Energy Efficiency in India –

Challenges & Lessons

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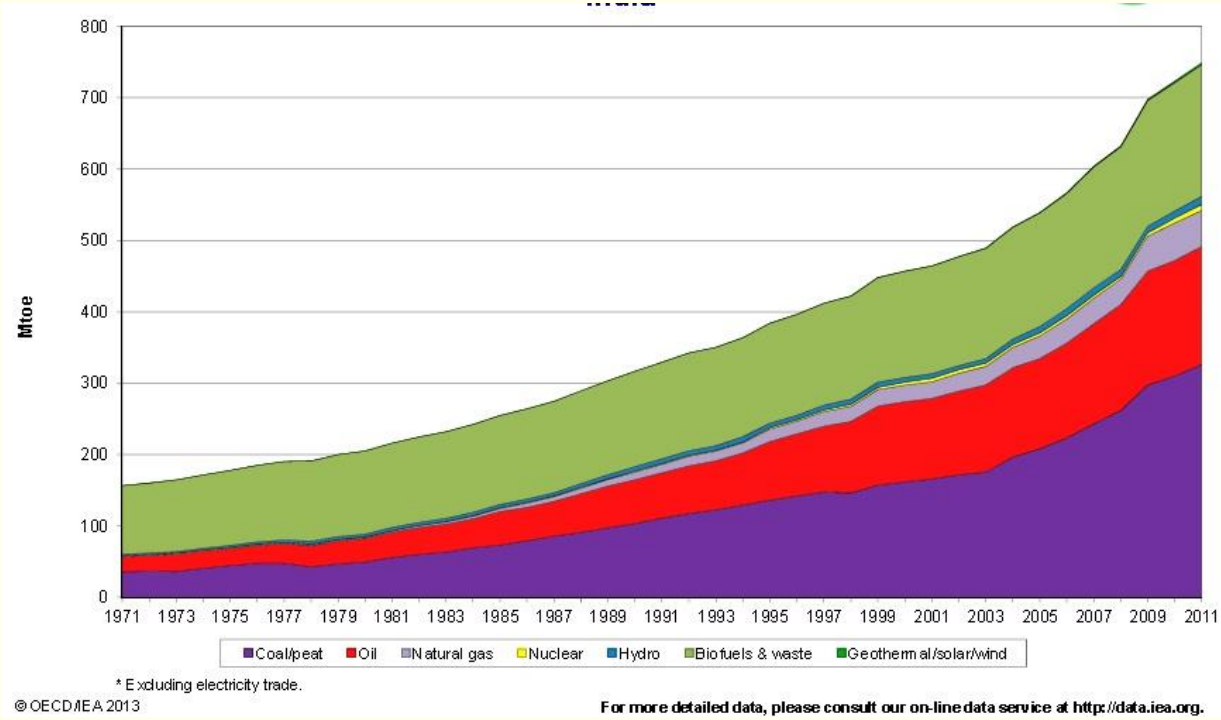
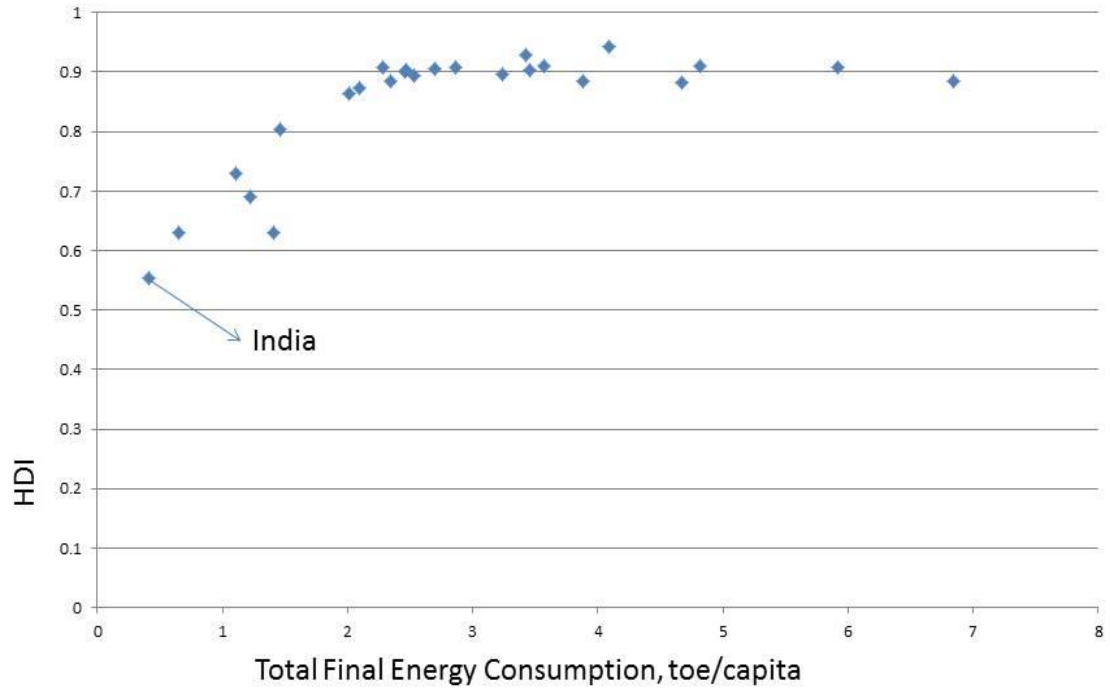
Bhaskar Sarma
Bureau of Energy Efficiency

