Energy Efficiency Initiatives of India

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Contents

1. Legislative and Institutional Framework on Energy Efficiency in India
2. EE Initiatives in Industry, Buildings and Appliances
3. National Mission for Enhanced Energy Efficiency (NMEEE)
4. Voluntary Initiatives to promote Energy Efficiency
5. Conclusions

1

Legislative and Institutional Framework

Energy Efficiency in India

INTRODUCTION

- India has made rapid strides towards economic self-reliance over the last few decades.
- Impressive progress has been made in all sectors of economy necessitating growing consumption of energy
- Conventional source of energy such as coal, oil and gas are scarce and exhaustible.
- Consumption of fossil fuel resources also leads to Global warming and climate change
- Hence, all initiatives needs to be undertaken to ensure the efficient use of the available energy resources to manage energy supply and minimize the impact of energy use on environment.
- This has led the Government of India through the Energy Conservation Act and the Bureau of Energy Efficiency to launch several energy efficiency improvement initiatives.

THE INDIAN ENERGY CONSERVATION ACT

- EC Act enacted in October 2001
- Became effective from 1st March 2002
- Bureau of Energy Efficiency (BEE) operationalized from 1st March 2002 and State Designated Agencies established in 32 States/Union Territories
- Energy efficiency institutional practices and initiatives in India are now mainly being guided through various voluntary and mandatory provisions of the Energy Conservation Act

MISSION OF BEE

Develop policy and strategies with a thrust on self regulation and market principles, within the overall framework of the EC Act with the primary objective of reducing energy intensity of the Indian economy.

THE INDIAN ENERGY CONSERVATION ACT

- The **five major provisions** of EC Act relate to:
- ***Designated Consumers*** *(mainly energy intensive industries and buildings) to comply with the specific energy consumption norms for the manufactured products and services and establishment of energy management system,*
- ***Standards and Labeling*** *of energy consuming appliances, gadgets and equipment to ensure promotion of energy efficiency of the new stocks entering the market*
- ***Energy Conservation Building Code*** *ensuring that new commercial buildings constructed in the country have less electricity consumption*
- *Creation of* ***Institutional Set up*** *(Bureau of Energy Efficiency at the Federal level and State Designated Agencies at the State level) for effective coordination of the energy conservation efforts in the country and*
- *Establishment of* ***Energy Conservation Fund*** *at Centre and States to provide necessary financial support for energy efficiency initiatives in the country.*

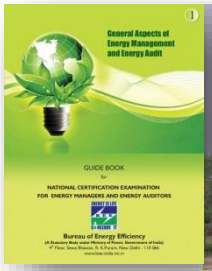
2

Energy Efficiency Initiatives

Industry, Buildings and Appliances

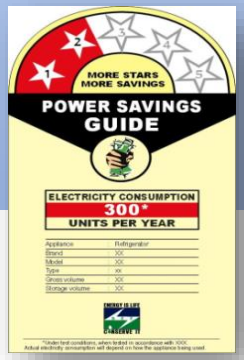
Energy Manager Certification and Energy Audits

- 9 energy intensive industry including Railways have been notified as designated consumers
- 13 National Certification examinations have certified about 10,400 Certified Energy Managers, out of which 7200 are also qualified as Certified Energy Auditors
- 85 Coal fired power generating units of various sizes (110-800 MW) have been mapped with the help of Ebsilon software. Studies have identified 3 million ton of coal savings potential in 49 nos. of 210 MW units
- Baseline energy audits studies carried out in about 500 units of 8 energy intensive industry and thermal power units.
- Guide Books on EE and Energy Audit Manuals prepared



Standards and labeling

- 14 Equipment and Appliances covered under S&L Programme
- All the refrigerators (frost free), air conditioners, distribution transformers and fluorescent tube lights that are sold in India must have a BEE Star label
- Draft standards & Labelling scheme for passenger cars have been finalised.
- India became the first country in the world to comprehensively regulate the performance, safety, and quality of light-emitting diodes (LEDs). The newly published standards in 2012 by BIS with the active support of BEE will help ensure quality and avoid market-spoiling effects from poorly performing products.

