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Energy Security
An Indian Perspective: The Way Forward

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Abstract:

Energy security has become a popular catch phrase, both in scientific arena as well as in the political discussion. Yet, in general the applied concepts of energy security are rather vague. This paper sheds some light on concepts of energy security in an Indian perspective. First, we conceptually discuss the issue of energy security. Then by providing brief survey of existing attempts to define & thus measure energy security. We have then suggested the way forward for strengthening the energy security, by analyzing the various concerns. Our conclusion suggests that it is worthwhile to take into consideration the market structure along with the political stability.

Introduction:

Growth demands energy. It is no wonder that India – with an economy expecting a GDP of more than 9% for next decade has developed a ravenous appetite for energy. The relationship between energy consumption & growth of a nation is well documented. In fact, it is the steady economic rise of India that in substantial measure has placed the issue of energy security on the forefront. Though, the concept of =security f energy supply‘ or in short form =energy security‘ seems to be rather blurred. A closer look at the current scenarios reveals that the concept of energy security is frequently used to justify various policies or action at the same time – even if these policies seem contradictory.

Strategies promoting alternatives in energy security production are supported by a group of agents which is in itself fairly heterogeneous. Some agents regard the threat of energy insecurity, as a reason to build coal-fired power plants in countries which have domestic coal reserves while others suggest building nuclear power stations. At the same time, aspects of energy security serve as a rationale for promoting various sources of renewable energy. While such proposals aim at reducing dependence on foreign energy sources, others suggest expanding and diversifying import channels.

Energy security has been traditionally been associated with the securing of access to oil supplies and with impending fossil fuel depletion. Specifically, the oil crisis in the 80‘s made the dependence of oil exporting countries in the Middle East evident. With an increase in Natural Gas use, security concerns also arose for natural gas widening the concept to cover other fuels.

The fact that the energy security is strongly related to other policy issues which concern the energy system ; such as affordable energy and climate change and environmental policy ; implies that it is important to consider the energy security consequences of different pathways.

In this paper, we aim to provide the way forward for strengthening the energy security by analyzing the various concerns for India. From the available literature, it is obvious that distinct perspectives on the meaning of the concept exist. That‘s why it is important to define energy security before discussing the various concerns with an Indian perspective. Therefore we have first tried to frame the concept then discuss the global scenarios. This allows us for a schematic ordering of constraints in Indian perspective. Thus the way forward is provided with regard to their emphasis.

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An Insight Into Energy Security

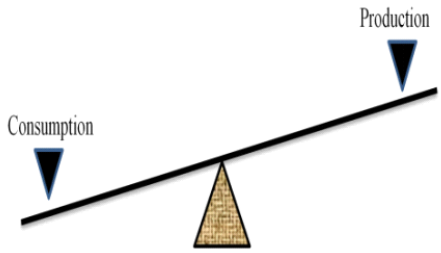

Fig: Visualization for Energy Security

The interest in energy security is based on the notion that an uninterrupted supply of energy is critical for the functioning of an economy. 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. It has traditionally been associated with the securing of access to oil supplies and with impending fossil fuel depletion.

Defining Energy Security

The concept and definitions of energy security have widened over time, Most studies, however, address policies combating energy insecurity and mitigating externalities of energy supply disruptions without explicitly explaining the concept of energy (in-) security and how to measure the level of insecurity however, an exact definition of energy security is hard to give as it has different meanings to different people at different moments in time. Since the idea of energy security is not precisely defined, it seems even more challenging, if not premature, to attempt to define it. Indeed, the deputy chairman of the planning commission has said that "it was never clear in anybody's mind what energy security is". Let us take a look at different references to prices in defining energy security.

- A 1999 UNDP report defined Energy Security as the continuous availability of energy in varied forms in sufficient quantities at reasonable prices.

- From *Wall Street Journal* in which Daniel Yergin defined energy security as "the security and integrity of the whole supply chain and infrastructure, from production to the consumer."

