"A stitch in time saves nine" – Marching towards "unconscious[1] competency"

INDIA was a global market even before its independence, opening up of our markets to foreign traders and this had ultimately paved way for East India Trading Company to rule our Nation. After learning a worst lesson from such liberalization, our country had wisely adopted a Socialist, Sovereign (self-governing) and Democratic strategy for governance and development. The Governments that were formed since then, irrespective of its leadership, took direct responsibilities for all developmental activities such as building infrastructure—roads, rail and communication, running industrial, educational, and health organizations—along with the primary responsibility of governing the legislative process.

The Public Sector units (PSUs), thus, dominated the Indian developmental strategies. At that time, no body really talked or thought about core competencies such as productivity and energy efficiency in an Industry. Thus, our industries became energy guzzlers; our industries had excessive manpower; and our industries failed to compete with their global counterparts in the long run.

The table below shows a comparative chart of energy consumption of various energy intensive industries in India with respect to some developed countries, in terms of million kilo calories (MkCal) of energy consumed for one ton of the final product.

MILLION kCAL/TON

COUNTRY	STEEL	CEMENT	PULP & PAPER	FERTILISERS
INDIA	9.50	2.00	11.10	11.25
USA	6.06	0.95	9.70	11.32
UK	6.07	1.30	7.62	12.23
GERMANY	5.21	0.82	-	-
SWEDEN	5.02	1.40	7.56	-
JAPAN	4.18	1.20	-	-
ITALY	4.03	0.89	-	9.92

The table[2] shows that the major industries in India consumed more energy/product – some times as high as 5 times - when compared with the developed countries when analysed one decade ago. This continued till the end of the twentieth century.

From the time of independence to the middle of seventies we were in the mode of "**unconscious in-competency**", in the matter of energy efficiency was concerned. During that period, fuel was cheap and believed to be inexhaustible. Product output was the only concern, not the productivity! Neither the Specific Energy Consumption (SEC) was a matter of concern, nor the environmental issues caused by the fuels burned. Quadrupling of the crude oil price due to the turmoil in the Middle East changed the entire scenario since 1973, when we had the first oil shock. By this shock treatment we were forced to realize our in-competencies. The scenario has changed a lot now, as indicated by the graphs shown below[3].

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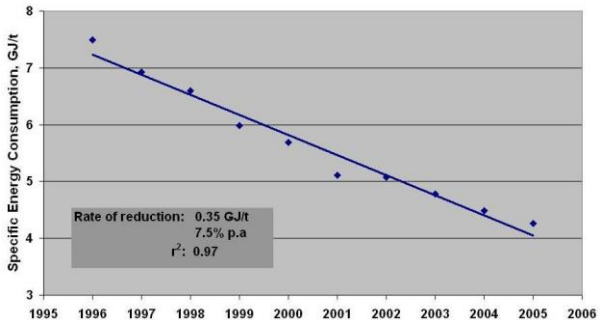
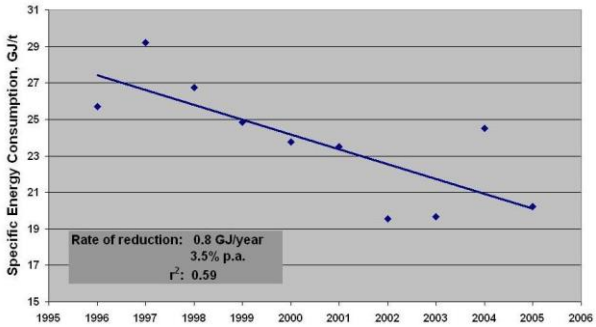
[1] Unconscious in all such contexts denotes the meaning "unaware" or "with out being consciously aware of" and not the stage of unresponsiveness or insensitiveness

[2] PCRA, www.pcra.org Data belongs to the year 1998

[3] Addressing Energy Security and Climate Change, by Bureau of Energy Efficiency



