



## **THE CITIZEN'S ENERGY FOOTPRINT**

The Indian Perspective

1

## Present status of energy use in India

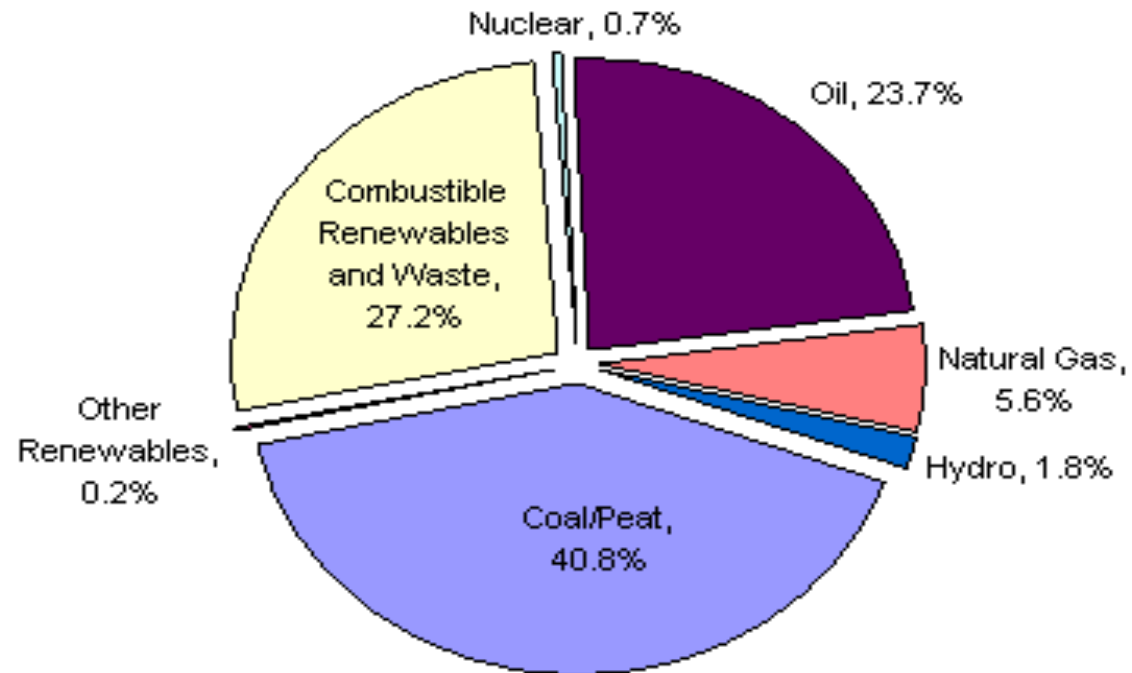
Indian Population Divide		Electrification	
Urban India	Rural India	Villages	Rural Households
30%	70%	21%	50%

Per Capita Energy Consumption for Cooking - Rural India			Per Capita Energy Consumption for Cooking - Urban India		
Firewood	Dung Cake	LPG	Firewood	Kerosene	LPG
75%	10%	5%	22%	22%	44%

Home Lighting - Rural India		Home Lighting - Urban India	
Kerosene	Electricity	Kerosene	Electricity
50%	48%	10%	89%

