सत्यमेव जयते

Climate Change and Constitutional Response

The Vital Role of Energy Efficiency

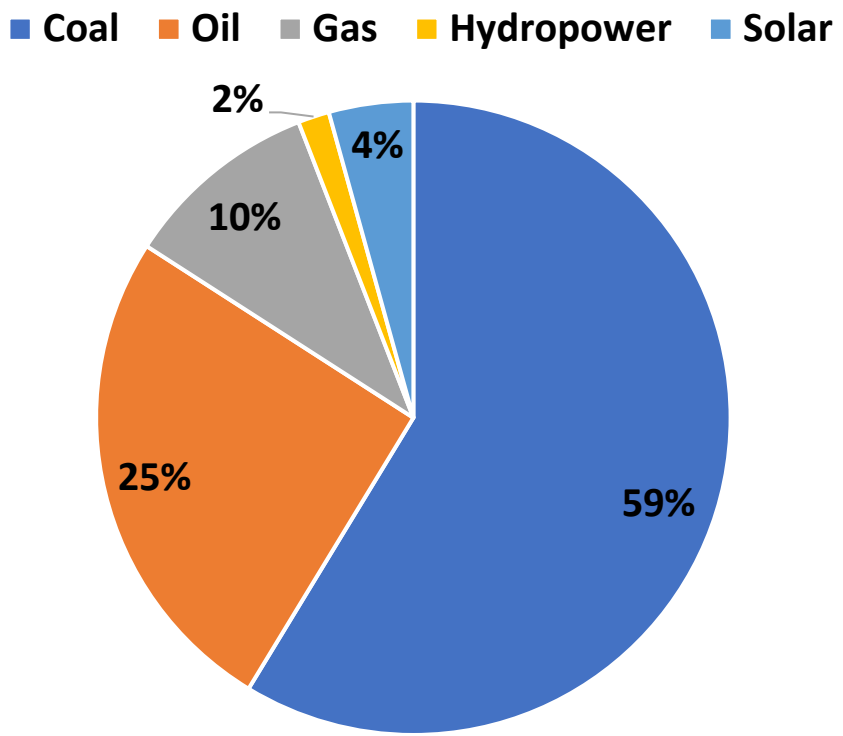
26 November 2023

Bureau of Energy Efficiency,

Ministry of Power

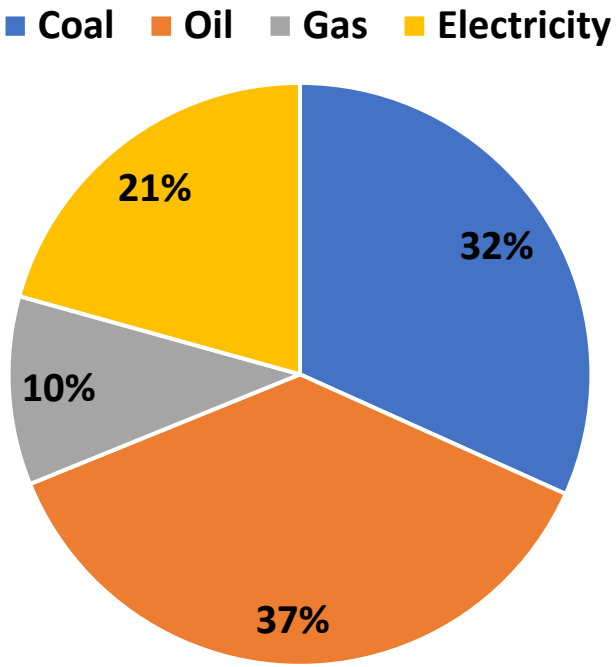
Energy Scenario – India

Total Primary Energy Supply