Trends in thermal specific energy consumption in the Indian cement sector

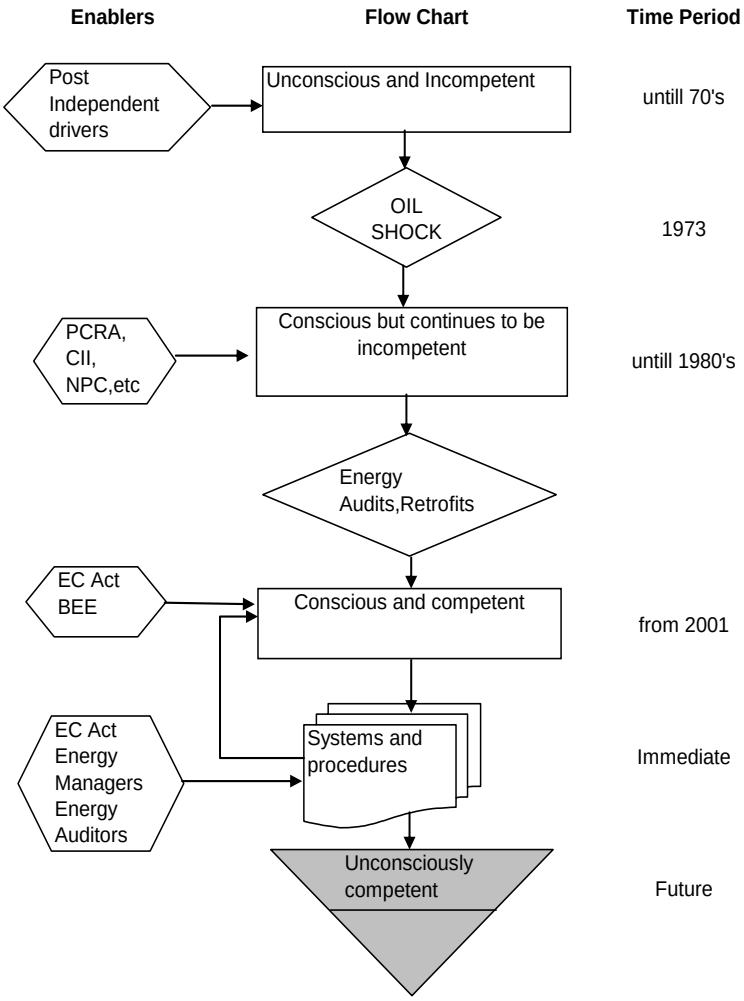


Trends in specific energy consumption in the Indian iron & steel sector

From Unconscious In-competency to Conscious Competency[4]

Three years after the first oil shock, Indian democracy also suffered a jolt in the form of "emergency". But, as a curse turning down to be a boon, this era advocated to "*talk less and work more*", which eventually improved productivity. It is in the same year Petroleum Conservation Action Group (PCAG) (which later changed its name as Petroleum Conservation Research Association (PCRA) was formed. PCRA acted as the catalyst of change in the field of energy conservation.

We started to realize our incompetence through internal and external audits; we started to work on retrofitting our inefficient equipment; we started to make our house-keeping better as we relaised that one drop of oil that leaked in every second will eventually become 4,000 litre in a year. An awareness was created among the industries that



[4] The terminology was adopted from a presentation by Shell Global Solutions

even a pin hole leak in the steam or compressed air system can lead to draining of lakhs of rupees. Thanks to organizations like PCRA, National Productivity Council (NPC), and Confederation of Indian Industry (CII), by the middle of the eighties we started to move to a stage of "*conscious incompetency*". That is, we became conscious about our incompetence and started to take corrective actions.

Most of the actions during this period were of retrofitting equipment to improve efficiency. Heat recovery systems were widely installed, to trap the heat energy released to atmosphere, for reheating purposes; many burners of boilers and furnaces were retrofitted with more efficient and less polluting ones; many vehicles had gas retrofits to replace liquid fuel; many buildings installed additional thermal insulation to reduce energy consumption; so on and so forth. PCRA went one step ahead and provided soft loans for retrofitting - replacing – an entire boiler if its efficiencies were proved to be low. Even though these processes increased the efficiencies in many cases it back fired at least in some cases. PCRA had to withdraw their soft loan schemes as there were no mechanisms in place to ensure that these inefficient boilers were removed from the system; many a time they were simply moved from one place to another for availing loans. A similar thing was reported to have happened in the case of the CNG (compressed natural gas) drive in the capital of India. The pollution level in the capital drastically reduced by the switching over from diesel and petrol to CNG; but some unofficial reports indicate that many of these vehicles found a good second hand market in the neighbouring states.

By the beginning of the 21st century, committed to the goal of making India an energy-efficient economy, the Central Government has enacted the Energy Conservation Act, 2001 and set up the Bureau of Energy Efficiency (BEE) for promoting the efficient use of limited energy resources. The BEE is implementing the voluntary and mandatory provisions of the Act with the support of all stakeholders. It has been instrumental in creating a community of energy-efficiency professionals, who have a constant need to access information on energy policy, best practices, technology fact-sheets, innovative techniques in energy management and financing, besides social and environmental issues relating to energy use.[5]

We did improve our efficiencies by these actions and did move to a state of "*conscious competency*". **Let us not be complacent. This is not enough**.

