Who Ever Said Energy is Redundant?

The annual 2-3 per cent economic growth of Germany can be easily sustained by a 0- 0.5 per cent increase in energy demand. On the other hand, India targeting an economic growth of 7-9 per cent per year may only achieve this through an increase of 8-10 per cent of annual fossil fuel energy consumption. Why would India require so much energy to sustain its economic growth?

In recent discussions about the energy supply situation, and this includes electrical power in India, a consultant from India remarked: “The only problem we have here in India, is there are no dumb people. There are too many smart people. They all make intelligent decision based on circumstances. If decision makers and those who have the power don’t provide the right environment, people don’t make the right decisions.”

The Indo-German Energy Efficiency and Environment Project (IGEEP), in cooperation with the Energy Management Centre (EMC), Ministry of Power (MoP), has been providing its share of thoughts and services to industry concerning this issue. Since 1995, the programme has been assisting the industry in reducing energy costs at highly attractive returns.

The IGEEP, in the next six years, will support implementation of a part of the Energy Conservation Bill, which has been the subject of deliberation over the last few years, together with the creation of the Bureau of Energy Efficiency (BEE) under the Bill.

Not everybody is happy with the Bill. Some consider it an inappropriate government interference in the freedom to waste precious energy resources. Others call it a necessary regulatory framework to achieve sustainable economic growth. Any Act, such as the Energy Conservation Bill, however, is a framework of intentions, thoughts, and opportunities that will require sensible implementation guidelines and careful steering in the right direction.

While one reason for high energy demand in India is the transition from a mostly rural and agricultural to an industrial and urban society, the other is the highly subsidized energy supplies. This has resulted in intelligent energy consumers and decision-makers opting to “use energy in obsolete technologies and appliances as inefficiently as possible and waste it.”

An outside observer would conclude that such wastefulness is the result of Negative Strategic Alliances (NSAs), which can only be neutralized by supporting Positive Strategic Alliances (PSAs). The Energy

Conservation Bill is part of this PSA, which would seek to detach economic growth from energy demand. This might not be the only solution but one among many.

The IGEEP, in its first five years of working with the Indian industry, has clearly rebutted the common textbook belief that "Whenever there is an economic and viable investment opportunity it is picked up by a smart investor."

Our experience has belied this. It has been noted that India is needlessly wasting Rs 5,000 crore annually in fuel oil, coal and gas bills because economic opportunities in energy conservation are either unacceptable or unrecognized as a financially viable investment opportunity.

The new Bill would try to initiate this viability through a mixture of government intervention and fiscal incentives. It carries a carrot and stick approach. However, a yellow painted stick is a pretty poor substitute for a juicy carrot. Some fiscal incentives and conscious public investments may be necessary to tap the large potential of economic opportunities in energy conservation.

Though the IGEEP has discussed the need for highly effective and yet low cost measures among experts, the position is still the same as in Alice in Wonderland:

"One day Alice came to a fork in the road and saw a Cheshire cat in a tree. "Which road do I take?' she asked. His response was a question: "Where do you want to go?" "I don't know," Alice answered. "Then," said the cat, "it doesn't matter."

Nevertheless, IGEEP will support the cause for the following reasons:

- There is a need to introduce widespread financially attractive electrical power conservation measures and to stabilise electricity tariffs for industry and commerce, to make them more competitive. The annual increase of 5-10 per cent in industrial tariff in India implies excellent and large investment opportunities to reduce electricity consumption. The IGEEP project will support all strategies that eventually lead to commercially viable energy service providers (ESCOs) assisting industry and commerce to reduce electrical power and fuel costs on a risk-sharing basis.
- High energy prices do not necessarily lead to an energy-efficient society. Rather, the attribute of an energy efficient society is complete transparency of the technical performance of energy consuming equipment and appliances, which is largely missing or not followed by manufacturers. Advisers and energy consumers are therefore reluctant to pay a premium for energy-efficient equipment. The IGEEP will support those parts of the Bill that will regulate the testing and labeling of energy intensive industrial equipment to introduce more transparency and better informed customers. This will lead to rational decision making.

Table 1: Returns Guaranteed from different Renewable Energy Sources

Renewable Sources	Plant size	DM/kWh	Rs/kWh
Hydropower and power from gas from municipal waste sites	Up to 500 kW	0.15	3.3
Gas from water treatment plants	500 kW to 5 MW	0.13	2.9
Biomass power plants	Up to 500 kW 500 kW to 5 MW 5 MW up to 20 MW	0.20 0.18 0.17	4.4 4.0 3.7
Wind power	Any size, the first 5 years After 5 years, depending on volume	0.178 0.121 to 0.278	3.9 2.7 3.9
Geothermal	Up to 20 MW Beyond 20 MW	0.175 0.14	3.9 3.1
Solar Photovoltaics	Up to 5 MW	0.99	21.8

- Investments in renewable energy will neither detach economic growth from energy consumption, nor provide relief to the power sector based on allocation efficiency of investments, since it lacks a system integrated approach. Most subsidies for investor give the wring signals to the end-user that renewable power is as inexpensive as conventional power and can be consumed in technologies and appliances designed and priced for inexpensive power.