Total Primary Energy Supply (TPES)
802.95 million TOE

Total Final Energy Consumption



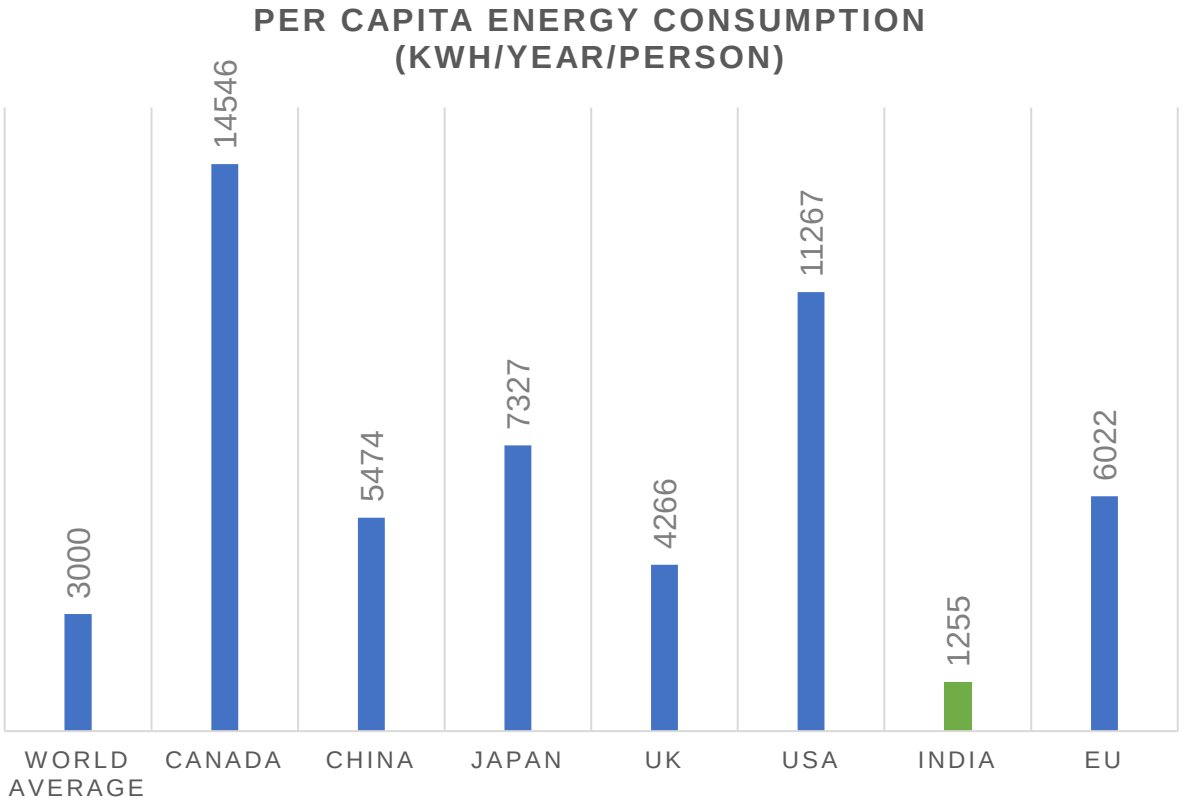
End Use Consumption
538 million TOE

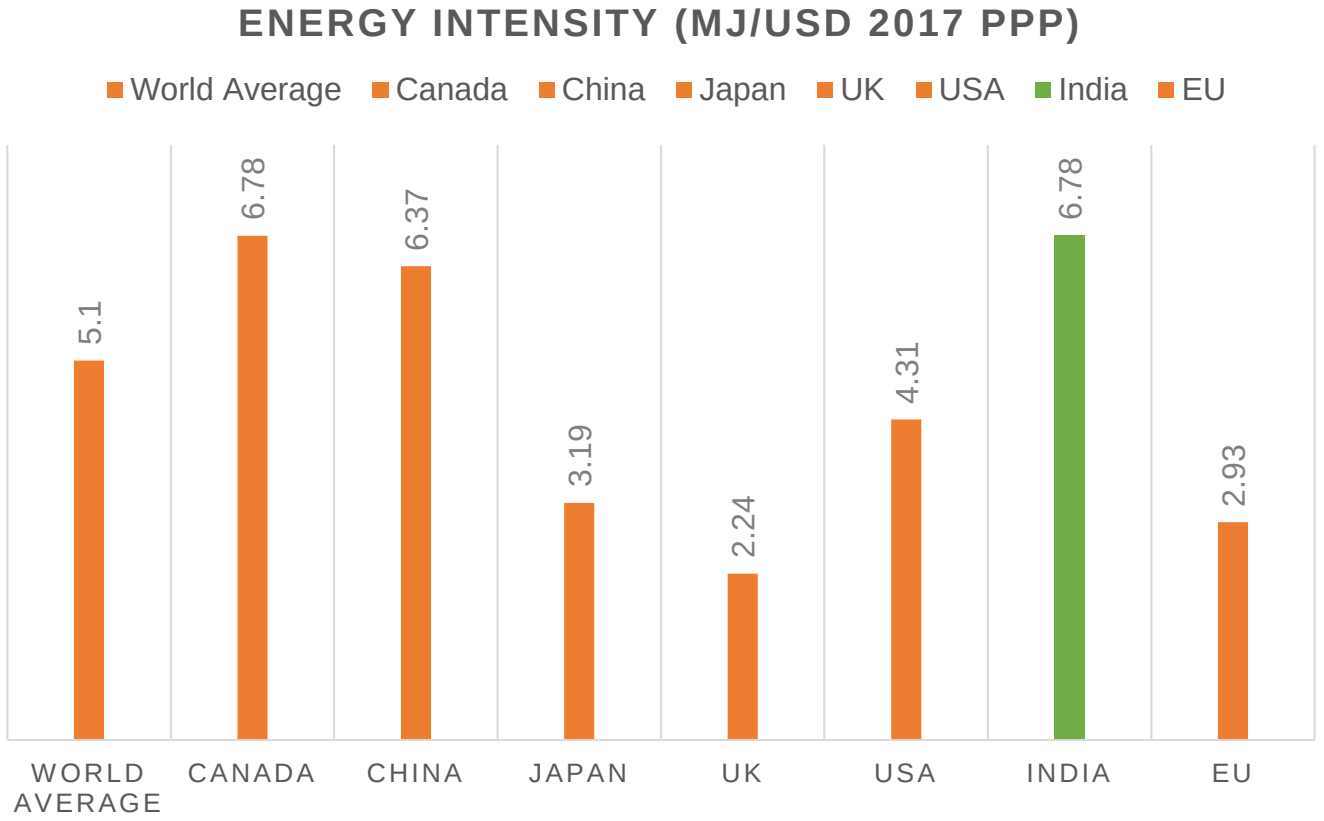
Source: India Energy Statistics, GOI and IEA – India Energy Review, 2021