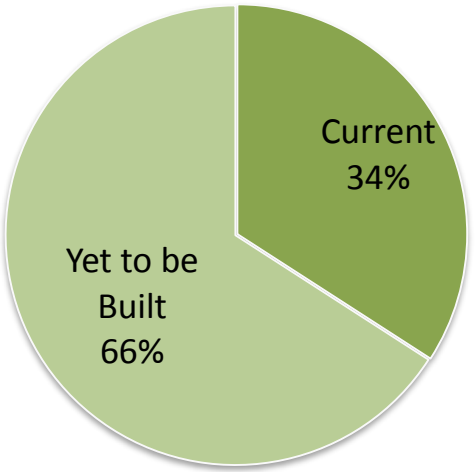


Growth in the Indian Building Sector

Commercial Buildings Floor Area - Growth Forecast

- Currently, ~ 659 million m^2
- In 2030,~ 1,900 million m^2 (estimated)*
  - 66% building stock is yet to be constructed

Year: 2010



1,900
million m^2

Year :2030

* Assuming 5-6% Annual Growth

Energy Conservation Building Code

- ECBC covering five climatic zones of India (Hot & Dry, Warm & Humid, Composite, Temperate and Cold) prepared
- ECBC set minimum energy efficiency standards for design and construction
- Mandatory Scope Covers commercial buildings
- Survey indicates about 306 buildings being constructed in the country are ECBC complaint
- Star labeling programme (Voluntary) for day use office buildings, BPOs and Shopping Malls developed