ENERGY DEMAND IN INDIA WILL INCREASE BY A FACTOR OF 1.5 TO 2.5 BY 2030



- Energy supply and consumption in India was 819 and 493 mln toe respectively in 2011
  - Per capita supply was about 0.6 toe
  - Per capita consumption was 0.4 toe
- Supply is expected to grow to 1200 mln toe (IEA) to 1700 mln toe (India Integrated Energy Policy) by 2030

HOW MUCH ENERGY IS REQUIRED ?



Source: Data for 25 countries from Human Development Report, 2013
International Energy Agency, Key World Energy Statistics: 2013

- A minimum energy consumption of 2.3 toe/year/cap is needed today to achieve HDI of 0.9
- Countries which "develop" later achieve transition at lower levels
- Probable that transition may occur at 1.5 toe in the future
- Enhanced energy efficiency is essential to enable early transition

ENERGY EFFICIENCY IN INDIA – THE CONTEXT

Energy prices are high in India

- Industrial and commercial consumers pay electricity and petroleum product prices that are amongst the highest in the world
- Household consumers pay electricity and petrol prices that are highest in the world relative to their incomes
- Energy intensity of the economy has declined by 30% between 2000 and 2011; about half due to energy-efficiency improvements

Energy efficiency reduces costs, energy imports, GHG emissions, and pollution, but penetration is limited because:

- High first costs deter users, especially households
- New technologies are perceived as being risky
- Costs and benefits accrue to different people, especially in the case of buildings

REGULATORY FRAMEWORK FOR ENERGY EFFICIENCY IN INDIA

Energy Conservation Act, 2001

- Created Bureau of Energy Efficiency
- Appliance standards and labeling
- Energy consumption norms, and energy-use reporting requirements for energy-intensive industrial units
- Energy Conservation Building Code for commercial buildings
- Certified Energy Managers and auditors

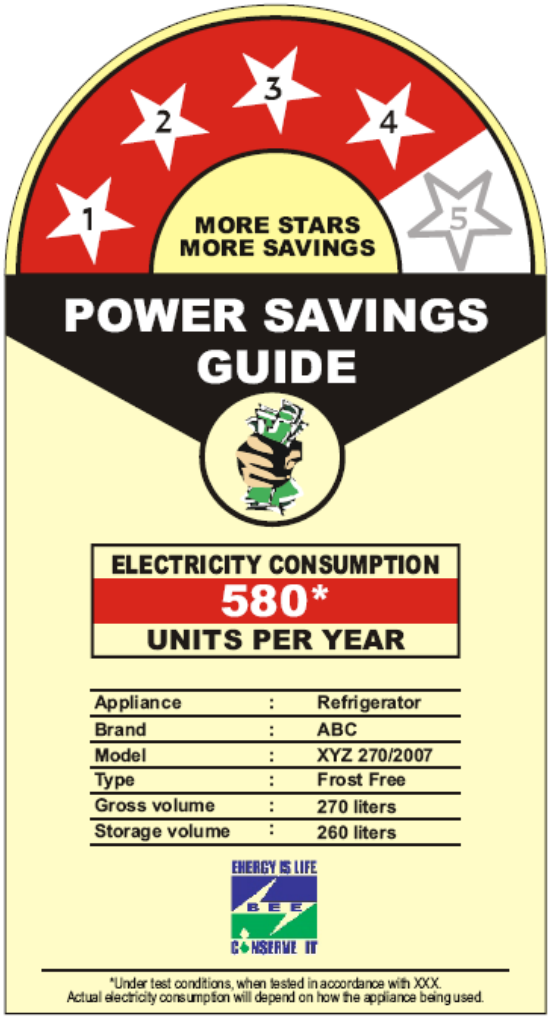
National Action Plan for Climate Change, 2008