## Total Energy Consumption in India

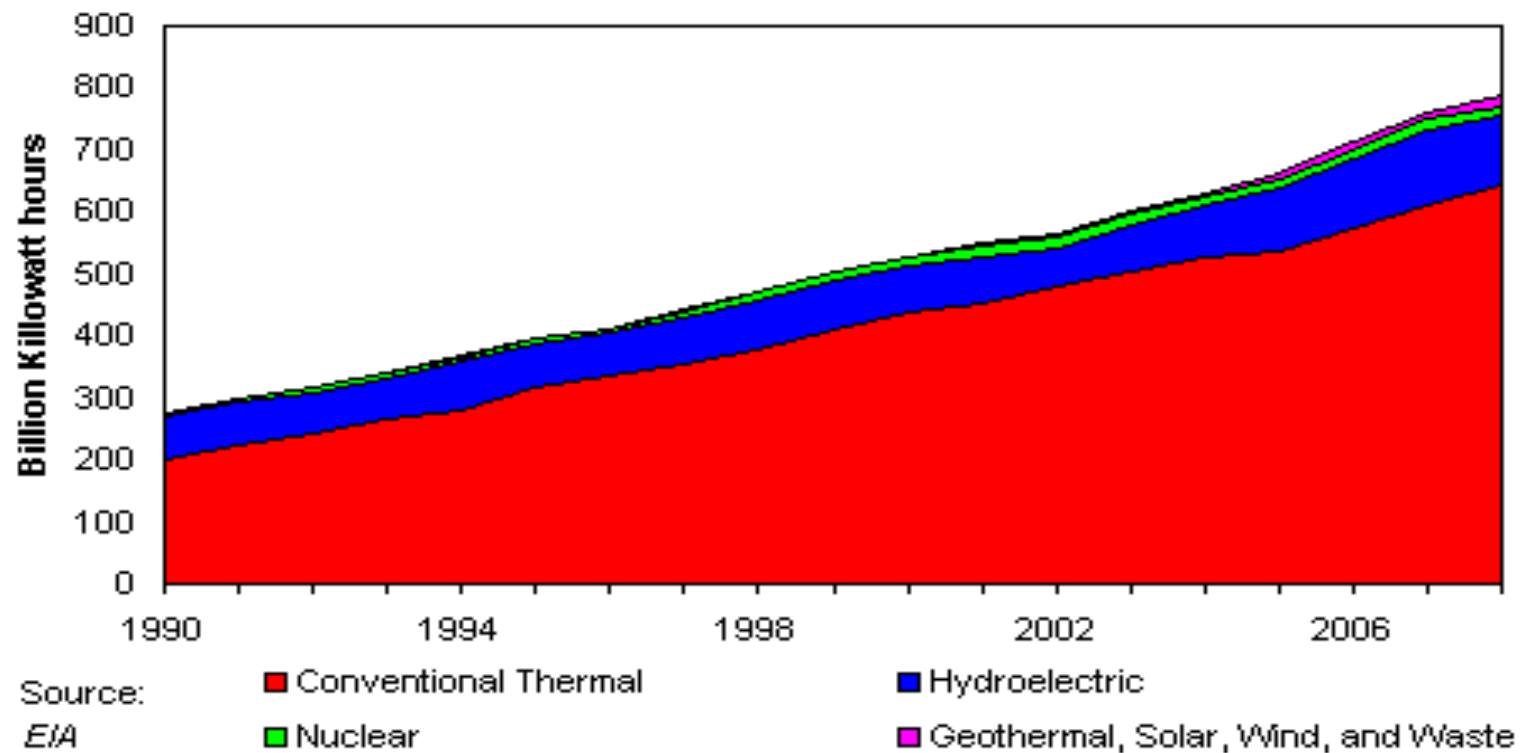
**Total Energy Consumption in India, by Type (2007)**



Source: International Energy Agency (IEA)