ISO 50001 Energy Management System

- More than 200 industrial units have declared their energy policy .
- PAT mechanism has all factors which are part of EnMS
- Relatively easier for Indian industry and buildings to adopt EnMs standard and achieve and sustain higher levels of energy efficiency
- Around 60 establishments including buildings and industry in India have been certified for ISO 50001 EnMS
- The Delhi International Airport Limited (DIAL) became the first airport operator and Dahanu Thermal Power Station, Maharashtra (India) became the first Thermal Power Station in the world to receive this certification after its publication in mid 2011.

3

National Mission for Enhanced Energy Efficiency (NMEEE)

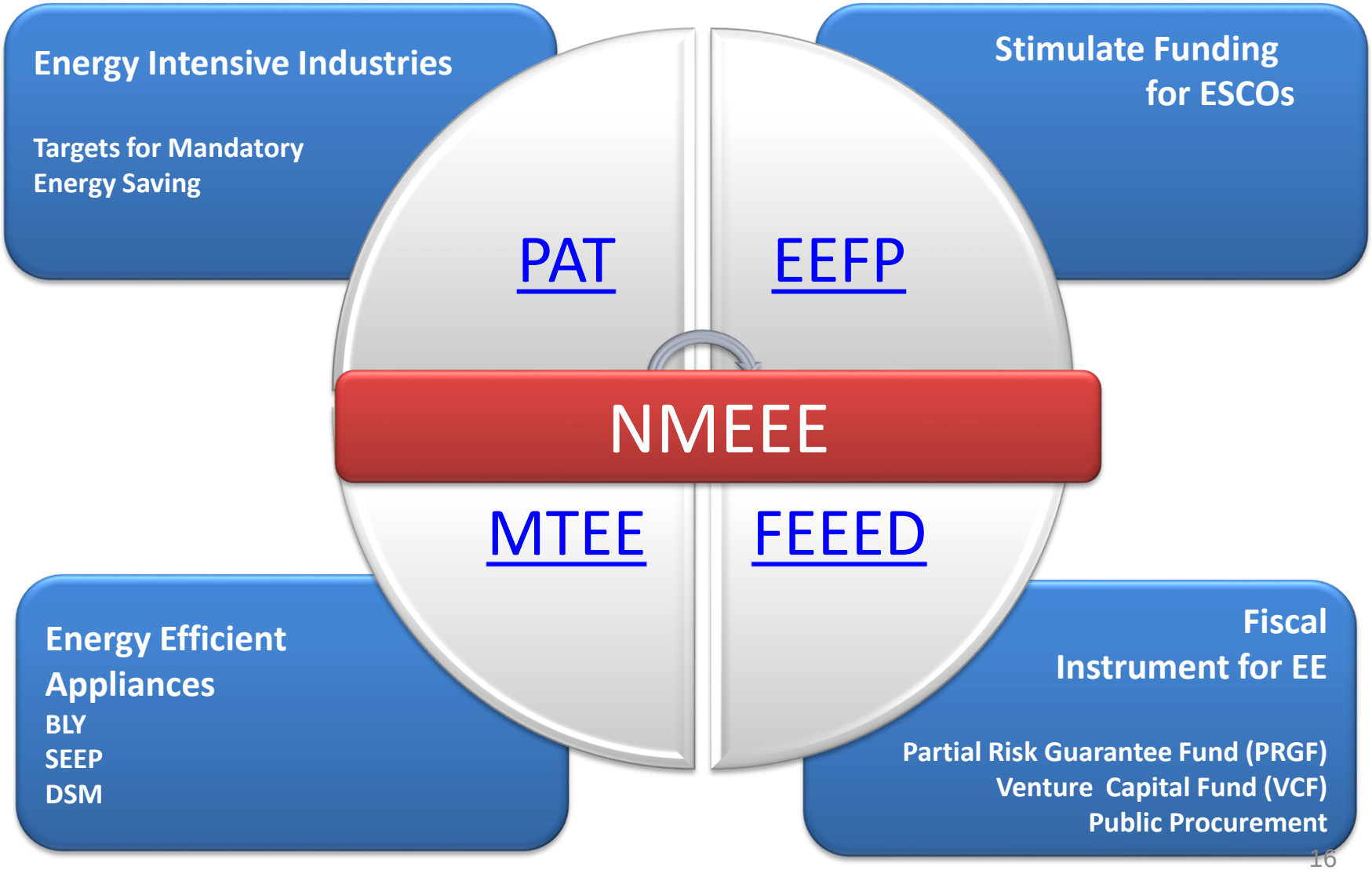
NATIONAL MISSION FOR ENHANCED ENERGY EFFICIENCY (NMEEE)