Energy needs of Growing Economy

For sustained 8% GDP growth rate till 2031-2032

Energy Required 3-4X and Electricity 6-7X from current

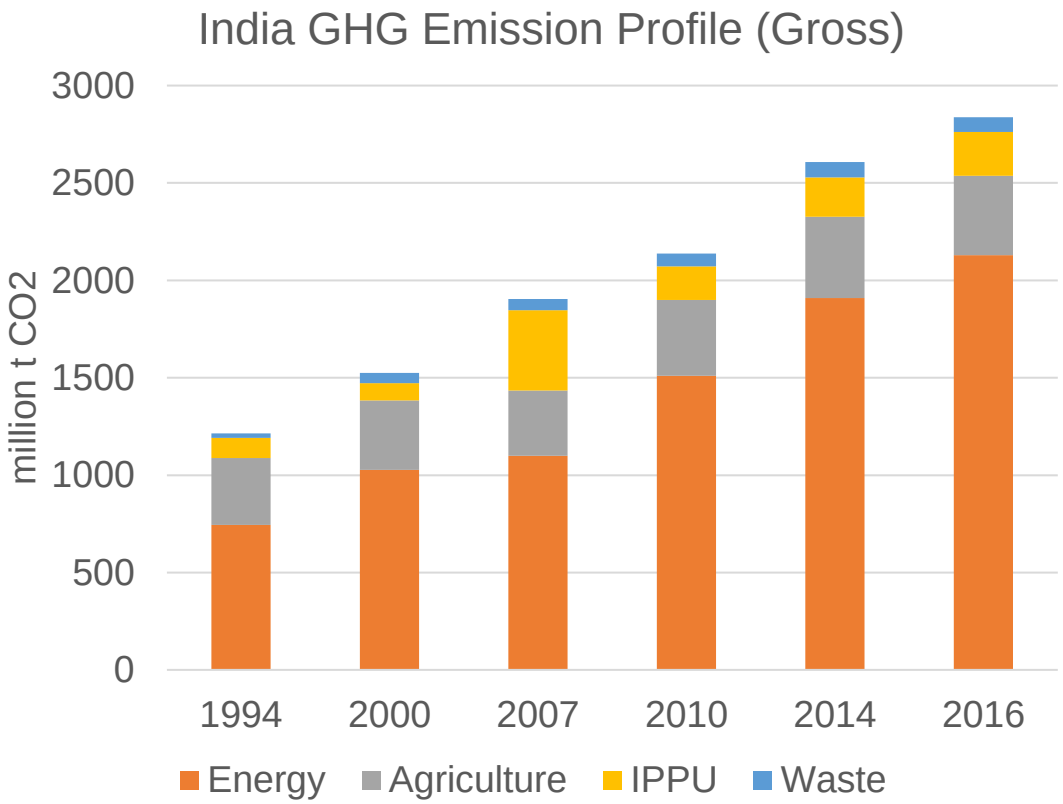


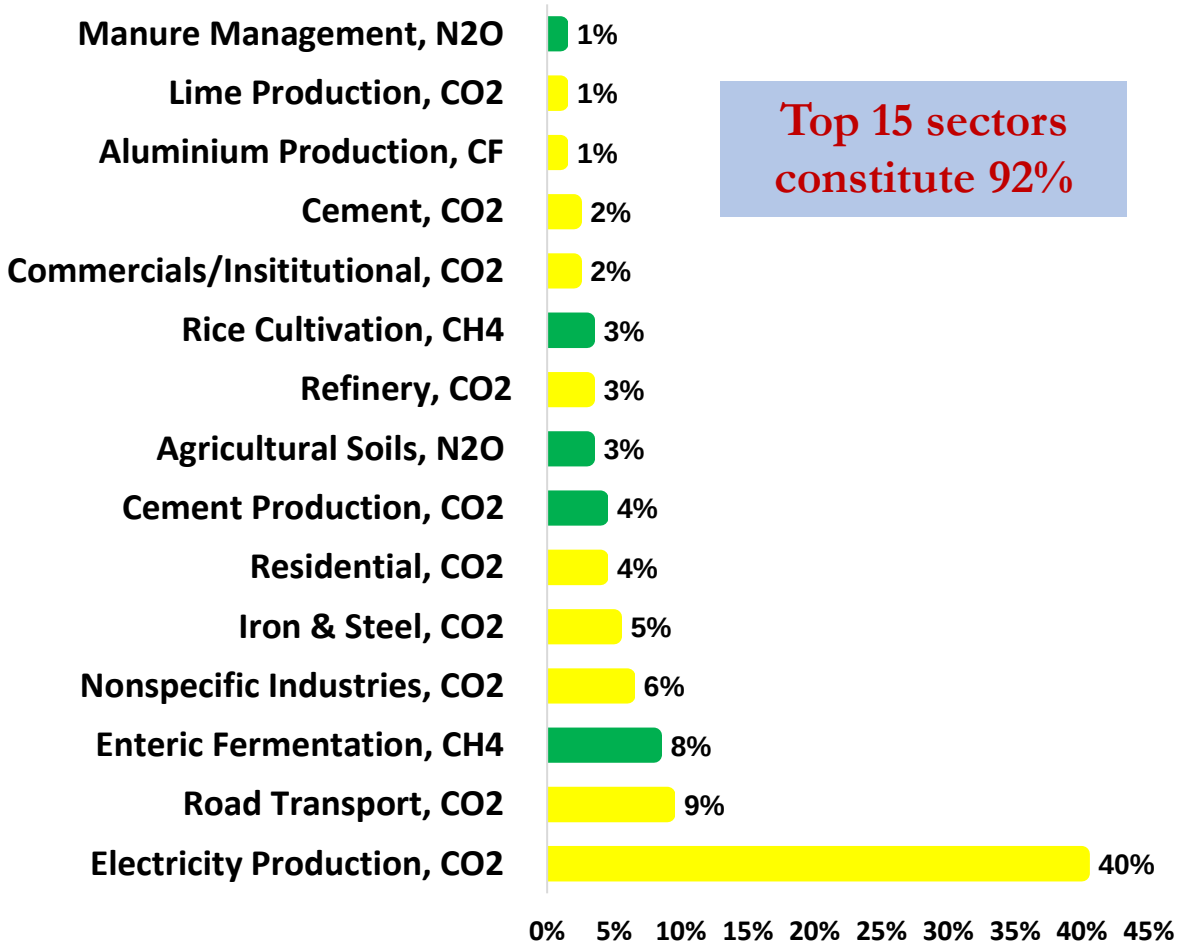


We as a country have lower per capita which is expected to grow, but at the same have the opportunity to improve our energy efficiency

Source: Ministry of Power and The World Bank

India GHG Emissions - Profile





Top 15 sectors constitute 92%

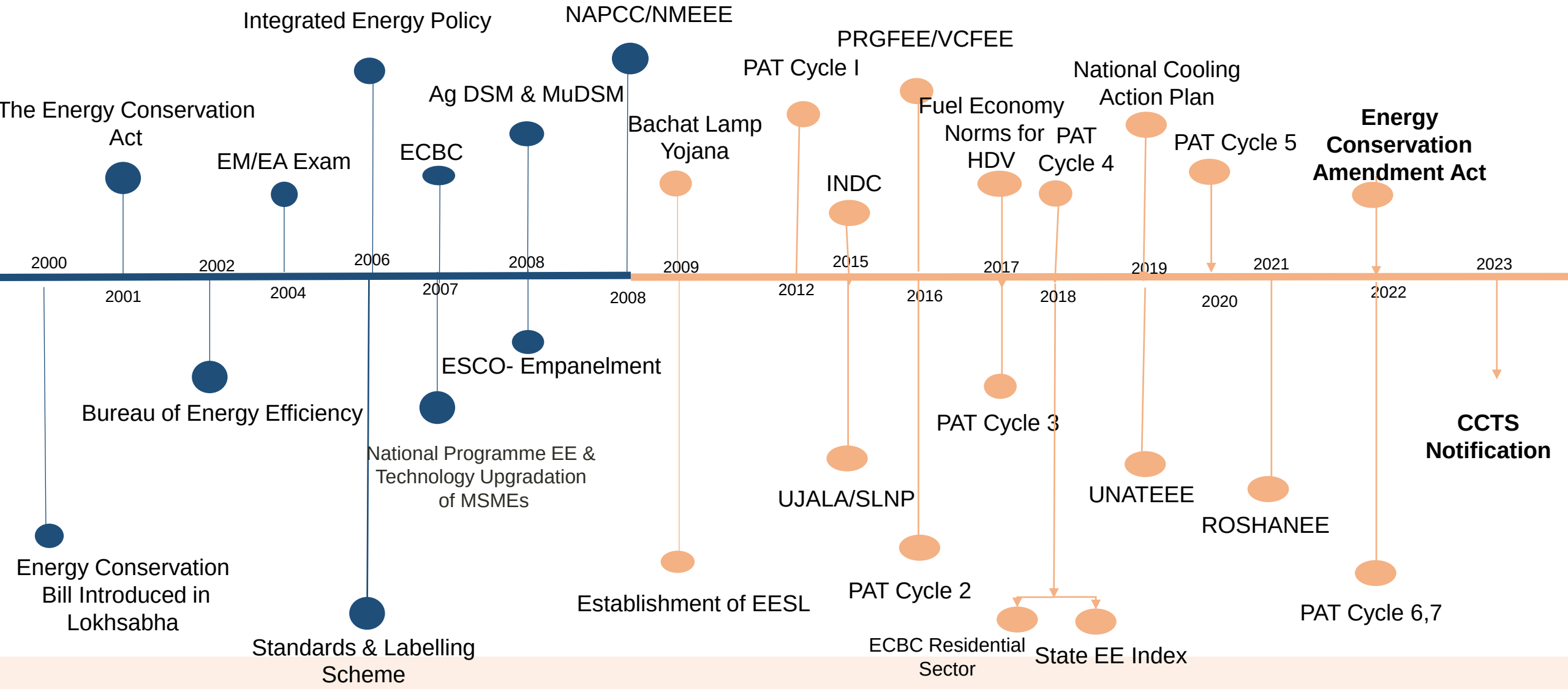
IPPU – Industrial, Process and Product Use, LULUCF – Land Use, Land Use Change and Forestry