  The IGEEP is therefore supporting only an integrated system approach of large and small grid-based renewable power plants with subsidies for the efficient use of power instead of subsidising incremental investment costs of such power. This approach spells the difference between a sustainable versus a non-sustainable subsidy policy.

In this context the German experience can be quoted. The German Renewable Energy Act provides a sustainable subsidy, paid by the State Electricity Utilities that is purely based on generation and delivery of power to the grid. Table 1 shows the ensured reimbursement that is guaranteed over the technical life of the plant. Investors who just look for a tax haven, or fast depreciation for a renewable power plant, cannot come into the picture based on the Act. The guaranteed and reimbursable tariffs are above average tariffs from the power mix and are also much higher than spot market prices. The letter are between Rs 1.1/kWh and Rs 1.5/kWh for large volume buyers.

The tariffs will be lower by 1 per cent for biomass, 1.5 per cent for wind and 5.5 per cent for photovoltaics, annually, starting January 1, 2002.
The tariffs reflect the present life cycle cost for renewable power in Germany and provides commercial viability for the investors as well as marginal commercial risks due to long-term power supply contracts. This policy will most likely improve the present contribution of renewable power from 6-10 per cent of the entire power mix within 10 years. The German law is a classic example of an Act that does not reward investors for putting up power capacity that adds only to the power mix, with low or hort-lived electricity output. At the same time, it puts thhe burden of subsidy on the state power utilities.

In India, the scene is different. India has three major electric power consumer groups that are either not presented a monthly electricity bill (therefore pay noting to very little), or do not have an address or identity. Consumer group # 1 is the transmission and distribution system that consumes between 20 and 30 per cent of all electricity supplied to the public grid by power plants. Consumer group #2 is the agricultural sector which consumes an estimated 30 per cent. Consumer group #3, which also pays nothing, is the station use of all thermal power plants which consumes between 8 and 12 per cent.

In such a situation, SEBs should practise Demand Side Management (DSM) with these non-paying groups (consuming about 70 per cent of power) instead of trying DSM with the well-paying industrial and commercial customers leading to a further erosion of annual SEB revenues.

The IGEEP therefore supports all activities that lead to reduction of technical losses and a more efficient use of fossil fuels in power generation and distribution, as well as at the rural level. Table 2 compares an efficient and an inefficient utility.

It will be difficult for a society like India to sustain economic growth ad become energy efficient as long as an inefficient power supply causes serious economic damage to the end user. It will also be very difficult to convince energy users and, in particular, electrical power consumers, to conserve energy if supply and quality of power is erratic.

Sustainable economic growth of a nation depends not only on the efficient use of energy but also on the rarely mentioned energy modesty. Consumers in industrialized countries may be proud of their 400-litre state-of-the –art efficient refrigerator and their fuel efficient car with a 2.8 litre engine. However, energy efficiency without energy modesty, does not lead to sustainable development. Any less-efficient 180 litre Indian refrigerator, or fuel-inefficient small car, consumes at the end of the day, less energy than oversized efficient state-of-the-art technology. Energy efficiency by itself does not help.

It is the sum of “energy efficiency + energy modesty.”

Table 2: Performance of a Modern Efficient Thermal Power Generation and Distribution Utility compared with a Grossly Inefficient System

Performance	Highly Efficient	Grossly Inefficient
Station use	6 – 8%	6 – 12%
Frequency fluctuations	0.2 Hz	2 Hz
Voltage fluctuations	5 – 7%	10 – 40%
Statistical no-availability	0.1 hours per year	About 200-2,000 hours per year
Thermal efficiency	43%	37% (because of high ash coal)
Technical transmission and distribution losses	7–9% from 440 kV to 220 V	Estimated 30% from 440kV to 220 V
Commercial Losses	< 1%	> 20%
Financial standing	Profitable	Technical bankrupt

The path to a sustainable economic growth detached from growth in energy consumption is based on the $(BEE)^2$ principle:

First: Buy Energy Efficient (Equipment)
Second: Be Energy Efficient (in its operation)

Shakespeare's Hamlet mused "To BEE or not to BEE that is the question"
He did not say "To BEE or not to BEE is out of question".

If all this fails and India does not recovery by rational strategies from its long lingering electrical power problem, another less appealing law of Mother Nature, called Chaos Theory, will prevail. It says that any

system out of control should not be supported to stabilise it. Instead let it proceed into a chaos out of which a stable equilibrium emerges again. Others may call this predictable stable equilibrium, the dark ages, literally.

In less technical and more human terms, the frustration tolerance those who depend on energy for profit, or their livelihood and well being may be sooner or later exhausted.

Once a farmer, angered by the unreliable power situation and low voltage, demonstrated to the IGEEP project his frustration tolerance, He touched the electrical wire to the light build and remarked: “You know, even if power is available it is so bad you don’t even drop dead touching the wire.”

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Reference book:
The Bulletin on Energy Efficiency
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