- The National Action Plan on Climate Change was released by Prime Minister of India in June 2008
- The Action Plan Outlines **8 Missions** including National Mission for Enhanced Energy Efficiency (**NMEEE**)
- The basic objective of the NMEEE mission is to ensure a sustainable growth by an approximate mix of 4 E's, namely-Energy, Efficiency, Equity and Environment and unlock energy efficiency opportunities through market based mechanisms.

NMEEE – Four New Initiatives

- ***Perform Achieve and Trade (PAT):*** A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded.
- ***Market Transformation for Energy Efficiency (MTEE):*** Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable-
- ***Energy Efficiency Financing Platform (EEFP):*** Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings.
- ***Framework for Energy Efficient Economic Development (FEEED):*** Developing fiscal instruments to promote energy efficiency

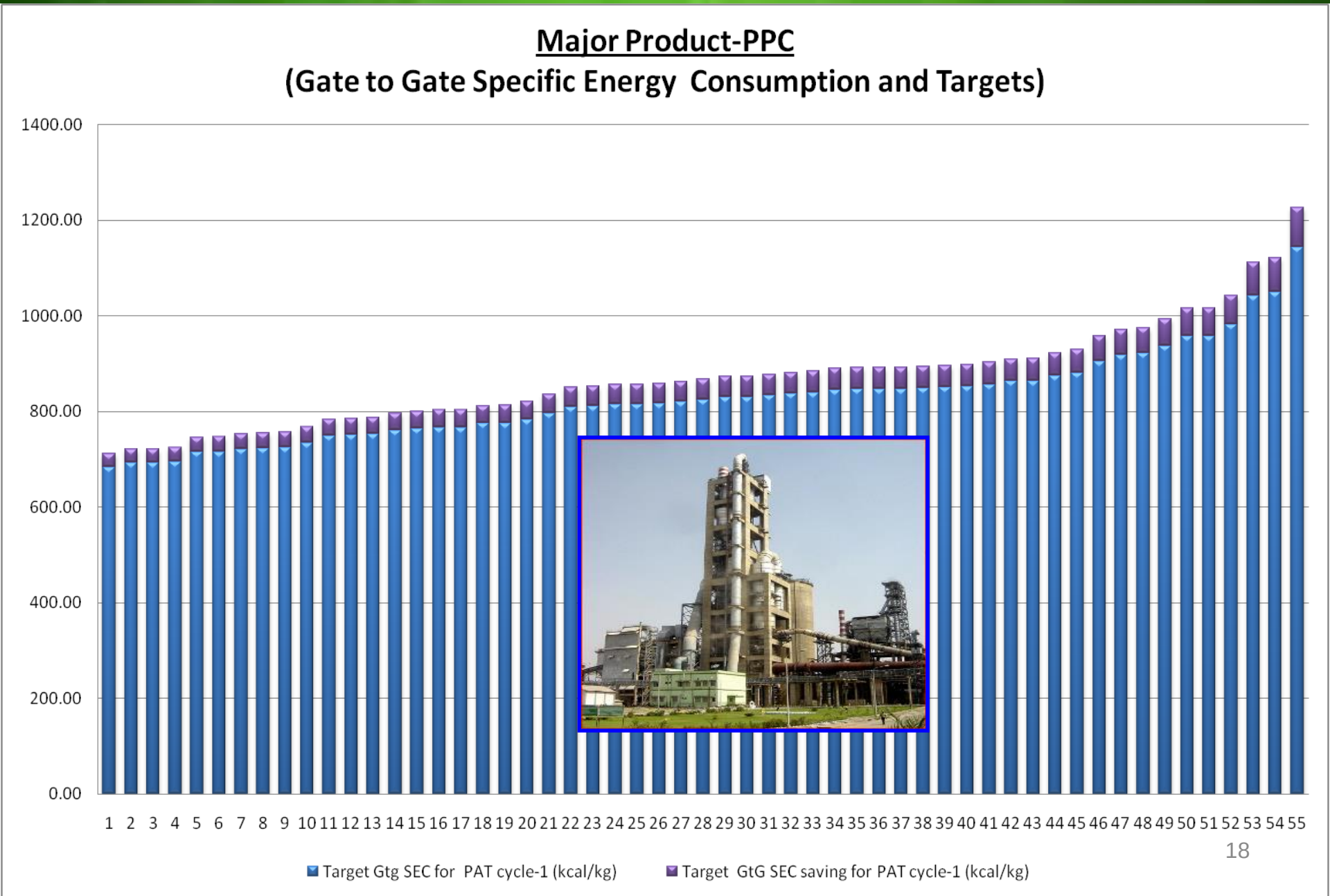
NMEEE – Four New Initiatives



Perform, Achieve & Trade (PAT)

- The key goal of the PAT scheme under National Mission for Energy Efficiency (NMEEE) is to mandate specific energy efficiency improvements for the most energy intensive industries.
- The scheme builds on the large variation in energy intensities of different units in almost every sector
- The energy intensity reduction target mandated for each unit is dependent on its current efficiency : the reduction target is less for those who are more efficient, and is higher for the currently less-efficient units.
- The design of PAT is the result of extensive consultations over the last two years (2010-11 and 2011-12), which have contributed to its robustness and simplicity.

Cement Sector- An Example



PAT Scheme

- **Covers 478 designated consumers in 8 sectors, consuming about 165 million toe energy.**
- **National Target = 6.686 million toe at the end of 1st PAT Cycle (by 2014-15)**
- **Reducing India's CO2 emissions by 24 million tons / year in 2014-15.**