Sources: National Communication, BUR -1,2,3 (+) emissions and (-) Removals

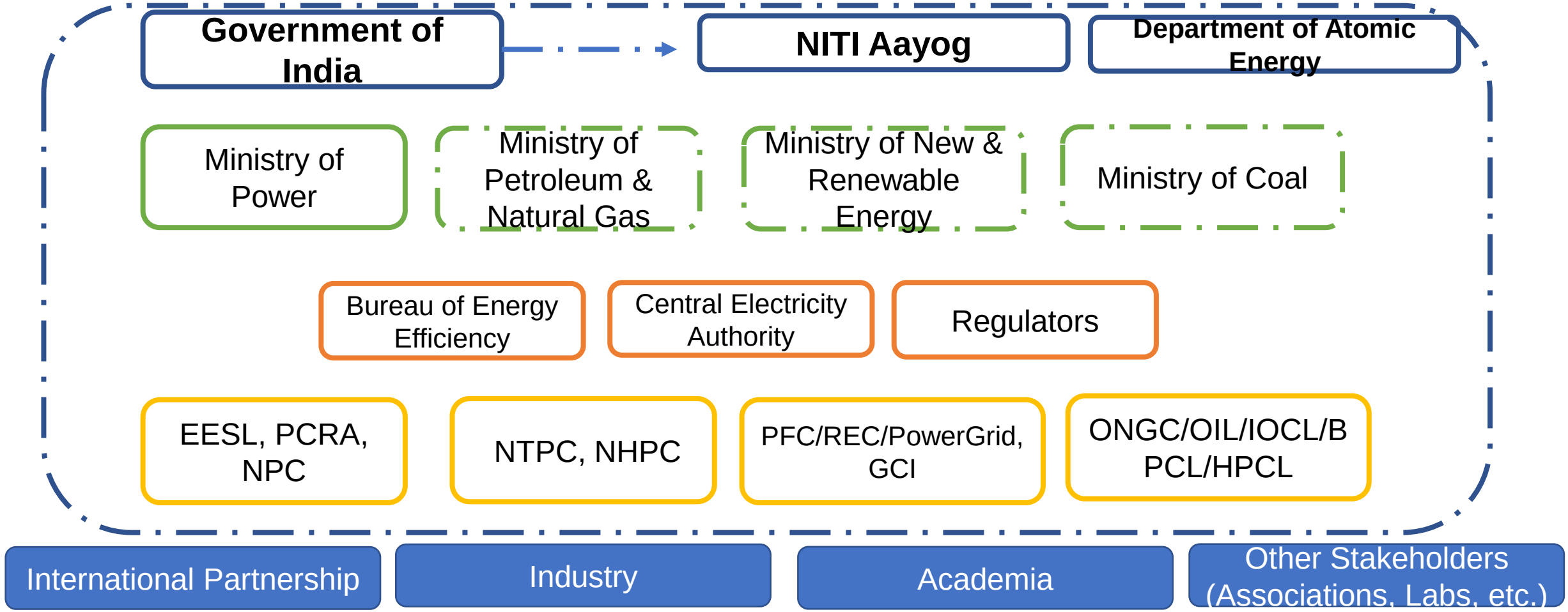
Why there is a need of Government intervention for Energy Efficiency ?

- Technology Availability
- Market Structure
- Awareness & Capacity Building
- Conflicting Objectives
- Efficiency & Emission Reduction Potential
- Competitiveness
- Financing & Demonstration

Energy Efficiency (2001-Present)

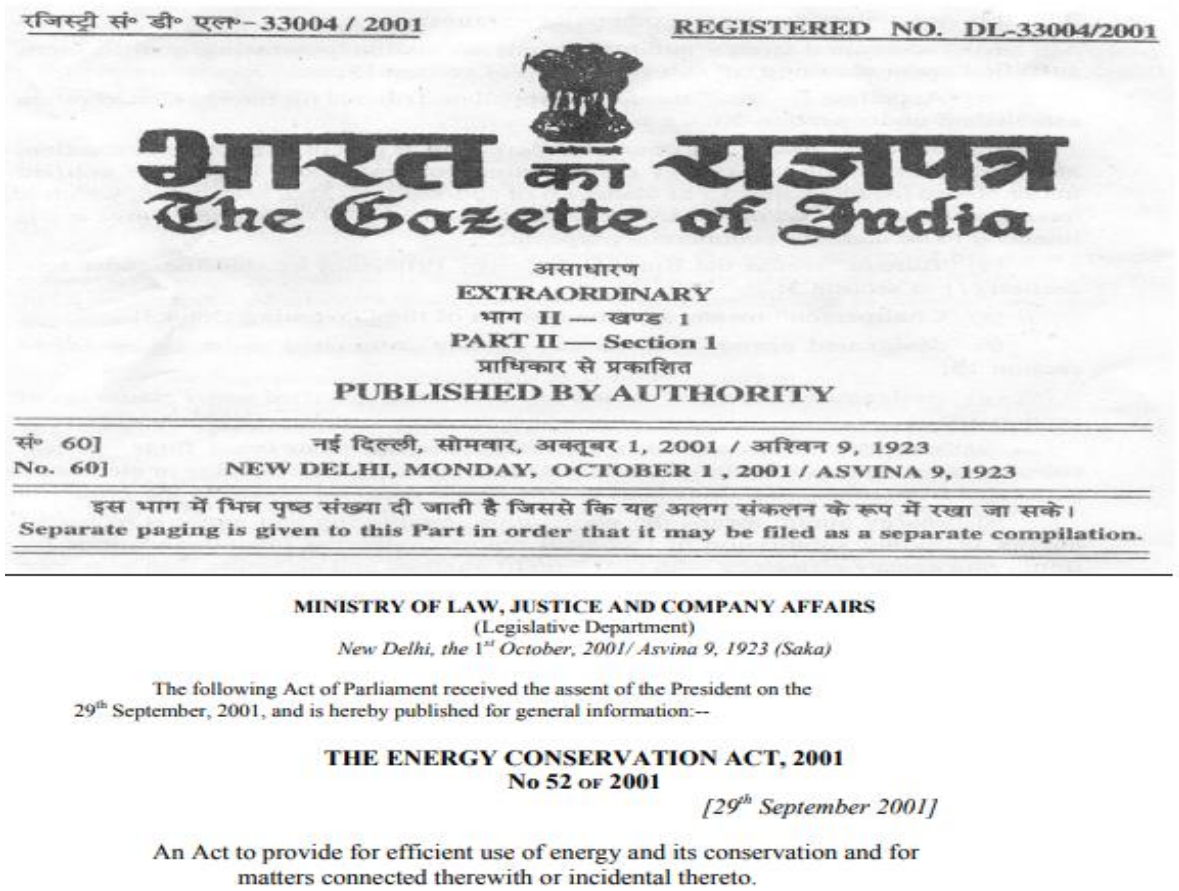


Institutional Structure – Energy



The Energy Conservation Act 2001

- Government of India enacted the Energy Conservation Act, 2001
- Effective from 01 March 2002
- Establishment of BEE – (earlier Energy Management Centre)
- Provides –
  - Legal Framework
  - Institutional arrangement
  - Enforcement mechanisms at the Central and State level



रजिस्ट्री सं० डी० एल०-33004 / 2001 REGISTERED NO. DL-33004/2001

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II — खण्ड 1
PART II — Section 1
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं० 60] नई दिल्ली, सोमवार, अक्तूबर 1, 2001 / अश्विन 9, 1923
No. 60] NEW DELHI, MONDAY, OCTOBER 1, 2001 / ASVINA 9, 1923

इस भाग में भिन्न पृष्ठ संख्या दी जाती है जिससे कि यह अलग संकलन के रूप में रखा जा सके।
Separate paging is given to this Part in order that it may be filed as a separate compilation.

MINISTRY OF LAW, JUSTICE AND COMPANY AFFAIRS
(Legislative Department)
New Delhi, the 1st October, 2001/ Asvina 9, 1923 (Saka)

The following Act of Parliament received the assent of the President on the 29th September, 2001, and is hereby published for general information:--

THE ENERGY CONSERVATION ACT, 2001
No 52 OF 2001
[29th September 2001]

An Act to provide for efficient use of energy and its conservation and for matters connected therewith or incidental thereto.

The Energy Conservation Act 2001

- Establishment of BEE & State Designated Agencies
- Energy Consumption Norms for Designated Consumers
- Buildings - Energy Conservation Building Code
- Appliances – Minimum Energy Performance Standard
- Capacity Building – Energy Professional (Auditors & Managers)
- Promotion – research & development, innovative financing
- Power of State Government – Enforcement, levy of penalties, promotion etc.