## Electricity Generation By Type

**Electricity Generation by Type, India  
1990-2008**

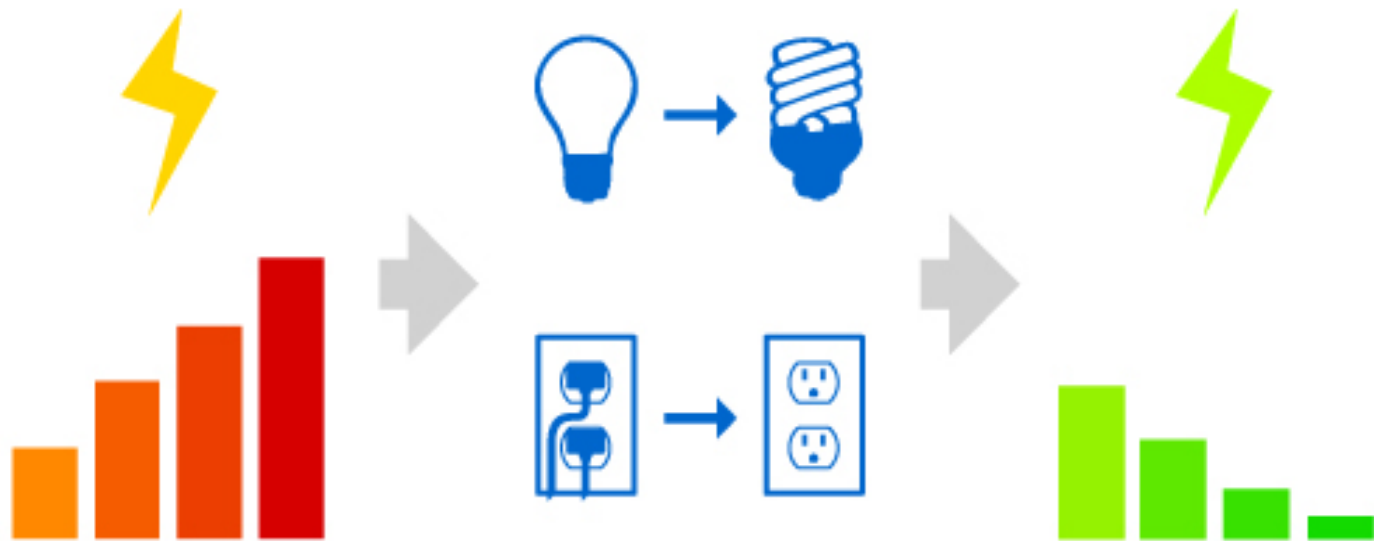


## Energy Consumption – A Comparison

<b>Country</b>	<b>Energy (Kg) per capita</b>
Unites States	7778
Singapore	6968
Australia	5917
Russia	4745
Germany	4231
United Kingdom	3814
<b>World Average</b>	<b>1818</b>
Mexico	1702
China	1433
Brazil	1191
Indonesia	803
<b>India</b>	<b>510</b>

Source: World bank

## Energy Conservation Necessity of Today & Tomorrow



## The Case Analysis- The Questions to be Considered

- What is the Citizen's role in sustainability of the Planet, especially on energy use?
- Is Energy use an important sustainability issue in your region? If so, what are the concerns? Are there any standards in use for instrumentation and calculation of energy use?
- What are the effective ways to answer the question "What is your energy footprint?"
- Recommend standards for measuring Energy Footprint and ways of making instrumentation implementing such standards available to citizens in your country/region.
- Is this extendable to private and public enterprises and beyond?

➤ What is the Citizen's role in sustainability of the Planet, especially on energy use?

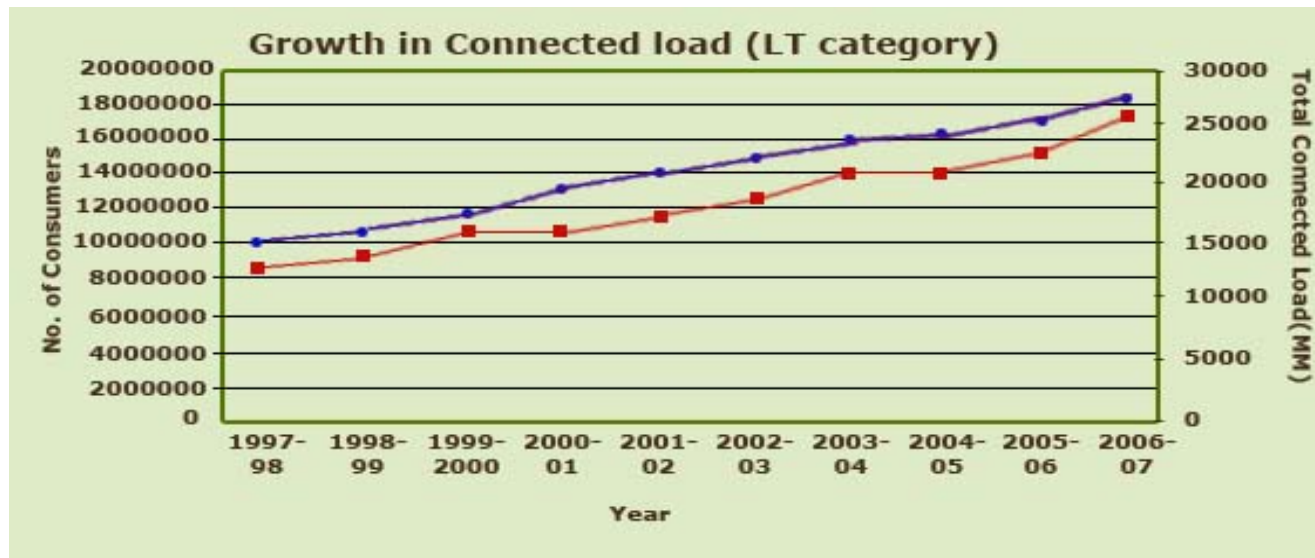
- The Domestic Sector accounts for 30% of total energy consumption in the country. Economic use of Home Appliances can reduce the Electricity Bills.