- Dr A.P.J Abdul Kalam as Indian president defines it as "ensuring that our country can supply lifeline energy to all its citizens, at affordable costs at all times." He sees energy security as based on a few principles: conservation; secure access to all sources of energy globally (even though he believes "the end of thea fossil fuel era is fast approaching"); and access to "reliable, affordable, and environmentally sustainable energy." But he views energy security as merely a transitory step toward what he believes should really be India's first and highest priority "energy independence" which he thinks should be achievable by 2030.

- For India, the Parikh Committee report stated that a country is energy secure when it can supply energy to all its citizens and meet their demand for safe and convenient energy at affordable costs at all times with a prescribed confidence level considering shocks and disruptions that can be expected.

- The Planning Commission of India has probably come closest to providing a comprehensive and official Indian definition of energy security to date: "The country is energy secure when we can supply lifeline energy to all our citizens as well as meet their effective demand for safe and convenient energy to satisfy various needs at affordable costs at all times with a prescribed confidence level considering shocks and disruptions that can be reasonably expected."

While talk of "energy security" has increased, clarity about its meaning has not necessarily improved and includes a wide range of interpretations.

- Security of supply of oil and natural gas; secure lines of interdependence.

- Oil security—some in this camp further believe energy security is more than merely protecting against temporary disruptions; it should take into account price volatility, which poses a risk to India's economic security.

- Independence from imports, or "oil self-sufficiency," though most experts dismiss this idea as one promoted by people who either have not assessed India's situation realistically or have little grasp of technical facts.

- Going beyond the country's overall requirements as a whole and looking at the requirements of individuals.

Indicators For Energy Security

Over the recent years there have been quite some attempts to devise indicators for energy security. Whereas some deal with one aspect of energy security, others attempt to capture several relevant elements in a single aggregated indicator. In this paper, we do not attempt to quantify the externality but to provide ordinal measures for different aspects of what is typically referred to as energy security.

We therefore start with an overview of indicators of energy security that can be found in the literature to date.

Resource Estimates

The actual existence or availability of energy sources is crucial for Energy Security and hence the available (remaining) resources can be used as a direct indicator for Energy Security. Unfortunately, large uncertainties surround the amounts of hydrocarbon resources and their extraction potentials. There are a few studies that provide estimates of fossil resources. The best known one is that of the United States Geological Survey (USGS) (USGS, 2000). Although called "one of the most independent and reliable sources of data"), 'pessimists' or proponents of the peak oil theory argue that the USGS estimates are overly optimistic. Thus there is no consensus on the available resources.

Reserves To Production Ratios

The reserves to production ratios (also called R/P ratios or RPRs) are often used as indicator of Energy Security. These indicators indicate the years of production left at current production levels. As neither reserves nor production rates are fixed, a combination of these factors will also be a dynamic quantity. In practice, constant factors are usually used for both. While expressing the available reserves in terms of current production is relatively easy to interpret (communicative), the indicator maybe somewhat too simplistic in case of rapidly changing demand and/or highly uncertain reserve estimates. However, if one uses projected production levels instead of current ones (yielding so-called dynamic RPRs), the indicator becomes less transparent.

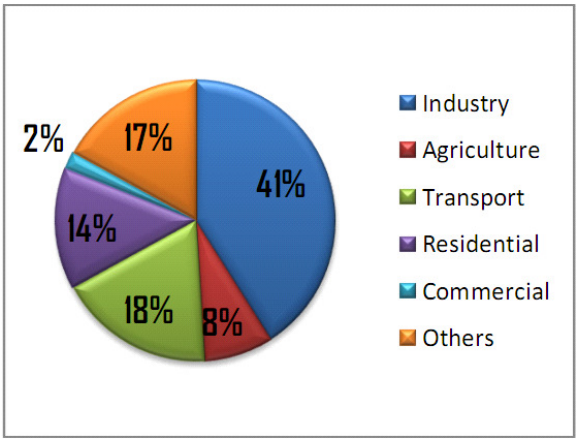

Fig: Sector-wise commercial usage of Energy in India. (Source: TERI Analyis)

