while its total primary energy supply would need to grow at 5% annually. This is based on the assumption that elasticity of GDP in relation to supply of energy would be less than 1. However, this assumption may not be true entirely as, over a period of time, when economy grows, industrial sector is bound to increase at a faster pace and thus with the change in sectoral composition, demand of electricity would grow at much faster rate than projected above. Increase in the reach of the electricity has its own dynamism and would certainly act as catalyst towards more demand of electricity with growing consumerism in the country. Therefore, the correlation between electricity growth and GDP will tend toward 1:1. As noted economist Samuelson has said that **choices create its own preferences**. This is true in the context of Indian energy sector as well. We believe that availability of electricity creates demand for electricity.

To meet the growing demand, there is a difference of opinion among the experts about supply options and market structure. One school of thought advocates that a competitive market is the most efficient way to realize optimal fuel and technology choices for extraction, conversion, transportation, distribution, supply and end use of energy. This approach believes that an energy market being managed on competitive principles is bound to minimize market distortions and maximize efficiency gains. However, there is another school of thought which questions the wisdom of assuming automatic efficiency gains in utter disregard to the prevailing market conditions and absence of a matured market with sufficient number of players in the supply chain and highly skewed demand – supply mis-match. Nobel Laureate Amratya Sen forcefully argues, **"Market mania involves an under-examined faith in the efficiency and other virtues of the market, regardless of the context."**

The Committee set up by the Government of India has recently come out with the Integrated Energy Policy, which aims to bridge the prevailing gap in the demand and supply of energy in short, medium and long term perspective.

II. ENERGY POLICY OF INDIA

In recent years, India's energy consumption has been increasing at one of the fastest rates in the world due to population growth and economic development. During the 5-year period which ended on March 31, 2007, the CAGR of consumption of petroleum products was approximately 3.6%, compared to a CAGR for GDP of 7.6% for the same period. Despite the overall increase in energy demand, per capita energy consumption in India is still very low compared to other developing countries.

Today, India has one of the highest potentials for the effective use of renewable energy. India is the world's fifth largest producer of wind power after Denmark, Germany, Spain, and the USA. There is a significant potential in India for generation of power from renewable energy sources-, small hydro, biomass, and solar energy. The country has an estimated SHP (small-hydro power) potential of about 15000 MW.

The **energy policy of India** is characterized by tradeoffs between four major drivers:

- Rapidly growing economy, with a need for dependable and reliable supply of electricity, gas, and petroleum products;

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 2, February 2016

- Increasing household incomes, with a need for affordable and adequate supply of electricity, and clean cooking fuels;
- Limited domestic reserves of fossil fuels, and the need to import a vast fraction of the gas, crude oil, and petroleum product requirements, and recently the need to import coal as well; and
- Indoor, urban and regional environmental impacts, necessitating the need for the adoption of cleaner fuels and cleaner technologies.

These trade-offs are often difficult to achieve. For example, the supply of adequate, yet affordable electricity generated and used cleanly is a continuing challenge because expansion of supply, and adoption of cleaner technologies, especially renewable energy, often means that this electricity is too expensive for many Indians, particularly in rural areas. In recent years, these challenges have led to a major set of continuing reforms and restructuring.

III. USING ENERGY ABROAD

In case India can access cheap natural gas overseas under long-term (25-30 years) arrangements, it should consider setting up captive fertilizer and/or gas liquefaction facilities in such countries. This would essentially augment energy availability for India.

IV. CONCLUSION

Demonstrations of new technologies, their economic assessment and further R&D to make the new technology acceptable and attractive to customers could follow, before finally leading to commercialization and diffusion. Some key policy initiatives relevant to energy related R&D are detailed below:

1. A National Energy Fund (NEF) should be set-up to finance energy R&D. Much of R&D can be considered a public good. It is thus better financed by the Government. Initially an allocation of Rs.1000 crores should be made for energy R&D excluding atomic energy.
2. A number of technology missions should be mounted for developing near-commercial technologies and rolling out new technologies in a time bound manner. These include coal technologies (where India should focus) for efficiency improvement; in-situ gasification; IGCC and carbon sequestration; solar technologies covering solar-thermal and photovoltaic; bio-fuels such as bio-diesel and ethanol; bio-mass plantation and wood gasification, and community based bio-gas plants.
3. The NEF could provide R&D funding in support of applications, innovative new ideas, fundamental research etc. to researchers in different institutions, universities, organizations and even individuals working independently.
4. A number of academic institutions should be developed as centres of excellence in energy research.
5. India has drawn the attention of the world body to what it called "the glaring contrast" between the lack of access to energy in developing countries and the overconsumption in developed countries and urged the developed countries to act on the commitments made in the 1992 Rio Conference on Environment and Development.

REFERENCES

1. "State-wise Installations Statistics". Wind Power India. 2010-03-31. <http://www.windpowerindia.com/statstate.html>. Retrieved 2010-11-27.
2. Deepak Fertilizers signs JV with Norway major
3. India Energy 2009
4. "Kalam to attend Jatropa planters' convention". India eNews Pvt. Ltd.. <http://indiaenews.com/2006-06/10698-kalam-attend-jatropa-planters-convention.htm>. Retrieved 2006-07-08.
5. "Tapping the Wind - India". February 2005. <http://www.tve.org/ho/doc.cfm?aid=1678&lang=English>. Retrieved 2006-10-28.
6. Watts, Himangshu (November 11 2003). "Clean Energy Brings Windfall to Indian Village". Reuters News Service. <http://www.planetark.com/dailynewsstory.cfm/newsid/22758/story.htm>. Retrieved 2006-10-28.
7. "Wind power boosts Southern Indian economy". Aljazeera.net. November 2 2003. <http://english.aljazeera.net/NR/exeres/554FAF3A-B267-427A-B9EC-54881BDE0A2E.htm?printguid=%7B24C5448E-20D7-4155-A93F-F60F0B813B75%7D>. Retrieved 2006-10-28.
8. "Energy Security India, Allianz Knowledge". 2008-05-27. http://knowledge.allianz.com/en/globalissue/safety_security/energy_security/energy_security_oil_electricity_gas_coal_india.html. Retrieved 2008-07-03.
9. Sustainable production of solar electricity with particular reference to the Indian economy (publication archived in ScienceDirect, shows numbers in detail, but needs subscription / access via university)
10. Renewing India - Under Heading: Solar Photovoltaics
11. Solar LEDs Brighten Rural India's Future
12. Solar plan for Indian computers