-Achievement > Target ⟹ E-Scerts

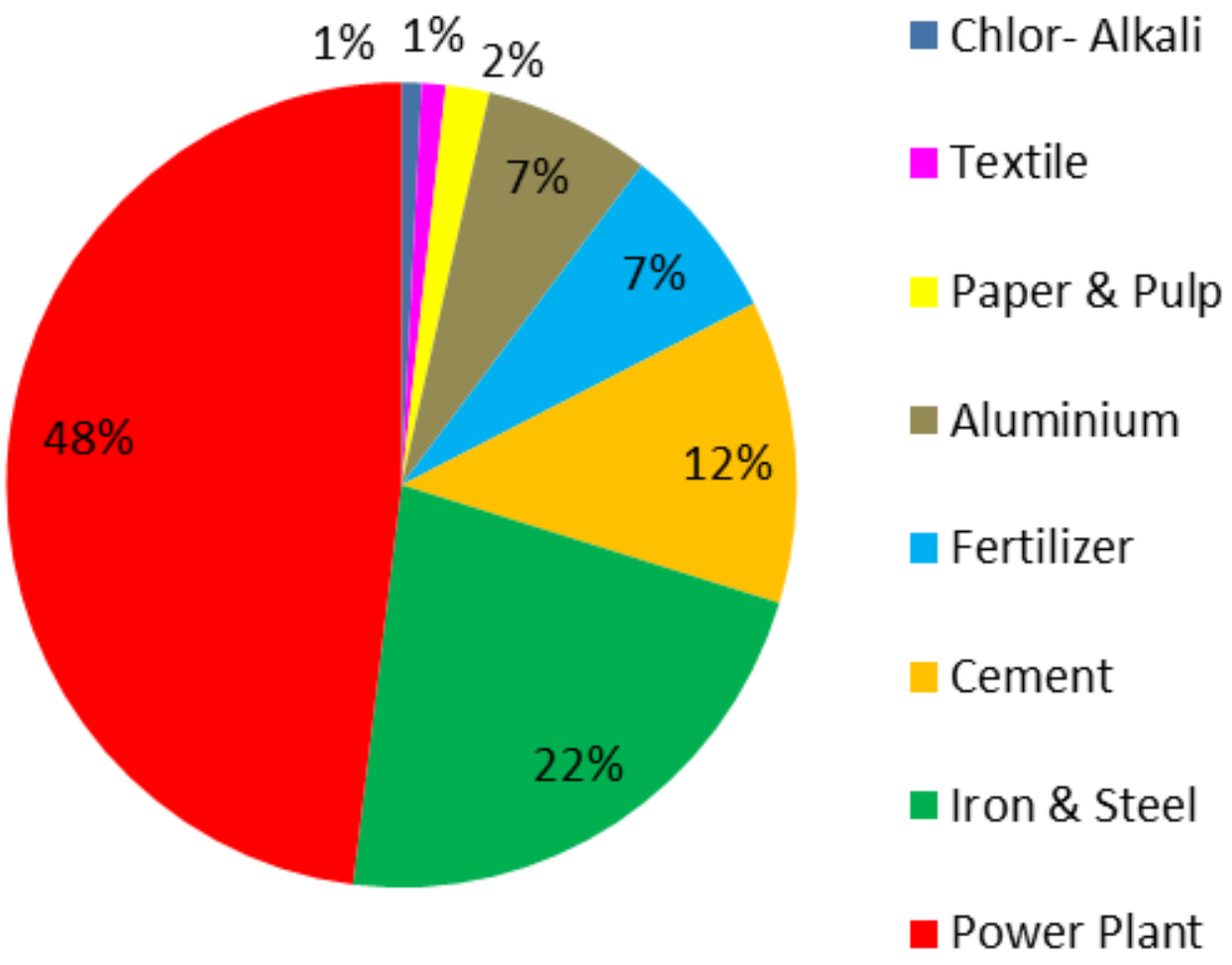
-Achievement < Target ⟹ Purchase E-Scerts / Penalty

- **The Energy Savings Certificates (ESCerts) so issued will be tradable on special trading platforms to be created in the two power exchanges (Indian Energy Exchange and Power Exchange India).**
- **The direct benefit for the participating industries in this period is reductions in input costs related to energy of approximately US$ 1250 million.**
- **Total EE Projects planned in 2012-15: 2057**
- **Total anticipated investment : US$ 3095 million**

National Target of Energy Saving among all Sectors

S.NO.	Sector	No. of Identified DCs	Annual Energy Consumption (Million toe)	Share Consumption (%)	Apportioned Energy Reduction For PAT Cycle-1 (Million toe)
1	Power (Thermal)	144	104.56	63.38%	3.211
2	Iron & Steel	67	25.32	15.35%	1.486
3	Cement	85	15.01	9.10%	0.815
4	Aluminium	10	7.71	4.67%	0.456
5	Fertilizer	29	8.20	4.97%	0.478
6	Paper & Pulp	31	2.09	1.27%	0.119
7	Textile	90	1.20	0.73%	0.066
8	Chlor- Alkali	22	0.88	0.53%	0.054
	Total	478	164.97	100.00%	6.686

Sectoral Share in Energy Saving Target (%) (2012-15)



Market Transformation for Energy Efficiency (MTEEE)

- **Bachat Lamp Yojana (BLY) (Energy Saving Lamp Scheme)**
  - Total sales of CFLs have increased to 350 million (in 2011) from 180 million (in 2008) when the Bachat Lamp Yojana (BLY) was conceptualized.
  - The doubling of CFL market, even though BLY has contributed to only about 15% of the increase, suggests that the transformation conceptualized under BLY has occurred.
- **Super Efficient Equipment Program (SEEP)**
- Fans account for about 12% of residential electricity consumption in India today.
- SEEP will bring to market ceiling fans that are twice as efficient (35 Watts) as those currently available (75 Watts). Programme will incentivize manufactures to produce and sell super efficient equipment/ appliances for accelerated introduction to bring market transformation
- India is also looking to expand SEEP to promote the adoption of additional super-efficient products, like light emitting diodes (LEDs).