Few simple measure are given below;

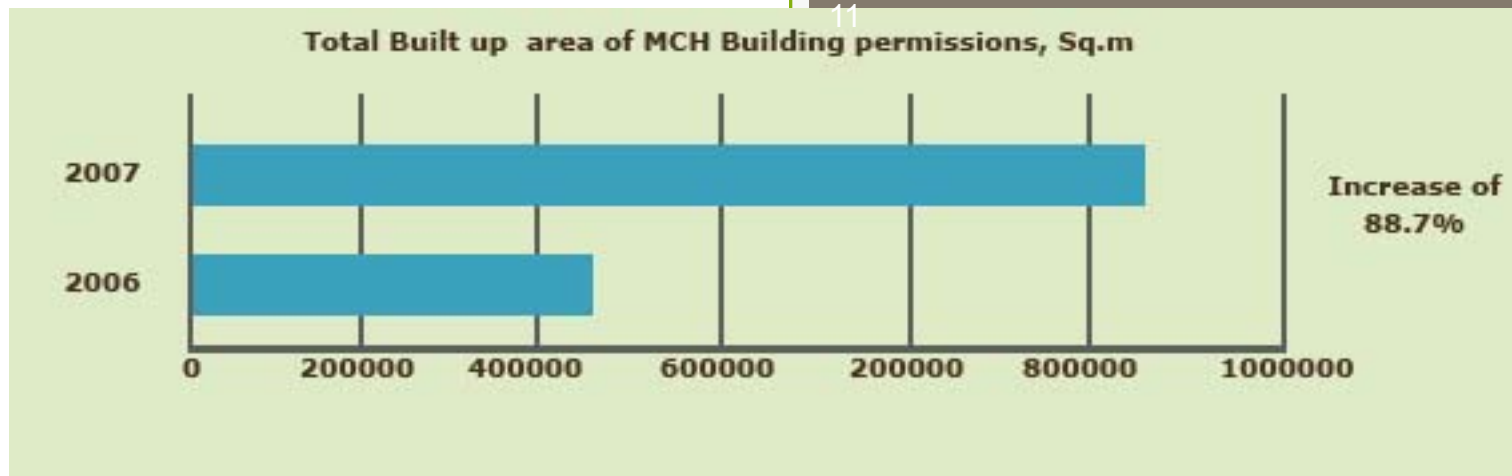
- Switch off electrical appliances like lights/fans/ACs etc when not required to save on your energy costs.
- Use of renewable energy systems like solar PV, biomass, wind, fuel cells etc for external lighting fixtures.
- Use of Florescent tube lights, CFLs, transformers, motors, refrigerators, air-conditioners to increase energy savings
- Installation of solar water heating systems to meet hot water requirements like bathing, kitchen use etc.
- Existing trees not to be felled unless prior permission from local authorities. Where cannot be protected have to be transplanted. Where both not possible, replanting with native/ non-invasive species in proportion of 3 new tree saplings for every mature tree felled.