Import Dependence

Measures of import dependence are amongst the most commonly used indicators for Energy Security. Various disaggregations with regard to fuels and regions are possible, expressed in either physical or monetary terms. An example of such an indicator is the import of oil, often expressed relative to oil consumption For Energy Security purposes; it would appear most practical to look at net imports. In the case of a country or region acting as a transport hub, or simply in the context of freely traded commodities, subtracting the exported energy (or oil/gas/electricity) provides a more realistic view of actual

dependencies. Import shares provide a straightforward and insightful indicator that does not require specific expertise to comprehend. The indicator is often used. If global energy markets are assumed to function optimally, it can be argued that import dependence is less relevant to Energy Security. In a more regionalized world, where trade barriers and a paradigm of competition rather than cooperation prevails, import shares form a useful indicator as the access to energy sources is an important element of Energy Security.

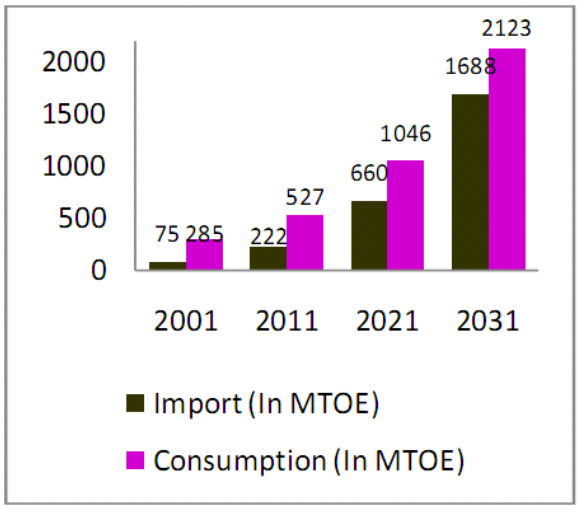

Fig: India's Likely Energy Dependency. (Source: TERI Analyis)

Political stability

In the public discussion the more alarming statements on energy insecurity seem to come from the political arena rather than from economists. A prominent example is the fact that the import of expensive energy implies a wealth transfer to certain states which might be inconsistent with the importer's policy priorities. A situation in which one country could pose an economic threat to another country, namely, by deliberately inflicting economic harm, the economic dimension is thus of key importance to the problem of energy security. On the other hand, economics alone cannot deal with the problem comprehensively, since at least standard economics does not consider politically motivated changes of preferences or deviations from the principle of rationality, such as accepting own harm if this generates more harm to someone else.

The Energy Price

In a well functioning market, price functions as a balancing mechanism for demand and supply. Prices thus give an indication of the supply in relation to demand, while they are also considered as a measure of economic impacts. Finally, they also reflect scarcity and thus depletion of energy resources .The oil price plays a special role. Being a dominant energy carrier in most parts of the world, the oil price is seen as a crucial Energy Security indicator. A difficulty in using oil prices, however ,is that these prices are influenced also by other factors(speculation, strategic communication, short-term shortages).For use in scenarios, it should be noted that historically it has proven to be extremely difficult to model oil prices accurately. The use of oil prices as Energy Security indicator is mainly useful relative to other scenario.

Market liquidity

Market liquidity relates to the capacity of markets to cope with fluctuations in supply and demand and is therefore relevant to a discussion of Energy Security. The IEA included a market liquidity measure in their information paper on Energy Security (defined as the exponential function of the ratio of a country's consumption over the total of that fuel available on the market. The concept of market liquidity is also linked to price elasticity. For stock markets, it has been suggested to use a coefficient of elasticity of trading (CET) as an indicator of market liquidity defined as the relative change in trading volume over the relative change in price. Values below unity indicate an inelastic market, while values above unity indicate elastic markets.