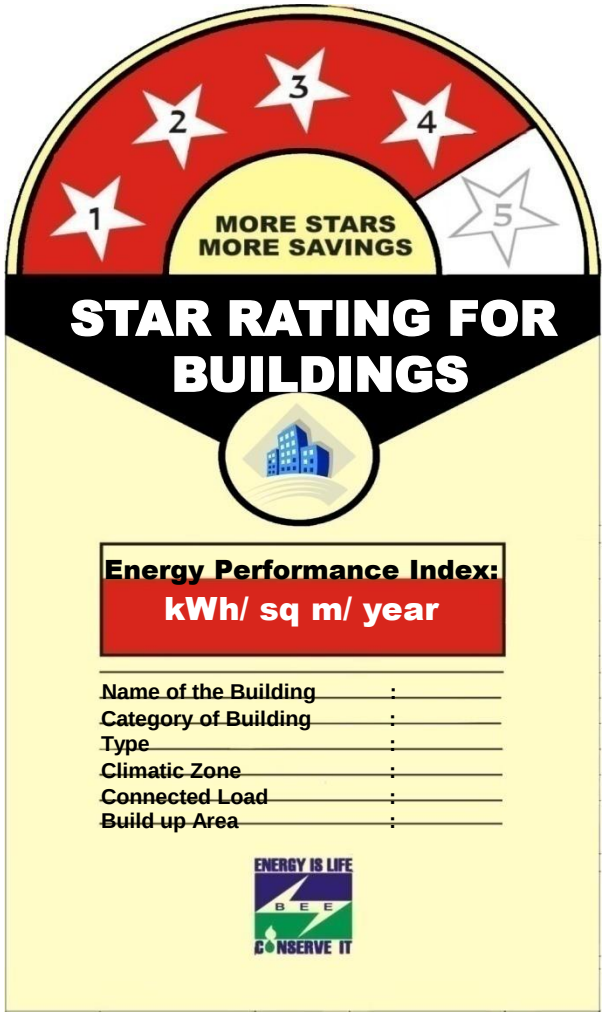
- National Mission on Enhanced Energy Efficiency provides mandate for market-based mechanisms to promote energy efficiency
- National Mission on Sustainable Habitat seeks to incorporate energy-efficiency requirements in building byelaws

ESTIMATION OF 5-YEAR POTENTIAL IN 2006

	MW
Appliances	3,000
Buildings	500
Efficient Lighting (CFLs)	4,000
Industry	500
Agricultural & Municipal DSM	2,000
Total	10,000

INFORMATION HELPS CONSUMER DECISIONS





LABELS BUILT UP AS A "BRAND"

Voluntary labels for refrigerators and airconditioners introduced in December 2006

Aggressive advertising and outreach promoted labels as a brand of superior products – manufacturers piggybacked on label advertising

Labeling became mandatory for four products (where market transformation was well under way) from 7th January, 2010

Voluntary labels in place for eleven other appliances

Refrigerator and air conditioner standards and labels tightened periodically

Labeled products bought for check testing

Labeling seldom works if payback period is more than 5 years; maximum sales is of products with 2-3 years payback

NEW BUILDINGS HAVE HUGE POTENTIAL – WHICH VERY DIFFICULT TO ACHIEVE

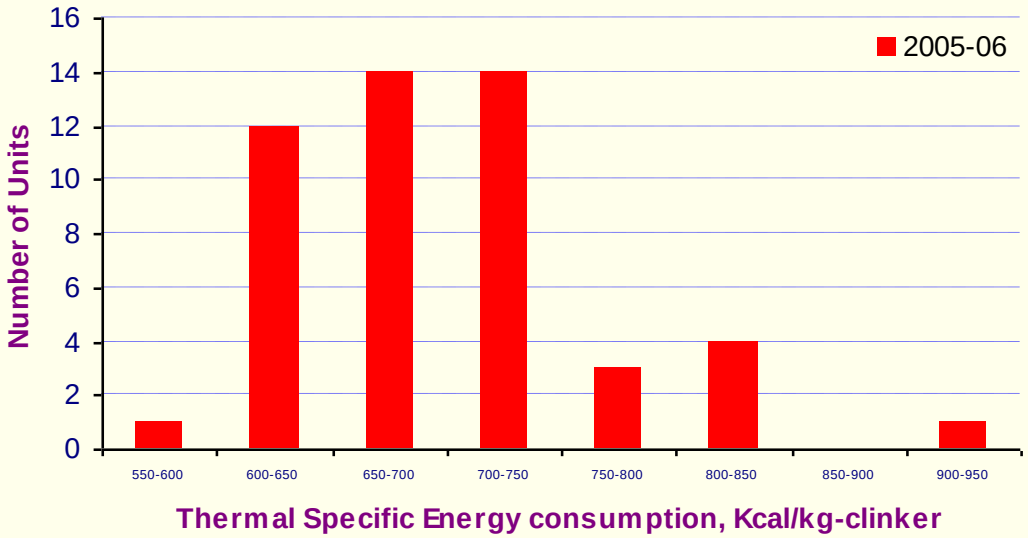
Approximately two-thirds of the buildings that will exist in 2030 are yet to be built