<b>Appliances</b>	<b>Rating (Watts)</b>	<b>Operating Hrs/Day</b>	<b>Units/ Month</b>
<b>Incandescent Bulbs</b>	<b>40</b>	<b>6</b>	<b>7</b>
	<b>60</b>	<b>6</b>	<b>11</b>
<b>Fluorescent Tube light</b>	<b>40</b>	<b>10</b>	<b>12</b>
<b>Night Lamp</b>	<b>15</b>	<b>10</b>	<b>4.5</b>
<b>Mosquito Repellent</b>	<b>5</b>	<b>10</b>	<b>1.5</b>
<b>Fans</b>	<b>60</b>	<b>15</b>	<b>27</b>
<b>Air Coolers</b>	<b>175</b>	<b>8</b>	<b>42</b>
<b>Air Conditioners</b>	<b>1500</b>	<b>6</b>	<b>270</b>
<b>Refrigerator</b>	<b>225</b>	<b>15</b>	<b>101</b>
<b>Mixer/Blender/</b>	<b>450</b>	<b>1</b>	<b>13.5</b>
<b>Oven</b>	<b>1000</b>	<b>1</b>	<b>30</b>
<b>Electric Iron</b>	<b>1500</b>	<b>1</b>	<b>45</b>
<b>Water heater-instant Type (1-2 Ltr capacity)</b>	<b>3000</b>	<b>1</b>	<b>90</b>
<b>Immersion rod</b>	<b>1000</b>	<b>1</b>	<b>30</b>
<b>Vacuum Cleaner</b>	<b>700</b>	<b>0.5</b>	<b>11</b>
<b>Washing Machine</b>	<b>300</b>	<b>1</b>	<b>9</b>
<b>Water pump</b>	<b>750</b>	<b>1</b>	<b>22.5</b>
<b>TV</b>	<b>100</b>	<b>10</b>	<b>30</b>
<b>Audio system</b>	<b>50</b>	<b>2</b>	<b>3</b>

- ✓ Is energy use an important sustainability issue in your region? If so, what are the concerns? Are there any Standards in use for instrumentation and calculation of energy use?
- **Yes, Hyderabad, the capital city of Andhra Pradesh**, is rapidly growing like many other cities in India. High economic growth is evident especially in the sectors of Information Technology, biotechnology and entertainment .
  - Growth has been most evident in the way the city's built environment has changed over the last 10 years. To understand the scale of growth, here are a few things the city has witnessed in the past few years.....
  - Annual Growth rate of number of electricity consumers is 7%, and total Connected Load is 8%



Source: HMDA (Hyderabad Municipal Development Association)



There has been an increase of 88.7% in built up area permissions give by MCH from 2006 to 2007

## CONCERNS

### The future projections.....

1. Residential area to increase by 133% in next 15 years
2. Commercial area to increase 21 times
3. Conservation/ agriculture area to decrease by 60% consequently

The tremendous growth of the city has put immense pressure on

- Energy supply
- Water supply
- Sewage disposal
- Storm water drainage
- Ecology – Flora and Fauna
- Local Geological Features – Unique rock formations

And causing environmental concerns on waste disposal and pollution of air, water, land and noise

#### **STANDARDS IN USE**

implementation of voluntary national and state-level energy policies and codes is very limited in Hyderabad, and very few builders are incorporating energy efficient technologies in their new construction

**At Individual Level there are no Standards for calculation of energy use at Hyderabad**

Two major concerns for sustainable energy are

- Water Crisis
- Power Crisis

**Water Crisis:**

- India (13%) is the largest consumers of the global water resources
- Wastage of water in India is taking alarming proportions and a crisis seems imminent.
  
- Production of water intensive crops is expected to grow by 80% between 2000 and 2050
- Per capita domestic consumption per person/day=88.9 lit in 2000.
- Expected per capita domestic consumption per person/day = 167 lit in 2050

