Managing Scarcity of Energy Resources– A study in the perspective of Global Crisis and Green Energy Management in India

Dr.Premasish Roy
Assistant Dean,
EMPI Business School,
New Delhi – 110074.
&
Mr.Ashtam Kumar Sau
Research Scholar,
School of Management Studies
Sangam University, Bhilwara.

Abstract: The perpetual advancement in civilization globally, has eventually led to the exponential increase in energy consumption. At present annual energy consumption of the world is almost equivalent to 138.8×10^{12} kWh. In India total annual energy consumption is 23.8×10^{12} kWh. The growth forecast is likely to continue at an annual average rate of 2.2% during 2004 – 30.

Though, technologically different non conventional and sustainable renewable sources are available yet on global basis commercial use is still restricted and the situation is also almost same in India. Along with this, there is all round demand in India as well as throughout the world to go for green energy which is neither technologically viable nor economically feasible with nonrenewable conventional fuel.

The present consumption rate forecasts that the stock of coal, oil and gas in the world is likely to continue for another 200, 40 and70 years respectively and in India for another 120, 30 and 60 years respectively. There is likely to be acute crisis of fossil fuel after this period.

It is the need of the time to have a careful study and analysis over the situation of changing power requirement and also scope and possibilities in spectrum of available conventional and non conventional renewable and nonrenewable fuel resources.

This situation requires an approach to manage this conflicting situation so that the future is not plunged into absolute and ever continued never ending energy scarcity and darkness.

Key words: *Sustainable sources, renewable energy, green energy, conventional sources of power.*

1.0 Introduction:

The total globe on the whole is on a trend of exponential rise over utilization of energy and to be very specific electrical energy. Also at the same time in almost all over the globe there is rush at equal rate towards the scarcity of conventional natural resources, mostly fossil fuel except few locations where there is availability of water based electricity called hydroelectricity in country like Rhodesia or in place like Holland where potentiality of wind power is in abundance or few more alike where the resources are sustainable.

Hence it requires a compromise in between these two extremes to avoid the extreme consequence of disaster jeopardizing even the basic privilege of living in these days. It requires proper energy management to come over the disastrous situation.

India is victim of this poor energy situation since only 36% of total installed capacity of Electrical power generation is available from source other than fossil fuel presently. It needs to find out how best this may be managed to migrate dependency of energy requirement from sources of fossil fuel which is expected to last for another 125 years only with its present rate of consumption to some other sources which are sustainable in nature.

2.0 Coping with Growing Energy Requirement:

2.1 Concept and Criticality of ConventionalRequirement and nonconventional Energy Resources: Conventional energy resource is the resource that is conventionally or traditionally used for generation of energy – electrical energy in the present context of discussion. At present the annual primary energy consumption of the world is 138.8×10^{12} kwh or average power of 1.5×10^{7} MW. Fossil fuel roughly provides about 90% of this energy. Approximately 25% of this energy is consumed in transportation sector and remaining 75% by industries, domestic, agriculture, and social consumers.

2.2: Conventional Resources:

i) Fossil Fuels – Fossil fuels have been a major source of energy since 1850, the start of industrial era. As an estimate, if the world continues to consume fossil fuels at year 2006 rates, the reserve of coal, oil and gas will last 200,40 and 70 years respectively.

ii) Hydro Resources – Among all renewable, hydro power is the most advanced and flexible source of power. It is a well developed and established source of electric power. The global installed generating capacity of hydro power is about 7,78, 038 MW which accounts for about 20% of total world's installed electric power generating capacity.

iii) Nuclear Resources – U^{235} and U^{233} (isotopes of uranium) and Pu^{239} (plutonium) are used as nuclear fuels in nuclear reactors. Nuclear power is a low cost, low emission technology. As up to end of last decade in around 440 nuclear power plants in world 3, 71,980 MW electricity is generated.

Nuclear fusion reaction has a lot more potential and vast resources are available. It is predicted that by year 2500 some breakthrough will take place in fusion technology and nuclear fusion will be main source of energy in world.