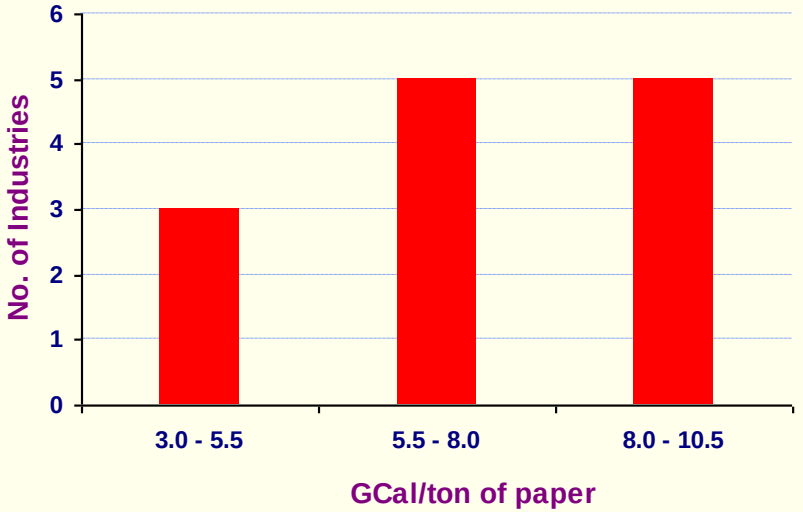
Energy Conservation Building Code (ECBC) issued in 2007 to guide design of new commercial buildings – where there is largest scope for efficiency improvements

ECBC has to be notified by states, and incorporated into building byelaws and enforced by municipalities; currently seven states (out of 35) have notified it; enforcement mechanisms are being strengthened

ECBC-compliant buildings use less-than-half the energy used by conventional buildings; incremental costs have reduced from 20% in 2007 to less than 5% now

Huge Diversity in Specific Energy Consumption within industrial sectors





- Large bandwidth in specific energy consumption in all sectors
- In almost every sector, the most energy-efficient unit is also amongst the most efficient units in the world

PERFORM ACHIEVE AND TRADE

Specific Energy Consumption (SEC) targets mandated for 478 units in 8 energy intensive sectors

