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Human Inefficiency and Fuel Switching!

What would happen if we converted all human beings to run on diesel oil? A large glass of diesel oil contains about 0.3 liter, and has about 0.3 liter x 37 MJ/liter = 11.1 MJ = 2653 Kcal of energy. This is enough to keep a human being going for a day. Furthermore, diesel is cheap energy, costing about Rs. 7 a day per person. Even the most modest Thali Costs Rs. 20 and gives less energy, plus you have to ask for a second, third and possibly even a fourth serving.

Human beings, as any internal combustion system, burn food energy together with air to sustain their motoric activities. Hard labour requires more than sleeping. "Thinking" I believe uses the least energy and is therefore a pretty energy efficient activity.

How efficient are we human beings? The bad news is that our system efficiency is very low, between 8% to 14%, depending on what we do and whether we run at full load or are idling.

Most combustion systems which we have invented, such as diesel engines, power plants, and gas engines, have much higher system efficiencies of between 30% and 50%.

Consequently about 620 Crore human beings are roaming this earth consuming the most expensive energy, "food", and burning it most ineffectively. It is therefore no wonder the concept of energy efficiency or energy conservation is a little bit alien to most of us.

Energy inefficiency starts in your head. It is usually not technologies which are inefficient, but the people who use them. Manufacturers of equipment such as boilers, fans, and pumps carefully talk about design efficiencies, and even design system efficiencies. They are fully aware that the design efficiency of a boiler of say 85% may quickly drop to 70% if an operator who is not well trained or doesn't care is in charge. Similarly, you may purchase the most efficient fan that has a design efficiency of 78% and then operate it at 40% efficiency because the fan was wrongly selected or the ducting does not match the design.

In other words, irregardless of whether you buy and install efficient or inefficient equipment, the *actual* efficiency at which a piece of equipment operates depends on the operator. He may loose too much of the design efficiency by inappropriate operation.

A firm's management usually follows a carrot and stick approach to improve energy efficiency and reduce energy costs. Let us not talk about the stick approach, but more about carrots, i.e. incentives.

We would be interested to know what kind of incentives and staff recognition schemes are offered in industry to motivate those in charge of energy intensive equipment and processes to undertake extra efforts to reduce energy costs. Please let us know what your firm or others you are aware of are doing in this area.