Energy Security Disruptions:

In a world characterized by both rapid change and uncertainty. India has to make the best use of available resources and opportunities to promote the well-being of its people. India's interests demand a stable, quiet environment in which it can concentrate on economic and social modernization and technological development. A country's desire for peace and rapid development, however, cannot by itself be a guarantee of its security and prosperity. India is a growing giant facing the critical challenge of meeting a rapidly increasing demand for energy. India ranks sixth in the world in terms of energy

demand. Its economy is projected to grow 7%-8% over the next two decades, and in its wake will be a substantial increase in demand for oil to fuel land, sea, and air transportation. Rapid urbanization, industrialization, rising incomes, and the growing use of energy intensive products are driving India's demand for energy. Concern about India's energy requirements is not new—at least in India. The degree of concern, however, has increased recently, as has the fact that this sentiment is now echoed abroad—albeit for different reasons. This concern has resulted in not so much a debate as a cacophony over optimal Indian energy and oil policy. By 2030 India is expected to overtake Japan and Russia to become the third largest global consumer of energy. However, if consumption follows the current pattern and trajectory, the country is projected to run out of coal, its primary source of energy, in forty years. Furthermore, its domestic reserves of oil and gas are limited.

The situation is complicated by a number of factors:

India's energy mix :

While India has significant reserves of coal, it is relatively poor in oil and gas resources. Its oil reserves amount to 5.9 billion barrels, (0.5% of global reserves) with total proven, probable, and possible reserves of close to 11 billion barrels. The majority of India's oil reserves are located in fields offshore Bombay and onshore in Assam. Due to stagnating domestic crude production, India imports approximately 70% of its oil, much of it from the Middle East. Its dependence is growing rapidly.

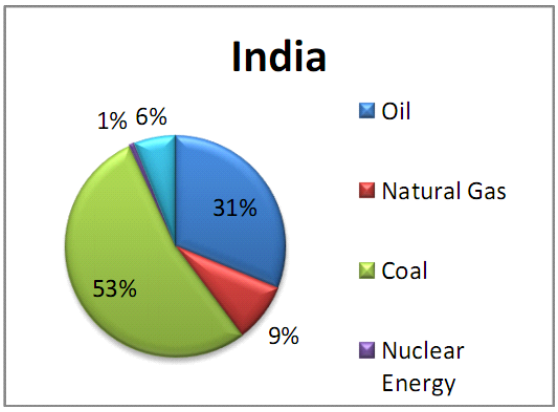

Fig: Energy Mix (BP Statistical Review 2009)

Dismal domestic Exploration and Production :

Due to the late advances in technology with respect to other developed and developing nations such as U.S.A, China, Japan etc. the exploration and production capabilities of India have been limited .On the other hand due development and constant increase in population, demand of energy has been increasing ever since .This led to the increase in import of fossil fuels as the proven reserves in India still do not stand near the demand of the country. The production capability of the country has been increased by the commencement of Reliance.

Political Instability:

India's politicians—no less than their American counterparts—are sensitive to the prospect of being punished at the polls for high energy prices. Thus "affordability" is not simply an altruistic goal. There is always a great deal of and wringing before any energy price hike is approved by a sitting government, even if it is clearly required. India's national political parties also operate at the state level. Conversely, its regional parties have increasingly been playing a role at the national level. All this translates to elections frequently on the horizon, and consequently, a strong need to appeal to the electorate. In addition, coalition governments, which have become the norm in India, compel the sitting prime minister to contend with a number of views on energy policy. Electoral majorities in India have become thinner over time and governments are afraid to act in any way that might lead to a popular (or indeed party) backlash or the defection of a coalition partner. Because of political calculations, Indian governments have tended not to pass on the rising prices of energy (especially oil), to the consumer—particularly at election time. Price increases, when implemented, are small and timed extremely carefully. The esult is that public sector energy firms (and eventually the government, which bails them out) absorb the losses, adding to India's persisting deficits.

The Way Forward:

As we have already discussed the various indicators as well as the concerns for the Energy Security for India, the various recommendations and suggestions which might if not provide energy independency to India but would certainly help to improve the present situation, are:

1. An Overall Vision and Integrated Approach

India has a long tradition of state-dominated planning, wherein the state assumed responsibility for the livelihood of its citizens. Elements of the Indian nationalist movement, notably the Indian National Congress, were strongly influenced by socialist notions of centralized planning, often in five-year increments, and India continues to have five-year plans. When it comes to the subject of energy, however, there has been criticism that this mode of planning, and especially its implementation, has not produced the best results. A number of observers do not criticize the idea of planning per se, rather they object to its having been "directionless," "fractious," and "ineffective" with implementation being "dismal." There is a need for a clear vision and an overall Indian energy strategy.