The Energy Conservation (Amendment) Act, 2022

- Enhanced scope of Energy Conservation Building Code to include Sustainability features
- Formulation of Carbon Credit Trading Scheme
- Inclusion of Transport for Minimum Energy Performance Standard
- Hydrogen/Renewable Energy/Non Fossil source usage norms
- Strengthening of State Electricity Regulatory Commission

BEE Activities

Strengthening Institutional Capacity of Partners

- Strengthening of State Designated Agencies (SDAs)
- International Cooperation

Awareness Programs

- General Awareness
- Energy Conservation Awards
- Painting Competition

Demand Side Management

- Agriculture DSM
- Municipal DSM
- Energy Efficiency in SMEs
- Capacity Building of DISCOMs

National Mission for Enhanced Energy Efficiency (NMEEE)

- Perform, Achieve and Trade (PAT)
- Market Transformation for Energy Efficiency (MTEE)
- Framework for Energy Efficiency Economic Development (FEEED)
- Energy Efficiency Financing Platform (EEFP)

Transport Sector

- Fuel Efficiency Norms
- Plug-in Electric Vehicle (PEV)

Buildings EE

- ECBC Commercial
- ECBC Residential
- Star Labelling of Buildings

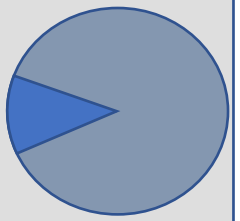
Equipment & Appliances

- Standards & Labelling
- Super Energy Efficient Programme (SEEP)

2010

TPES: 515 mtoe
Electricity: 793 BU
C02: 1583 Mt

Covered by BEE **15%**



Energy Savings

2.5 Mtoe

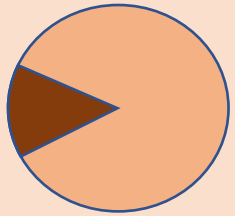
8.7 BU

Energy Audits	Voluntary
Examinations	9000
PAT	8/478 Sector
Star Labeling (V)	8
Star Labeling (M)	4
Buildings	Commercial
DSM	Agri, Municipal, SME
Other Sectors	Nil

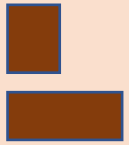
2015

TPES: 661 mtoe
Electricity: 948 BU
C02: 2092 Mt

Covered by BEE **25%**



Energy Savings



12 Mtoe

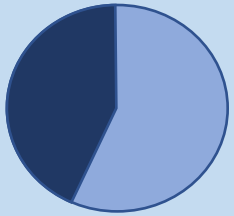
140 BU

Energy Audits	Voluntary
Examinations	13368
PAT(Sector/DC)	8 /478
Star Labeling (V)	11
Star Labeling (M)	8
Buildings	Commercial
DSM	Agri, Municipal, SME
Other Sectors	Transport

2020

TPES: 930 mtoe
Electricity: 1252 BU
C02: 2900 Mt

Covered by BEE **40%**



Energy Savings

28 Mtoe

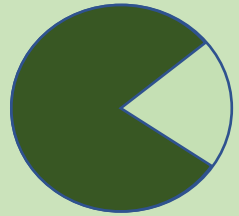
326 BU

Energy Audits	Mandatory
Examinations	19796
PAT (Sector/DC)	13 /1073
Star Labeling (V)	16
Star Labeling (M)	10
Buildings	Comm & Resi.
DSM	Agri, Municipal, SME,DISCOM
Other Sectors	Cooling, CAFÉ, EV, Airports

2030

TPES: 1450 mtoe
Electricity: 2455 BU
C02: 5400 Mt

Covered by BEE **75%**



Energy Savings

129 Mtoe

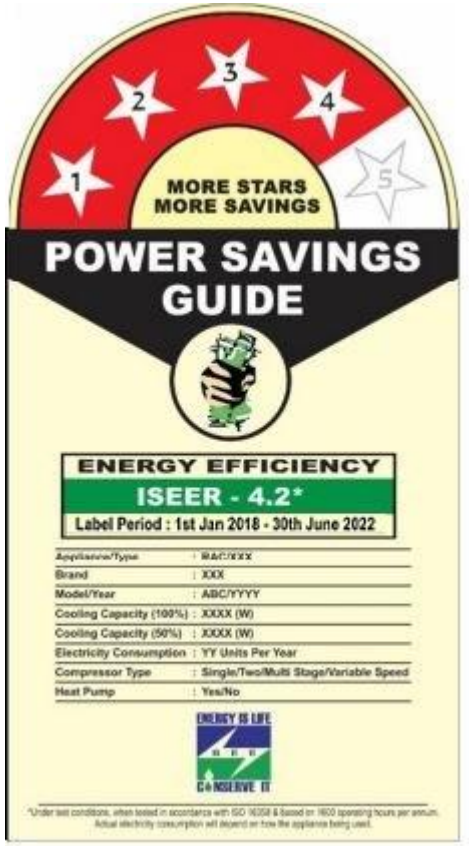
379 BU

Energy Audits	Mandatory
Examinations	50000
PAT(Sector/DC)	18 /3000+
Star Labeling (V)	30+
Star Labeling (M)	20+
Buildings	All
DSM	Agri, Municipal, SME,DISCOM
Other Sectors	Cooling, EV, Battery, H2, etc.

Standards & Labelling

Objective:

- To reduce the end use energy consumption of appliances without diminishing the service levels.
- To create awareness amongst the consumers, to make informed decision considering the cost effectiveness & energy performance while purchasing appliances.