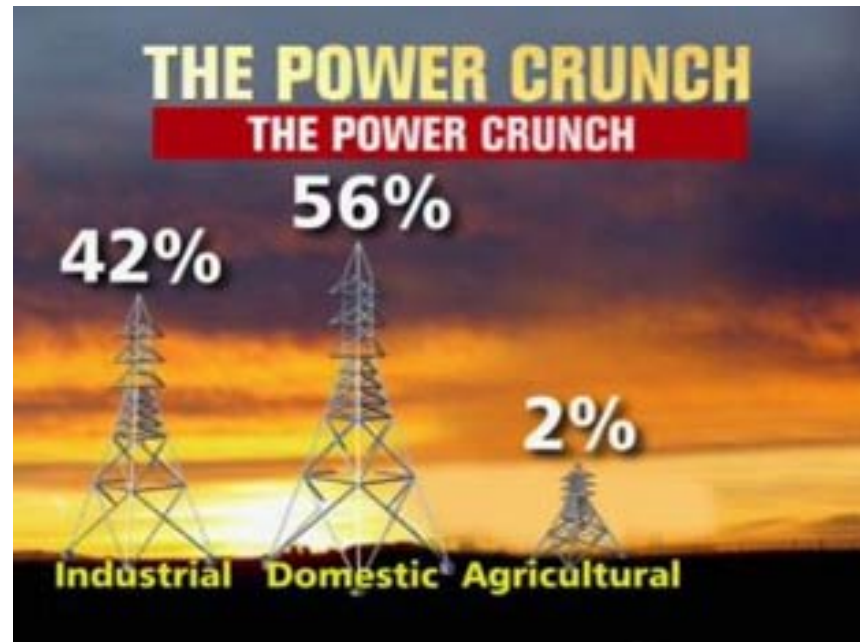


<b>Major River Basins</b>	<b>Major Agricultural States in the River Basin</b>	<b><sup>14</sup>Population Density</b>	<b>Water Used for Irrigation as a % of Total Consumption</b>
<b>Ganges</b>	<b>Uttar Pradesh (UP)</b>	<b>449</b>	<b>91%</b>
<b>Krishna</b>	<b>Maharashtra, Karnataka</b>	<b>253</b>	<b>90%</b>
<b>Kaveri</b>	<b>Tamil Nadu, Karnataka</b>	<b>389</b>	<b>95%</b>
<b>Godavari</b>	<b>Andhra Pradesh (AP), Karnataka</b>	<b>189</b>	<b>89%</b>

- Power Crisis

India is 6<sup>th</sup> largest energy consumer, accounting for 3.4% of global energy consumption.

- Per capita energy consumption in India is 733.54 Kwh in 2008 which is very minimal compared to the world average of 2340 kwh/yr.
- The demand for energy has grown at an average of 3.6% per annum over the past 30 years.
- The total demand for electricity in India is expected to cross 9,50,000 MW by 2030. There is an average energy shortage of 10.6% with a peak shortage of 12%.
- if the same percentage of rise in our power production continues there will be 10% shortage of power by 2030.
- If India G.D.P grows by 7% the rate of growth of power supply needs to be at 10%.



## What are the effective ways to answer the question “What is your energy footprint?”

- Energy Footprint is a measure of land required to absorb the CO<sub>2</sub> Emissions. This approach focuses on the outcome of the energy use, i.e. CO<sub>2</sub> emissions, to highlight the problem and pave the way for corrective action to be taken.
- To identify our Energy Footprint at individual level we have observed through a small Convenience Sampling Survey at Hyderabad have identified the below given energy consuming devices largely used;
  - Electronic Devices (EDO) and Gadgets (GH) that we use at office and Home .
  - Transportation to work place, within work place (TW)
  - Transportation for personal use (TP)
  - Energy used to for entertainment+ increasing mall and multiplexes (ENT)

**Total Energy Used = EDO+GH+TW+TP+ENT**

## Model for Evolving Standards - 1

### 1. Tracking Data

Public Private  
Partnership  
Required

**Tracking Data from The**  
**- Electricity Board**  
**- Water Board**  
**- Fuel Pumps**

**Individuals - Household**

**All other Establishments not  
covered under the category of  
Households**

## Model for Evolving Standards - 2

2. Measurement of Energy Per Capita
3. Comparison with Global Standards
4. Recommendations to correct Energy Consumption beyond acceptable limits

## Standards Recommending

- Number of Tube Lights, Ceiling Fans, A/Cs, Television Sets, Refrigerators for a Family of 3 Members.
- Sensors along with A/Cs, Refrigerators, Laptops, Washing Machines, Vacuum Cleaner indicating energy consumption.
- Recommended energy usage per Square Feet.
- Energy Literacy Program
- Production of gadgets with sensors
- Urgent need for communications as done with Aids awareness and female infanticide with India.

Is this extendable to private and public enterprises and beyond?

- Yes, as part of their Corporate Social Responsibility Initiatives
- Energy Audit to be made compulsory by all.
- Mandatory as per the Corporate Governance Laws
- To make energy consumption savings as a mandatory for listing on the stock exchange.

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