2. Altering The Energy Mix

The various recommendations with regard to India's energy mix:

- The solution lies in hydrocarbons. India should encourage private investment at home, acquire overseas assets, conduct oil diplomacy, and participate in projects like transnational pipelines to gain access.
- Natural gas should be the preferred choice.
- India should reduce its dependence on oil by turning to coal, since its coal reserves are abundant.
- There should be a differentiated sourcing plan.
- India needs to decrease its dependence on fossil fuels in general and emphasize nuclear, hydro, or solar energy over the longer term.

3. Self-Sufficiency

Self-sufficiency is a key theme in Indian political discourse. It flows from the desire of Indian nationalists to break away from the shackles of empire; the mind-set and the term continue to have resonance even today. The former Indian president believes that energy independence with "total freedom from oil, gas, or coal imports" is possible, although he acknowledges that it will take a lot of hard work to achieve. Some India policymakers still consider it an option affects and skews the debate. Most experts and decision makers think energy self-sufficiency is impossible to achieve barring a major breakthrough in exploiting solar or nuclear energy (and even this, they argue, could require foreign participation for maximum effect). This type of attitude has to be changed.

4. Diversifying Sources of Supply

A number of decision makers continue to see solutions abroad. While some experts have called for limiting dependence on oil imports, others recommend diversifying the sources of India's oil and gas. At the first meeting of the Energy Coordination Committee, the Indian prime minister, for example, emphasized the need to diversify energy supplies in order "to insulate the economy from any future shock."

5. Actions on the International Level

A few experts have called for the government to take more initiative abroad by competing and cooperating more intensely in the international arena, and through "enlightened diplomacy and negotiations." Other analysts call for more coordination, stating that in a globalized, interdependent world, no country can form an energy policy independently without considering the concerns and actions of others.

6. Conservation and Efficiency

There have been a number of suggestions on conserving energy and using it more efficiently. Among other things, this would include better technology, improved equipment maintenance, and increased availability and use of mass transit. In addition to recommending that the government provide better incentives and resources for efficiency measures and related research and development, experts have also suggested that India alter its economy to shift to low-energy intensity sectors.

7. Restructuring, Rationalization, and Reform

Some related suggestions:

- The energy sector should be restructured and liberalized.
- The tax and pricing systems should be reformed, for example, by using relative rather than independent pricing of different kinds of fuels.
- Greater investment—especially through increased private participation—is an often proposed solution. Experts emphasize that increased energy sector growth will require investment not only in exploration and production facilities, but also in distribution infrastructure: ports, railways, pipelines, and power transmission grids.
- There have also been calls for privatization—of everything from public sector undertakings to ports to pipelines—to bring in capital, technology, and skills.

Concluding Observations:

The main message of this paper is that energy security must become an integral part of the Planning Commission policy in respect of external trade, foreign relations and security, as these are crucial to achieve security of energy supply. It has been argued that, as a consequence of the geopolitical constraints/developments in the coming decades, the probability of events affecting the security of energy supply, the exposure of India and the vulnerability of society to energy supply disruptions are likely to increase. In this context, we have shown how the effectiveness of the policy instruments and approaches not only depends on the investment climate, on indigenous energy supply, on transportation and import facilities and on access to foreign oil and gas supplies, but also on the geopolitical setting in which these policies must perform. Yet, under the mounting pressures of a less multilateral oriented geopolitical system, India may find out that the time to realize a necessary reorientation does not fit the traditional process of Community consultations. Notably, the absence of agreement on a common direction in political-strategic issues could jeopardize the formulation of an Indian security of energy supply policy and fuel the preference for adverse national approaches. Given the dynamics of international political and economic relations, a static singular approach to energy security may not suffice.

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