What really required is that, right from the day of inception of any energy consuming system it must be as efficient as possible. This will happen only if we move to a stage of "***Unconscious competency***". Competent without being consciously aware! The competency will have to be in-built, unconsciously by the system. For example, the Singapore roads remain neat and clean in spite of heavy migrating population, due to the in-built mechanism in the local governance which does not allow anybody to deviate from it. They do not intend to keep the roads clean by engaging more and more number of cleaning agencies or by using more sophisticated and efficient cleaning equipment; but, by incorporating certain provision in their law which is self- governing and self-

[5] From the message of DG, BEE to the Inaugural issue to Energy ɳ Manager.

disciplined and prevent the pollutants to be on the road. Similarly, Thailand achieved great amount of energy saving through the removal of "FAT TUBES"[6] from the market itself, by lodging a joint mission by manufacturers, Government and the end-users.

If we want to achieve sustainable results, the system should drive the Human Beings not vice versa. For this, it is agreed that human beings themselves have to work and a few who are committed and concerned shall take extra efforts to see that the systems are in place. It is going to be the most challenging job of the certified energy managers and auditors of BEE in the coming days.

How to achieve "Unconscious Competency"

As the old adage goes, *a stitch in time saves nine*. But this rarely happens, especially in the new project sites of many Public Sector and inefficient Private sectors. In most of the Project manuals, it is given that "*Time is the essence of Contract*". When the stress is more on time, the quality of job often gets overlooked. **Manpower deployed during the kick off stages of a project is often found to be thoroughly inadequate in most of the cases as initial planning is not given the required priority**. The detailed feasibility report of most of the projects gives only the manpower requirement for running the activities after the commissioning of the project. These DFRs rarely speaks about the bare minimum manpower required for taking care of initial planning, execution, energy planning, or for the future maintenance planning. If such activities are looked into in detail and if someone is made responsible from the day one, and if the stitch is given in time, we surely will achieve better results.

All the contracts having a stamp of "time is the essence of contract" always caution the contractor about the huge liquidated damages that they have to pay if the contract is delayed for reasons beyond a force majure condition. This makes the implementing engineers and the contractors to overlook many minor aspects, which can ensure better quality and better efficiency. In an overenthusiastic bid to achieve this timely completion target, the losses suffered by the mankind and the mother earth go unnoticed!. Poor quality in execution of jobs and poor quality of equipment causes enormous losses of energy and other valuable resources. After the commissioning, the maintenance crew, the safety inspection crew and the energy monitoring team will start their retrofitting and retrograde activities and everyone will be conditioned to live with the exiting in-competencies and inefficiencies attached to the project. This is a very common scenario in our Industrial sector; which needs immediate attention.

The government has identified some core sectors for whom an Energy Manager is mandatory. Similarly any approved project shall have people responsible for monitoring the energy and environmental aspects right from the design stage. All approved projects shall specify the energy consumption norms along with the environment impact assessment. These energy consumption norms shall be, in no way, inferior to the minimum standard specified by Bureau of Energy Efficiency. For example, the Installed Light Efficiency Ratio (ILER) at any point in a new project shall be better than the

[6] 40 W T12 fluorescent lamps- They got replaced by 36 W T8 or 28 W T5 lamps saving energy

minimum stipulated standards; the efficiency of a boiler or furnace at any point of operation and load shall have a minimum stipulated value, a pumping system shall have a minimum set value for the overall efficiency; so on and so forth. If this is ensured from the design and implementation stage, and if enough effort and time are spent on these aspects to ensure them, all retrofitting immediately after commissioning of the plant can be avoided. What could be the added cost? A few lakhs of rupees towards salary!!

Let us urge BEE to insist for deploying energy managers/auditors for all projects of more than 10 kL of fuel consumption/day or 1 lakh kWh of electricity consumption/day. One percentage of saving achieved in these projects can produce an annual recurring saving of more than Rs15 lakhs, which can offset the salary part of atleast two Energy Managers in the present scenario. This will avoid cost of future retrofitting and can help to reduce future maintenance cost.

If such actions are taken, unconsciously the system will drive us into better and better competency. As rightly pointed out by Dr Brahmanand Mohanty[7] **lets hire people to fire losses.**

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[7] Inaugural Issue of Energy ɳ manager, a publication by Society of Energy Engineers and Managers(SEEM) titled "Energy managers - Key players in India's green growth"www.energyprofessional.in