Energy conservation and management

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- India’s Energy Efficiency Journey
- Energy Conservation Act
- Energy Policy
- Overview - National / International Program on Energy Conservation
- Future Outlook & Key Technology / Policy Development
- Equitable Partners in Journey
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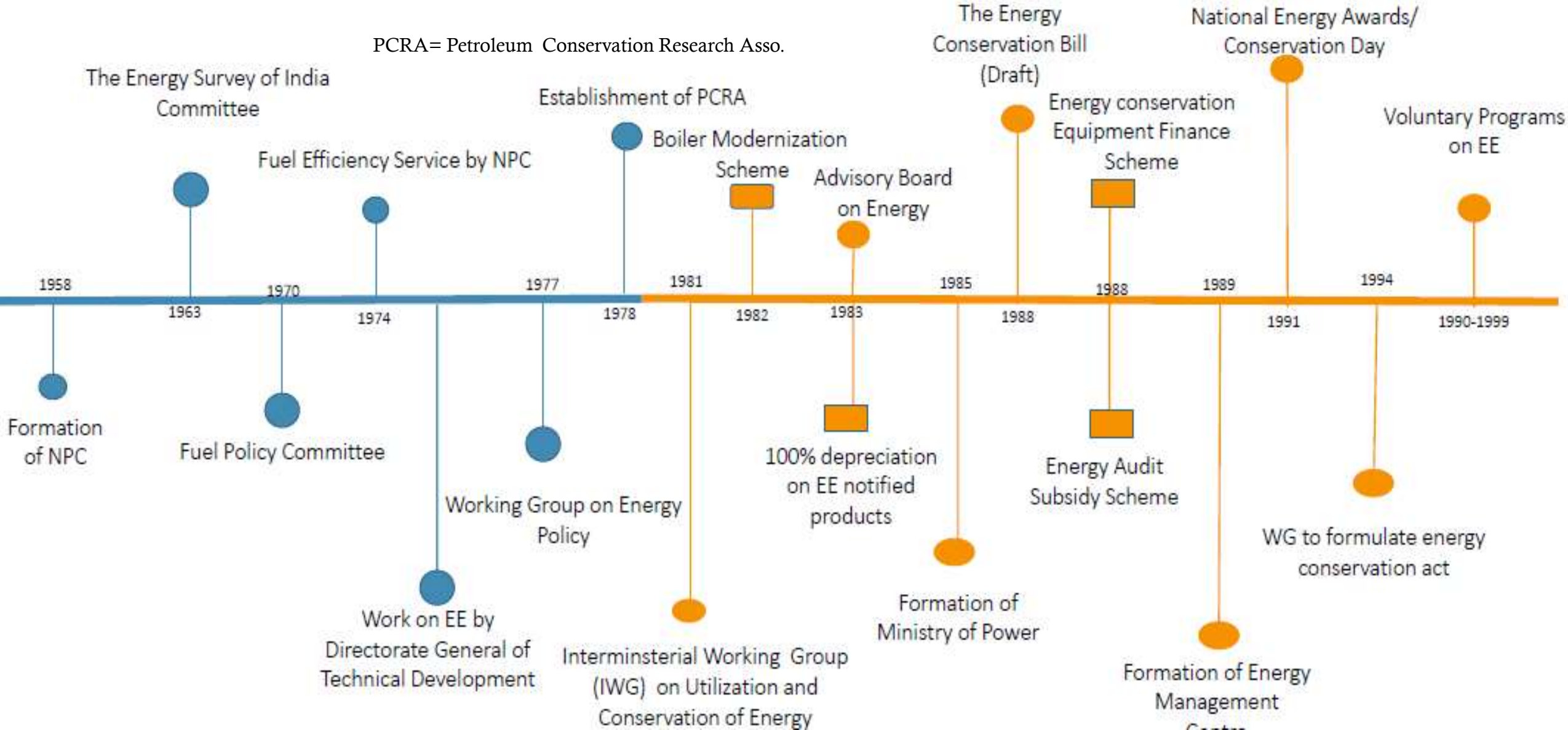
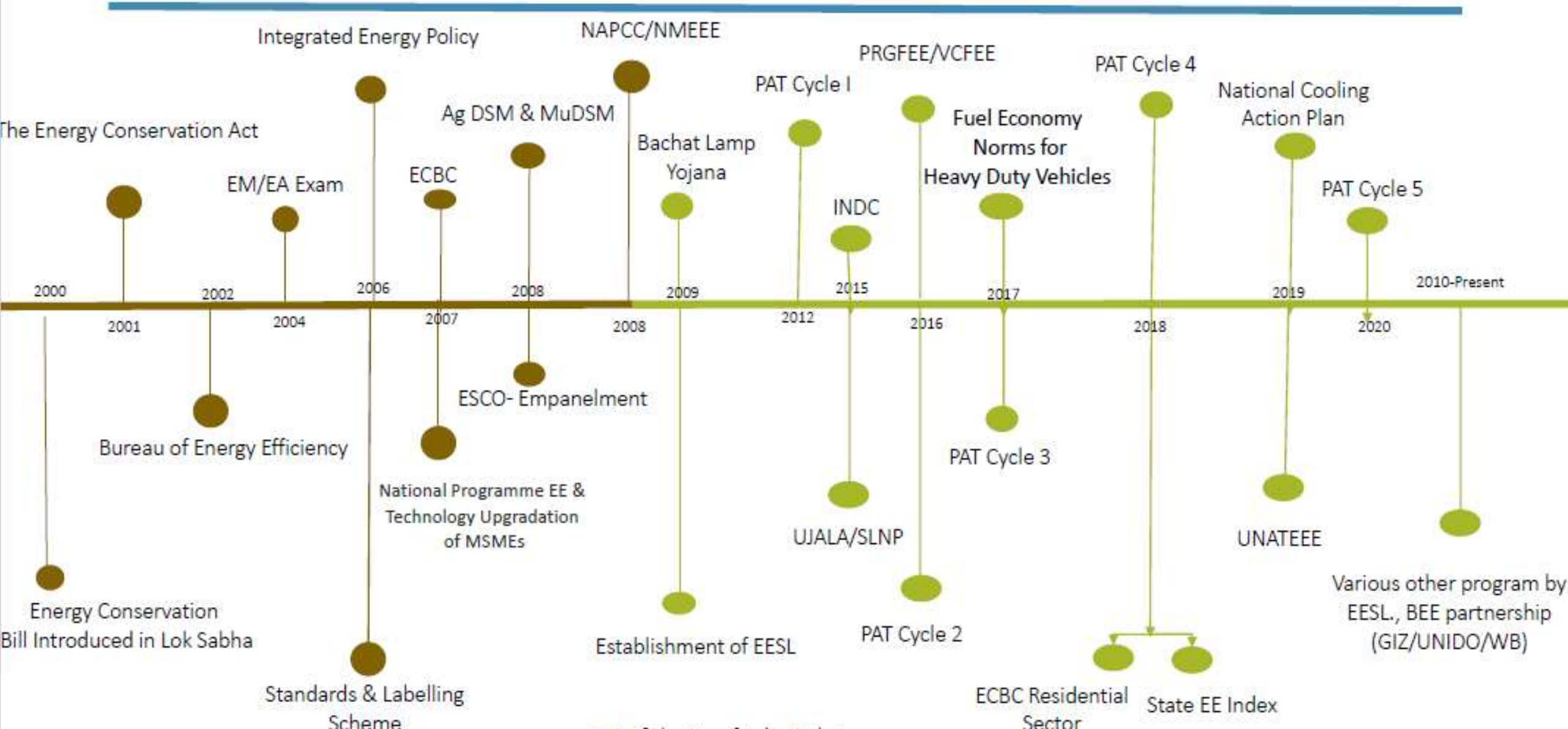
Energy Efficiency (1960-2000)