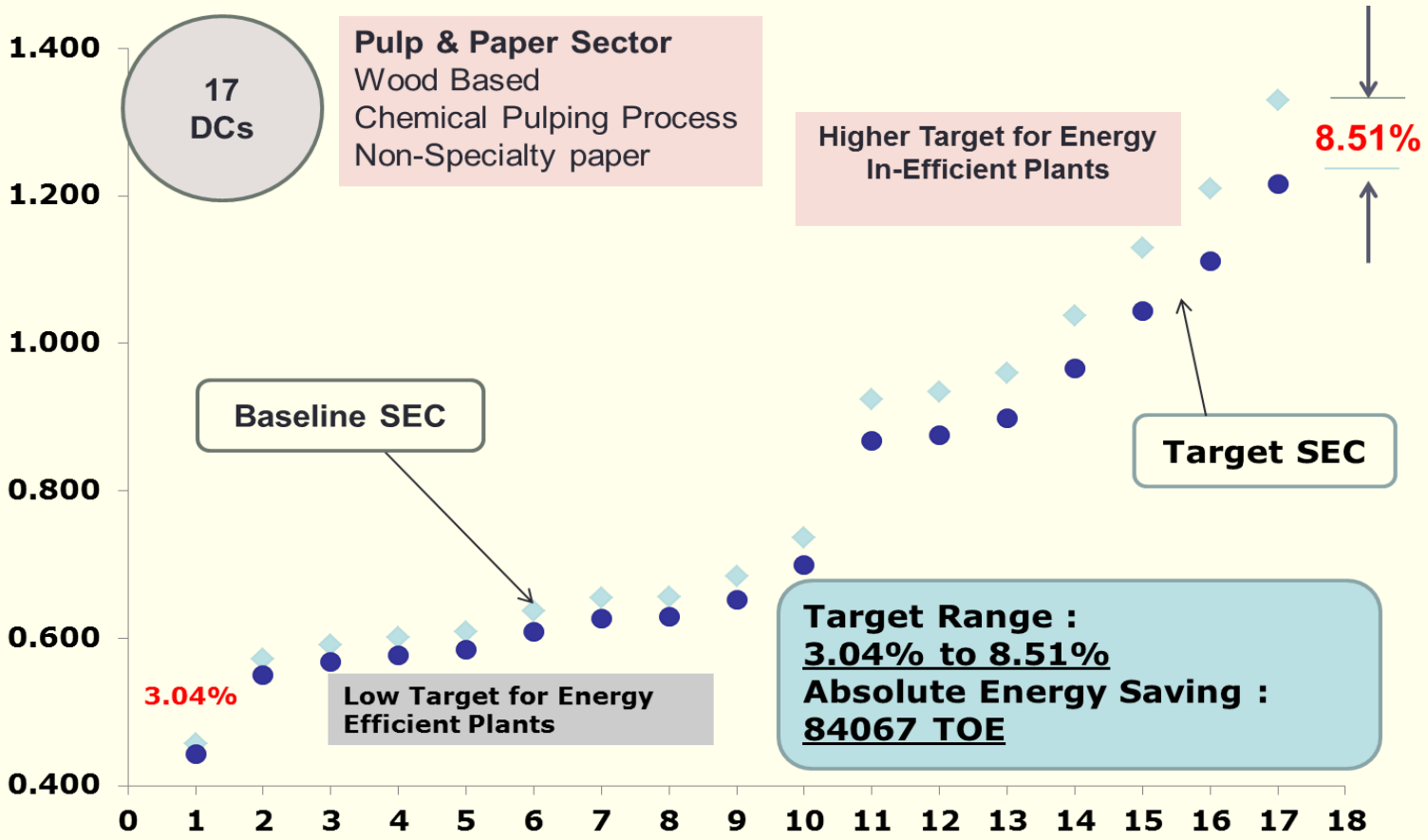
- The sectors are: Aluminum, Cement, Iron & Steel, Chlor Alkali, Thermal Power Plants, Fertilizer, Pulp & Paper, and Textiles
- They account for one-third of fossil-fuel consumption
- Targets are less (in % terms) for efficient units; more for less-efficient units
- Targets to be accomplished in 2014-15; new cycle with new targets after that

Energy Savings Certificates will be issued for excess savings; can be traded and used for compliance by other units

Financial penalties for non compliance

Baseline conditions have changed; normalization factors being developed

HUGE SPREAD IN SPECIFIC ENERGY CONSUMPTION WITHIN SECTORS



Target is Plant Specific …… Less for Energy Efficient and more for Inefficient Plants

ENERGY SAVINGS ACHIEVED

Target has been surpassed, but pattern of savings is very different from that originally estimated

Year-wise breakup of targeted avoided capacity during IX plan & Target achieved

Sl.No.	Schemes	Target for XI Plan (in MW)	Achieved during XI Plan (in MW)
1	Standards & Labeling	3000	7766
2	Energy Conservation Building Code & Existing Buildings.	500	14
3	Bachat Lamp Yojana	4000	324
4	SDA Strengthening Programme		1065
5	DC & SMEs	500	2
6	Agriculture & Municipal DSM.	2000	1
7	EC Awards		1664
TOTAL		**10000**	**10836**

CHALLENGES & LESSONS

Difficult to predict outcomes of programmes; feedback mechanisms and decision processes to enable constant monitoring and adjustments are essential

Benchmarking – of use patterns and energy performance of technologies - is very country specific; enabling it is an essential first step

Human and institutional capacity to measure, analyse and to integrate into mainstream sectors is limited; this is further confounded by multi-level governance regimes

National and international programmes to strengthen capacity around policy, technological or commercial transactions is important

Enforcement and monitoring are major challenges, and can add significantly to costs; public policies need to rapidly convert technological opportunities into “branded products”; targeted outreach programmes can be very effective

Higher first cost is a barrier; with adequate and credible information, people and organizations can make investments with paybacks of 2-5 years; higher payback periods require incentivization