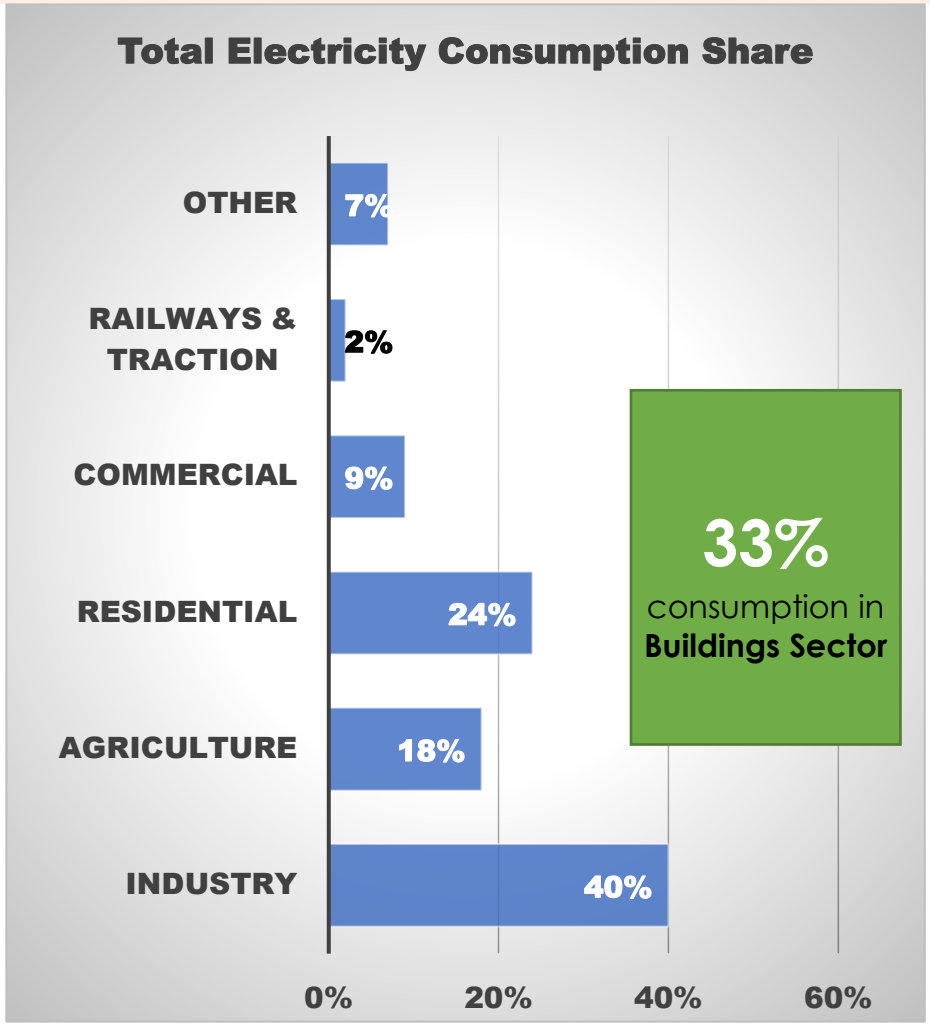


- Total production no. for the appliances during 2022-23 is about 55 Crore.
  - Total Brands registered = 3126
  - Total Model registered = 22192
- Program resulted in savings of 70 BU during 2021-22.
- Achieved a reduction of 57 Mn tonne of CO2 emissions.
- About 15,000 retailers have been trained under Retailers' Training Program.

Standards & Labelling (S&L) Programme

S. No.	Mandatory	S. No.	Voluntary
1	Frost Free Refrigerator	1	General Purpose Industrial Motor
2	Direct Cool Refrigerator	2	Submersible Pump Set
3	Deep Freezers	3	Domestic Gas Stove
4	Room Air Conditioner (Variable Speed)	4	Computer
5	Room Air Conditioner (Fixed Speed)	5	Ballast
6	RAC (Cassette, Floor Standing Tower, Ceiling, Corner AC)	6	Office Automation Products
7	Light Commercial AC Fixed Speed	7	Diesel Engine Driven Monoset Pumps for Agricultural Purposes
8	Stationary Storage Type Electric Water Heater	8	Solid State Inverter
9	Tubular Fluorescent Lamps	9	Diesel Generator Set
10	LED LAMPS	10	Microwave Oven
11	Ultra-High Definition (UHD) Televisions	11	Solar Water Heater
12	Colour Television	12	Air Compressors
13	Distribution Transformer	13	High Energy Li-Battery
14	Ceiling Fan	14	Tyres/Tires
15	Chillers (w.e.f 1st January, 2024)	15	Side by Side/Multi Door Refrigerator
16	Washing Machine (w.e.f 1st January, 2024)	16	Pedestal Fan
		17	Table/Wall Fan
		18	Induction Hob
		19	Solar PV

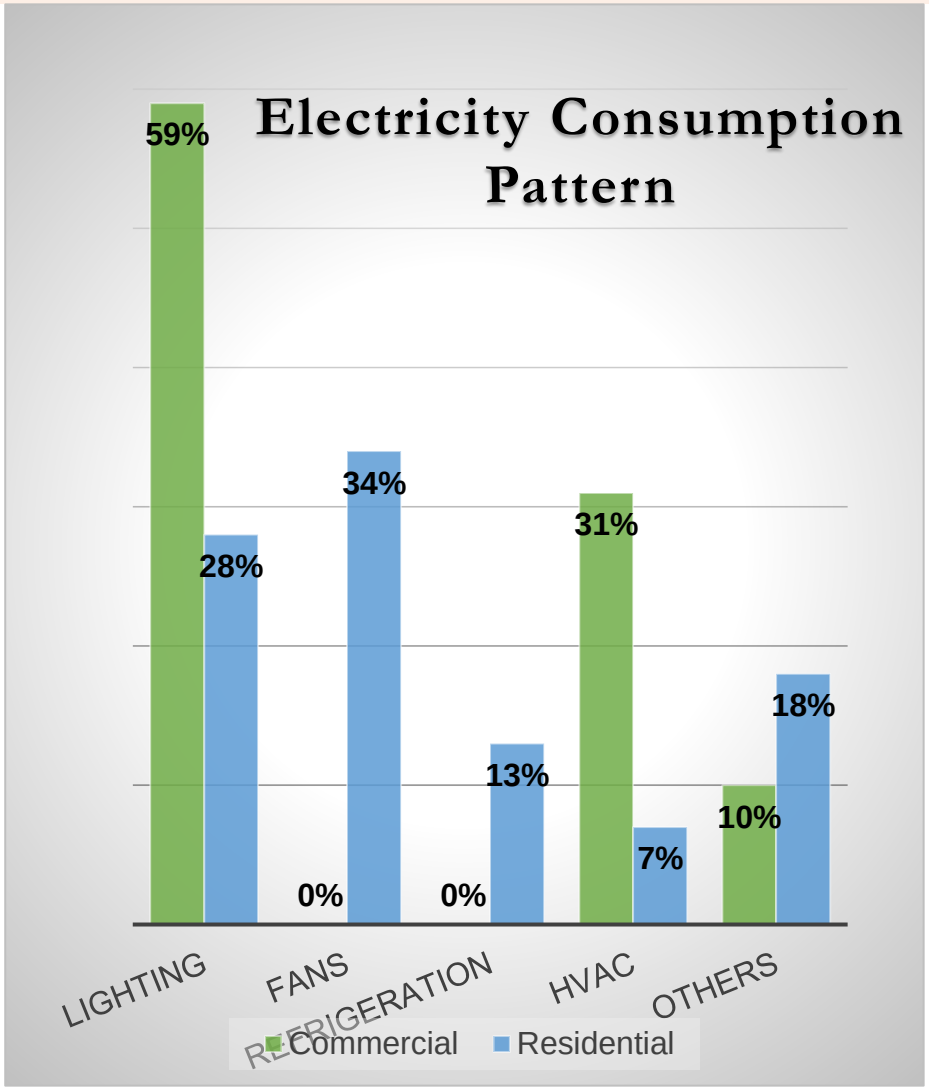
Building Sector Profile



1 Billion m^2
Commercial Buildings
will be
added by 2030

3 Billion m^2
Residential Buildings
will be
added by 2030

Building Sector will surpass Industry by 2030



Energy Efficiency in Building Sector

01 Energy Conservation Building Code (ECBC) for Commercial Buildings 2017

02 Star Rating of Commercial Buildings >250

03 Support for Demonstration Projects

04 Eco Niwas Samhita (ENS) for Residential Buildings 2018

05 Buildings Material Directory

06 >2600 Replicable Building Design and Compliance Tool

Energy Conservation Building Codes (ECBC)