Framework for Energy-Efficient Economic Development (FEEED)

- Fiscal instruments to promote energy efficiency project implementation have been developed
- **PRGFEE:** Debt guarantee to Financial Institutions for ESCO (Energy Service Companies) investments (upto US$ 0.55 million or 50% of loan, whichever is less)
- **VCFEE:** Equity investments in ESCO projects (upto US$ 0.36 million or 15% of equity, whichever is less)

4

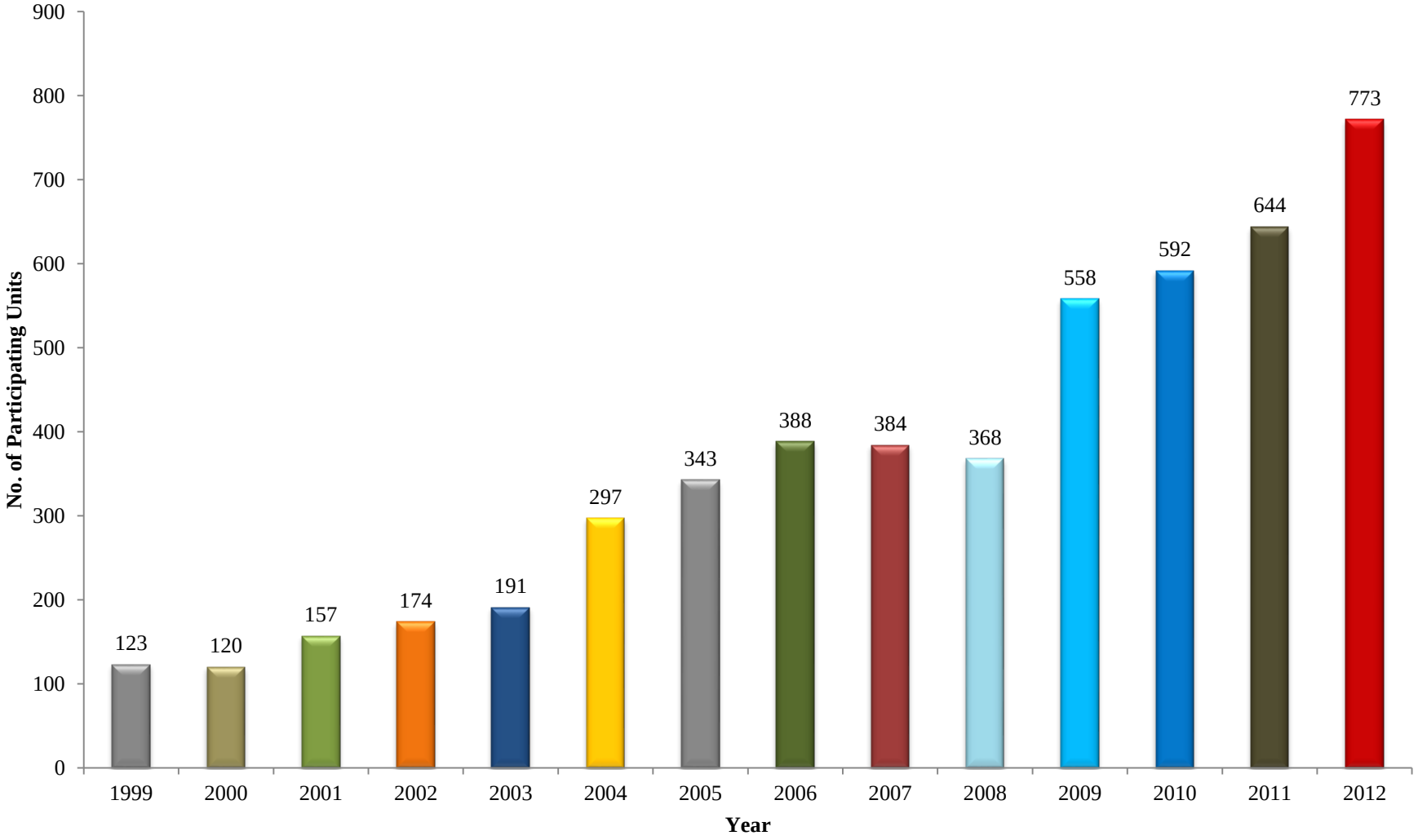
Voluntary Initiatives to promote Energy Efficiency

National Energy Conservation Awards

- **Motivated industry and other establishment to adopt energy efficiency measures**
- **Scheme has become very popular among industries and buildings, as is evident from increasing participation level (773 nominations in 2012 in comparison to 123 nominations in 1999)**

The President of India, Shri Pranab Mukherjee, presenting the National Energy Conservation Awards at the inaugural function of the National Energy Conservation Day - 2012 at Vigyan Bhavan in New Delhi on December 14, 2012.