2.3: Scenario of scarcity of fossil fuel resources because of depletion of mineral resources

Fossil fuel reserves of few countries are shown in table as below:

Country	Fossil fuel reserve (in thousand million tonnes oil equivalent)			
	Oil	Coal	Gas	Total
North America	8	170	7	185
South America	15	13	6	34
Europe	2	40	5	47
Russia	18	152	52	222
Middle East	101	0	66	167
India	1	62	1	64
China	2	60	10	72

Though at present consumption rate (calculated in 2006), the above stock of coal, oil and gas in world is like to continue for another 200, 40 and70 years and in India for another 120, 30 and 60 years, there is like to be acute crisis of fossil fuel after this

2.4: Consequence of scarcity of fossil fuel resources because of depletion

Though at present consumption rate (calculated in 2006), the above stock of coal, oil and gas in world is like to continue for another 200, 40 and70 years and in India for another 120, 30 and 60 years, there is like to be acute crisis of fossil fuel after this period.

3.0: Managing the electrical energy disaster: It needs to find out the suitable process of power generation which should not follow a common process along the whole country. In each region actual process to be followed should be in accordance with resources available and other associated facilities in that region. India has got abundance over the necessary resources; these are to be, as mentioned above, used with optimum utility value. However, power generation from alternative sources has got its own expenditure which is not always economically feasible and long technical and research work is necessary to make the expenditure of power generation economically acceptable and competitive. Infact higher per capita energy consumption means a higher per capita domestic Gross Domestic Product (GDP).

3.1 Objective of Study: i) To identify alternative measures so that dependence upon conventional power generation system may be significantly reduced without going for much change in the existing system

ii) To minimize expenditure or outlay of business capital to undergo these changed state of situation in power generation scenario.

4.0: Conservation of Electrical Energy: It is very common that coping up with the increased energy demand is to expand energy production. The problem can also be solved to a great extent by conservation (saving) of energy. Increasing the energy production is an expensive and long term option, whereas energy conservation offers a cost effective and immediate solution. As the present conventional energy assets are fast depleting and cost of energy is increasing, it is very important to conserve energy and utilize it more effectively. This also helps in reducing the environment pollution. Thus, there are three major incentives in energy conservation: (i)decreasing energy requirement, (ii) conserving the limited conventional assets of energy, and (iii) saving the environment. Experts have indicated a saving potential ranging from 10-25% in the total spectrum Indian industries without any major investment. Developed countries have been able to reduce their consumption of energy through self-discipline and strict energy conservation measures. Japanese primary energy conservation per unit GDP is the lowest in the world, owing to various energy conservation measures taken for respective sectors. Energy consumption level in the industrial sector of Japan is still at 1973 levels. In, Denmark, energy consumption has increased by only 2% since 1980, while GDP growth is 56% in the same period.

Energy conservation means reduction in energy consumption but without making any sacrifice in quality or quantity of production. In other words, it means increasing the production from a given amount of energy input by reducing losses/ wastages and maximizing the efficiency.

5.0: Compromising with Alternatives: There are several alternatives left with the approach of combating and confronting the critical situation developed because of scarcity of availability of conventional fuel and thereby conventional power generation because fast depletion of nonrenewable conventional resources. All

over the world there is effort and also consciousness towards the exploration of prospects of alternative power developed by the use of nonconventional resources. But as mentioned, nonconventional power generation is cost involving. Instead, the process of conservation of power with severe effort to minimize wastage and misuse of electricity and also consumption of electrical energy more efficiently will result to higher GDP out of each unit of electrical power. There needs higher consciousness over this concept and means of alternative to come over the crisis in scenario of scarcity of conventional power out of non renewable conventional fuel. There must not be any compromise with any other alternative; there must be strict adherence with the alternative of conservation of electrical energy.