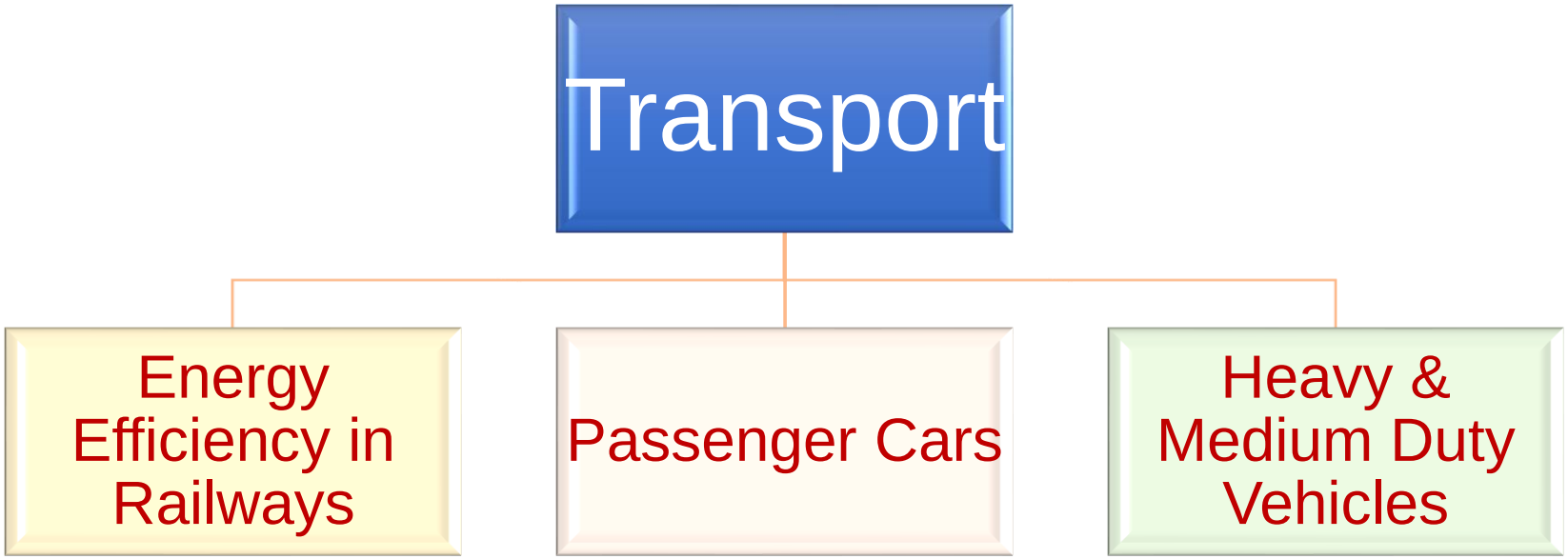
Status of State level adoption

Notified States/UTs	
1. Andaman & Nicobar,	13. Punjab,
2. Andhra Pradesh,	14. Puducherry,
3. Assam,	15. Rajasthan,
4. Arunachal Pradesh,	16. Sikkim,
5. Haryana,	17. Telangana,
6. Himachal Pradesh,	18. Tripura,
7. Karnataka,	19. Uttarakhand,
8. Kerala,	20. Uttar Pradesh,
9. Madhya Pradesh,	21. West Bengal,
10. Mizoram,	22. Goa,
11. Odisha,	23. Jharkhand,
12. Chhattisgarh,	24. Tamil Nadu

In Final Stage of Notification	Code Amended and in approval phase
25. Bihar,	31. Ladakh,
26. Gujarat,	32. Lakshadweep,
27. Jammu & Kashmir,	33. Meghalaya,
28. Maharashtra,	34. Delhi,
29. Manipur,	35. Dadra & Nagar Haveli and Daman & Diu
30. Nagaland,	

392 Nos. Urban Local Bodies (ULBs) have started implementing ECBC for building approval process.

Transport Sector



Inclusion of railways under PAT scheme to reduce carbon footprints

1. **Corporate Fuel Efficiency Standards in place**
2. **Electric Vehicles**

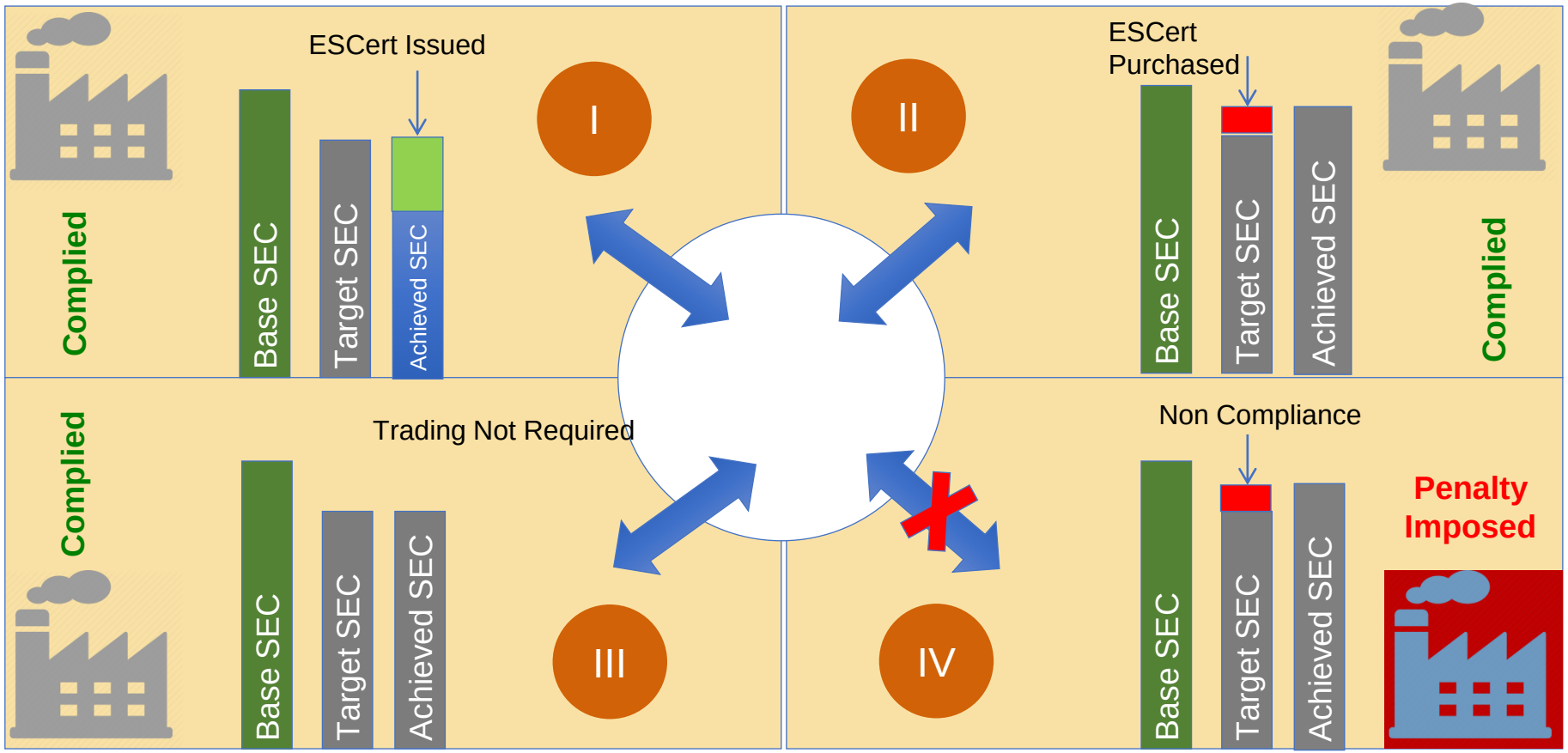
1. **Fuel Efficiency Standards launched**
2. **Electric Vehicles**
3. **Hydrogen Vehicles**

Fuel Economy Norms

S. No	Vehicle Segment	Category/ Description	Status
1	Passenger Cars	M1 Category: Gross vehicle weight (GVW) not exceeding 3,500 kilograms	Notified in April 2015 – stipulates Corporate Average Fuel Efficiency (CAFÉ) norms for the period, Phase 1: 2017-22 Phase 2: 2022 onwards
2	Heavy Duty Vehicles (Buses and Trucks)	M3 and N3 category: Gross vehicle weight (GVW) of 12 tonnes or greater	Notified in August 2017 and amended in September 2020, defining minimum fuel consumption for the period 1st April 2020 onwards
3	Light & Medium Commercial Vehicles	M2 and N2 category: Gross vehicle weight (GVW) 3.5 to 12 tonnes	Notified in July 2019, defining minimum fuel consumption for the period 1st April 2020 onwards

Large Industries – PAT Sector

Perform Achieve and Trade (PAT): A **regulatory instrument** to reduce specific energy consumption in energy intensive industries, with an associated **market based mechanism** to enhance the cost effectiveness through certification of excess energy saving which can be traded.