ENCOURAGING RESPONSE FROM INDIAN INDUSTRY AND OTHER ESTABLISMENTS IN THE NATIONAL ENERGY CONSERVATION AWARD SCHEME (1999-2012)



YEAR WISE ENERGY SAVINGS ACHIEVED BY PARTICIPATING UNITS (1999 to 2012)

Year	No. of Participating industrial units	Annual Savings in Rs. Million	One time investment in Rs. Million	Electrical Energy Saving		Furnace Oil & Other liquid fuel Savings, in 10^5 kL	Coal Savings in 10^5 Metric Tons
				Million kWh	Equivalent avoided capacity in MW		
2012	**773**	**28860**	**19480**	**4177**	**616**	**2.65**	**25.53**
2011	644	23900	22010	3421	504	3.29	33.21
2010	592	21380	54570	2422	357	3.41	23.42
2009	558	23770	31800	2451	359	5.65	12.4
2008	368	18590	24930	2216	325	1.85	3.47
2007	384	18430	29230	1620	308	1.25	5.86
2006	388	11350	12660	1288	245	1.19	5.17
2005	343	9930	13190	1327	252	2.4	7.58
2004	297	7630	13640	814	155	2.49	5.37
2003	191	5390	10710	542	103	2.21	12.65
2002	174	5940	6910	641	122	1.7	7.4
2001	157	5870	6590	485	90	2.21	4.79
2000	120	3660	6300	524	100	1.327	0.64
1999	123	2050	9400	205	45	1.62	2.15
Total 14 years		**186750**	**261420**	**22133**	**3581**	**33.65**	**149.53**

Painting Competition on Energy Conservation for Elementary School Students

- The scheme aims at sensitizing the children towards issues of energy conservation
- Ministry of Power and Bureau of Energy Efficiency have been organizing painting competitions on energy conservation for the last 7 years for students of the 4^{th}, 5^{th} and 6^{th} standards at School, State and National levels
- The scheme aims at sensitizing the children towards issues of energy conservation.
- The scheme is being executed in all the 28 States and 7 UTs of India
- In the year 2012, more than 3,000,000 students participated in comparison to about 343,000 students in 2005.

First Prize Winning Painting- 2012

FIRST PRIZE
US$ 2000

K R Roshni, Standard V, Tamil Nadu (India)

5

Conclusions

Impact of Energy Efficiency Initiatives

- Standards and Labelling of equipment and appliances programme has created a market transformation
- Energy saving targets have been fixed for 8 sectors of energy intensive industry- 6.686 million ton of oil equivalent by 2014-15
- The PAT scheme is a unique and innovative initiative, perhaps with no precedence anywhere else in the world.
- PAT would become a valuable model for other countries to adopt for their own energy efficiency programmes with a business perspective.
- Various activities under different initiatives have resulted in savings in avoided power generation capacity of about 10,836 MW during 11th Five Year Plan (2007-2012).

12th Plan(2012-17): Projected Energy Savings

- The strategies adopted during the 11th Five Year Plan (2007-12) have showed encouraging outcomes.
- 12th Plan (2012-17) will carry forward the existing schemes as well as further strengthen the EE initiatives to accelerate the process of implementation of energy efficiency measures to achieve the desired energy savings.
- Projected Savings in Billion kWh (BU):

➢ 44.85 BU (consumer end)

➢ 60.17 BU (at generating side)

➢ Additional thermal energy saving equivalent to 21.30 million ton of oil equivalent energy is expected to be achieved by 2016-17

We all have our personal doomsday scenarios with respect to an extremely "energy hungry" world

Year 1900

It is never too late to practice energy modesty and efficiency otherwise...

Year 2000

Year 2020

Year 1800
Year 2050

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