6.0:Energy Audit: Energy audit is an official, technical survey of energy consumption of an organization /process/plant/equipment aimed at reduction of energy consumption without affecting productivity and to suggest methods for energy consumption and reduction in energy acquiring cost. The suggestions/recommendations are known as ECOs (Energy Conservation Opportunities) and their implementations are known as ECMs (Energy Conservation Measures). The recommendations are presented in three categories.

i) CategoryA: Minor ECOs

Minor ECOs are simple, easy to implement and require less investment and implementation time. These are related to stopping 0f leakage points, avoiding careless waste, housekeeping, lapses an carelessness of operation and maintenance personnel.

ii) Category B: Medium ECOs

Medium ECOs or intermediate ECOs are slightly complex requiring additional investmentand moderate implementation time.

iii) Category C: Major ECOs

Major ECOs provide significant energy conservation opportunities. These are high technology involved, complex and require heavy investment and long time implementation period.

7.0: Energy Management: Energy management Involves planning, directing, and controlling the demand and supply of ener4gy to maximize productivity and comforts, and minimize the energy cost and pollution with conscious, judicious and effective use of energy. Energy audit and ECMs are essential functions of energy management plan which also deals with energy monitoring and implementing ECMs.

In most cases demand and supply are of energy are managed independent of each other. These are known as two sides of energy management, i.e. demand side management (DSM) and supply side management (SSM).

8.0: Economy and Finance: Some investment is made in order to implement energy conservation measures; however, this investment is very small in comparison to that in generating the equivalent amount of energy that is saved through conservation. As per a popular energy conservation concept ‘Energy saved is energy generated’. In fact energy saved is more than energy generated because the energy is saved at user’s end which includes saving of transmission / transportation losses also, apart from usable energy. Thus, the cost of DSM is much less (only a fraction) as compared to that of SSM.

9.0: Energy Strategy: Energy strategy refers to selection of a particular course to be followed from available alternatives under prevailing constraints. Such a strategy gives guidelines to policy makers and planners.

India’s energy strategy is to explore more oil reserves, consume coal as far as possible, and encourage and explore more the potential for renewable energy sources irrespective of capacity. India is predominantly an

agricultural country and the strategy is to make the rural sector self-reliant in energy through locally available renewable energy resources.

Energy policy: Energy policy refers to an officially declared guideline for the purpose of planning and actions. In 1991, Government of India declared reforms such as LPG – I) Liberalization, II) Privatization and iii) Globalization as its energy policy. Since then Government has been much liberal in its policy of power generation, transmission and distribution. Also the participation of private sectors in the areas of power generation, transmission and distribution has been much wider. Also the penetration of global system, global standards as well as global participation in areas related with power system in India is widely observed.

Energy Planning: Energy planning refers to detailed formulation of various actions a given time frame to achieve the objectives. The strategy and policy are the guidelines for planning. Planning is an essential management tool. Planning of several activities includes forecast, budget, infrastructure, material, equipment, technology, financial resource, human resource and Research and Development (R&D) planning.

Conclusion: The best means of going green with energy and also cutting down of use of conventional energy with use of nonrenewable fuel which is, in India, largely fast depleting mineral resources is to avoid at most as possible wastage of energy during its use. In this work it has been worked to observe how best this may be done and what are the achievements towards the objective of the study.

References:

1. Abbasi, S.A. and N. Abbasi (2001), *renewable energy System and Their Environment Impact,* Prentice Hall of India

2. Desai, A.V. (1990), *Non Conventional Energy,* New Age International Publication

3.Furlan, G. and N.A.Mancini ((1983), *A View of Non-Conventional Energy Sources* World scientific Publishing Co. Pvt. Ltd, Singapore.

4. Gupta, B.R. (1998), *Generation of Electrical energy,* Eurasia Publishing house

5. Rao S. and B.B. Parulekar (1999), *Energy Technology: Non-Conventional, Renewable and Conventional,* Khanna Publication

6. Twidell John W. and Anthony D. Weir, (2006), *Renewable Energy Resources,* Taylor and Francis