SEC (Specific Energy Consumption): Energy Consumed per unit production

Realized Outcome: PAT 2

Energy Saving

14.08 mtoe

2.39% of India's total primary energy supply

Emission Reduction

66 million tonnes of CO_2

2.5% of India's emissions

Skill Development

Capacity building: **12000+** Engineers and operators

17000 Energy Auditors & Managers

500 Accreditation

Savings

Rs 31,500 Crores

from saved **energy consumption** and **avoided generation**

Investment

Encouraged investments for energy efficient technologies for domestic manufacturing

Rs 43,721 Crore invested

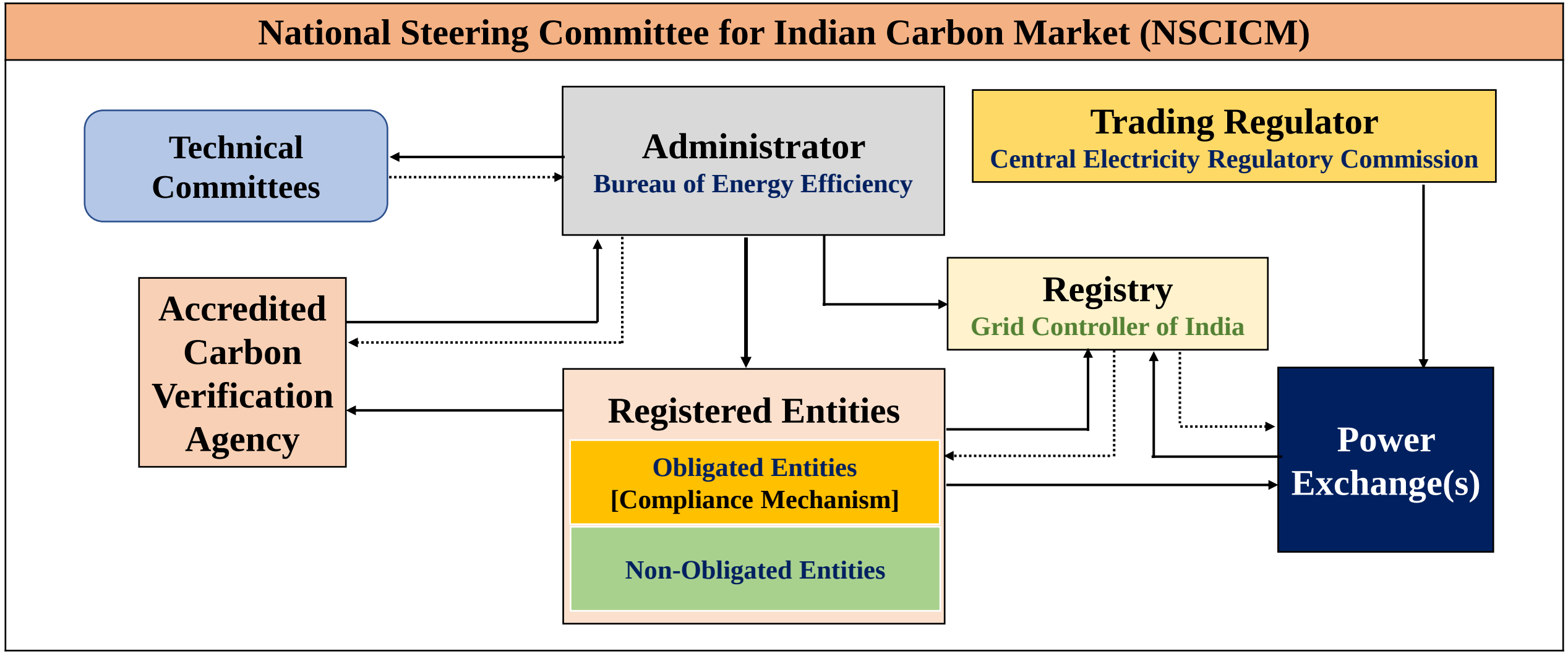
PAT – Scheme –Participation

Sr. No.	Sector / No. of DCs	PAT Cycle I (FY'12-15)	PAT Cycle II (FY'16-19)	PAT Cycle III (FY'17-20)	PAT Cycle IV (FY'18-22)	PAT Cycle V (FY'19-22)	PAT Cycle VI (FY'20-23)	PAT Cycle VII (FY'22-25)	PAT Cycle-VIII (FY'23-26)	Total Notified DCs till date
1.	Aluminium	10	12	1	-	1	-	12	1	**14**
2.	Cement	85	111	14	1	12	37	120	25	**200**
3.	Chlor- Alkali	22	24	-	2	2	-	24	1	**29**
4.	Fertilizer	29	37	-	-	-	-	-	-	**37**
5.	Iron & Steel	67	71	29	35	23	5	134	66	**270**
6.	Paper & Pulp	31	29	1	2	8	2	24	7	**55**
7.	Textile	90	99	34	7	16	7	120	38	**206**
8.	Thermal Power Plant	144	154	37	17	17	-	152	-	**239**
9.	Refinery	-	18	-	-	-	20	-	-	**20**
10.	Railways	-	22	-	-	-	-	26	-	**26**
11.	DISCOMs	-	44	-	-	-	-	95	-	**96**
12.	Petrochemical	-	-	-	8	-	-	-	-	**8**
13.	Buildings	-	-	-	37	31	64	-	-	**133**
	Total	**478**	**621**	**116**	**109**	**110**	**135**	**707**	**138**	**1333**

Need for Carbon Market in India

- **To facilitate cost effective** achievement of India's enhanced **NDC targets** and **future NDC goals**
- To mobilize new mitigation opportunities through **demand for emission reduction credits** by private and public entities.
- To **mobilise** a significant portion of **investments in clean technologies** required by growing economy to transit toward low-carbon pathways.
- To **leverage** the potential international collaboration and financing **opportunities under Article 6** of the Paris Agreement.

Institutional Framework – Indian Carbon Market



Impact of Energy Efficiency Measures: FY 2021-22

- **Annual Electrical Savings of 250 Billion Units**
- **Annual Thermal Energy savings- 24 Million Tonnes of oil equ.**
- **Annual cost savings worth INR 1,60,700 crores approx.**
- **Annual Energy savings of 44 Millions Tonnes of Oil Equivalent i.e., 6.00% of total primary energy supply of the country**
- **Total CO2 emission reduction around 280 Million Tonnes annually**

Thank You