

Different Facets of Energy Security

Energy security is next to defense and food. In fact both of them are dependent on energy availability, since in absence, everything will be in jeopardy. Issue of energy security is now a matter of serious concern as prime Minister is heading a coordination committee on energy would suffice.

- **C.R. Bhattacharjee**

Energy security is of course related to escalating price of oil moving towards \$100 / barrel, depleting reverse of fossil fuel and new discoveries falling short of rate of rise in demand for oil and gas. The single factor i.e. virtual poor deposit of oil and gas as prerequisite for transport purposes threatens the country in this respect. In the planning for energy in the next 25 years, it may be worthwhile to discuss some of the pertinent points.

Coal

Coal contributes highest degree of confidence on energy security. 200 billion tons of exploitable deposit, even though qualitatively not of high grade, is an assurance of enough resource for producing power. World uses coal as feedback for 40% power generation where as ours is 65-70% and almost same as that of china. Coal based power plants to constitute 50% of 400 000 MW by 2020 of total installed capacity has distinct possibility against about 75000 MW at present. But lost of home works will be necessary in the context of prevailing low technology and poor productivity in coal sector.

Administration of coal industry through the ministry is in very bad shape. Revolutionary reform to invite FDI, private investment and technological up-gradation cannot be delayed any further. Simultaneously, introduction of clean coal technology, extraction of coal-bed methane, coal gasification, liquefaction of coal, etc deserves a great push. Licensing for captive mining will improve the situation, but this should not be considered as panacea to resolve intricate problems in this field.

Hydropower

Hydropower occupies the next slot in the energy security. Hydroelectric potential identified so far is 85000MW at 50% load factor, which is likely to be revised upwards to 150000MW. Installed capacity presently is yet to touch 30000 MW. However, there is perspective plan to add 50000MW. Hydropower other than providing energy security, subject careful attitude to ecology, will deliver clean energy as anti-global-warming measure.

Hydropower has long gestation period as such harnessing full potential may demand a time frame of 25 years. Linking hydropower with flood moderation and irrigation will no doubt ensure additional benefits, but experiences of the last 50 years about inordinate delays in implementation of schemes must not escape notice in final decision making.

Renewable Energy

Renewable Energy has reached adulthood and now commercially viable, except of course, solar power which may take another decade to be fully competitive with conventional power. Potential of renewable energy resources is estimates as 85000MW. Capital cost is close or lower to conventional power. Great advantage lies in short gestation period. For a country like India with dispersed population in villages, sometimes far apart, renewable energy based on local resources offers best option to meet the demand for power.

In next 20 years, full potential should be harnessed to constitute by that time which might be difficult since share of wind power is 50% that are fast moving and maintain a competitive character with conventional power. Solar power potential is 20MW /Sq. Km. With 1% land earmarked for solar energy, including roof tops in towns and metros, capacity addition will be more than 600000 MW and could solve whole gamut of problems of power. But that needs lot of R&D to develop indigenous technology. President of India has high hopes and he desires thrust be given to developing renewable energy as solution to power shortage and for clean form of energy. Renewable resources, like wind, biomass, biogas, small hydro, hydrogen energy, solar power and geothermal are significantly attracting attention of developed countries burdened with high degree of pollution for more and more installations and India can not lag behind in this race.

Atomic power

Nuclear Power Corporation has ambitious plan to install 20000 MW by 2020 from existing capacity of 3300 MW. Atomic energy, as our scientist bears confidence, with deposit of thorium plus indigenous availability of uranium could be a great contributing factor in the search for energy security. In fact country should strive towards targets as high as it is in France of about 50000 MW. There are constraints about technological barriers, high capital cost and long gestation period that have to be overcome for early benefits and cheaper power.

Oil & gas

With 16% of the area the country has less than 1% reserve of oil and gas. Thus dependence on import is inevitable. Import is subjected to both rises in price and gradual depletion of reserve. As counter measure, the country has to find new discoveries as much as possible here and also adopt alternative recourses to switch over to other energy resources as replacement and follow strictly the principle of conservation to reduce import in a phased manner.

To be stakeholders in foreign oil and gas fields and long –term contracts for import should be efforts of successful commercial and diplomatic ventures. Gas now generates power to the extent of nearly 9% against about 16% world over of the total production and a good replacement to coal and liquid fuel for lower pollution. It would be a good endeavour in case percentage share in power generation through gas could be increased. In the chain of attaining self-reliance in energy availability, oil and gas are the weakest links and no doubt issues are complex here.

Hydrogen

Hydrogen fuel can replace oil and gas and could be ideal renewable energy for both stationary and mobile power. Commercialization of hydrogen generation and fuel cell power are fast progressing in Japan, USA and EU. For energy security especially to replace oil and gas these will be important tools. Hydrogen and fuel cell deliver benign power and considered as next generation resource to replace fossil fuel giving rise to green house gases. Looking to the far-reaching effect, it is necessary country lays proper stress especially on research and laboratory scale applications for advancing in the same place as that of other developed nations.

Biodiesel and Ethanol

To replace oil and gas or to reduce consumption and substantially improve upon discharges through exhaust for less pollution, biodiesel extracted from plants that can grown in at least 25% of 3.0 million ha of wasteland could be another valuable resource as oil replacement at cheaper cost. This has large scope for employment generation also. It is the same case with ethanol obtained as by product in sugar mills.

Transportation

While in the power generation there are scope to be self reliant in energy, in the transport sector, Import of oil and gas appears to be unavoidable, but with 100% railway electrification, mass transport system on electric vehicles, switching over to electric / hybrid system for drive of cars can no doubt minimise import burden. Technological change to find ways and means is inevitable necessity as prelude to accept hydrogen and fuel cell at a later date in transport industry.

Conclusion

To attain energy security for a country like India where per capita consumption is about one-third of world average of nearly 1200 KgOE with demand highly unsaturated and subject to continuously rising at higher than world average, it is a difficult task, but has to be achieved based on long term perspective and different energy mix. Renewable resources including hydrogen and fuel cell, hydropower, atomic energy and above all indigenous coal are going to be the main prop. Conservation of energy is as important as search for alternative to oil and gas while shortages are knocking at the door.

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Reference Book:

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