PCRA= Petroleum Conservation Research Asso.



NAPCC= National Action Plan on Climate Change: NMEEE= National Mission for Enhanced Energy Efficiency;ESCO= Energy Service Company;PAT:Perform Achieve Trade
INDC= Intended Nationally Determined Contributions;EESL= Energy Efficiency Services Limited;SLNP: Street Lighting National Programme;
PRGFEE:Partial Risk Guarantee Fund for Energy Efficiency;VCFEE:Venture Capital Fund for Energy Efficiency

Energy Efficiency (2001-Present)

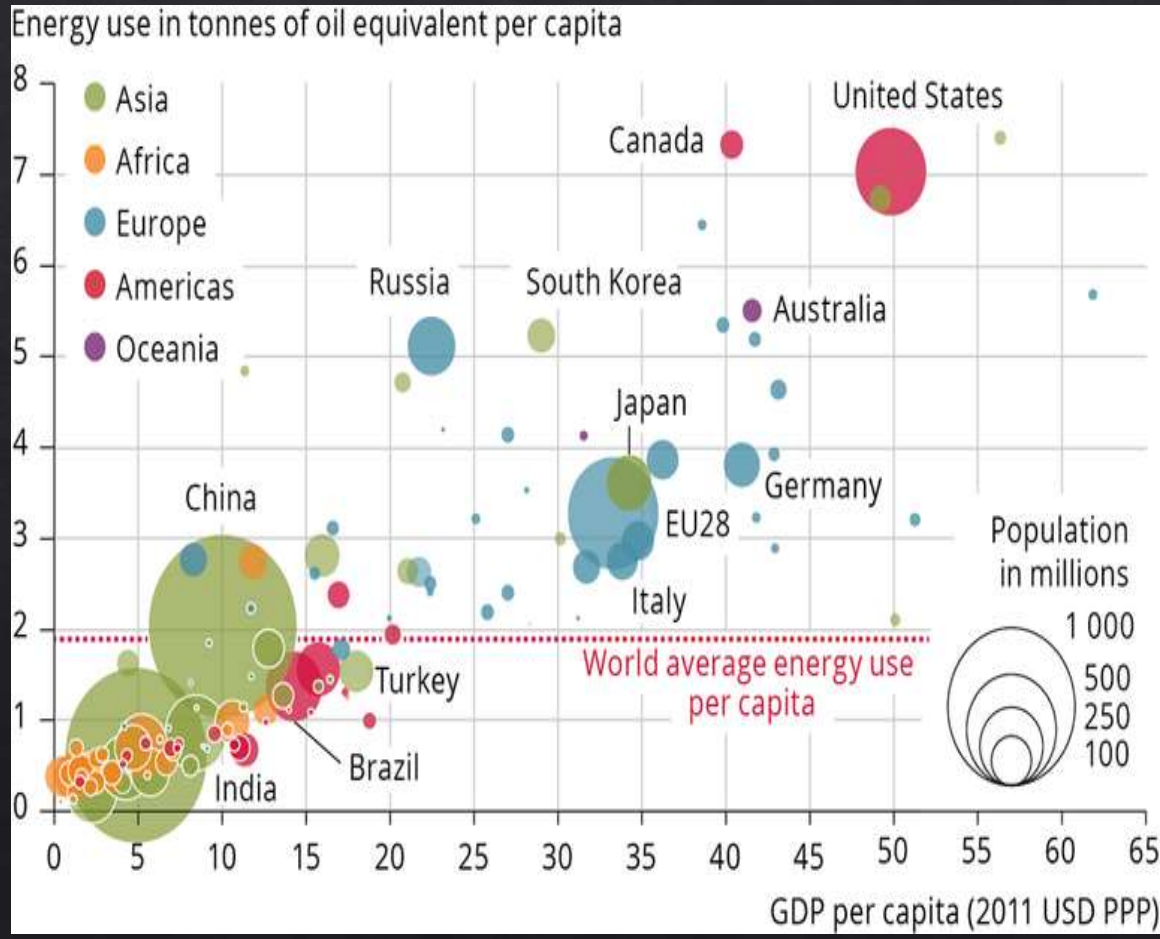


Energy Conservation Act 2001

- Setting up of Bureau of Energy Efficiency (BEE)
- Energy Conservation Building Codes (ECBC)
- Standard & Labelling Program for Appliances (S&L)
- Energy Consumption Norms for Designated Consumers (DC)
- Certification for Energy Manager / Auditors and Accreditation of Energy Auditing Firm

Objective of EC Act

- India one of the fastest growing economy in the world
- Estimated India's GDP grow at pace of 7% to 9%
- Per Capita Energy Consumption very low in India - ~400 to 450 kg of oil equivalent (Avg. world's per capita energy consumption stands at ~2500 to 3000 kg of oil equivalent
- Hence, its evident that India's energy consumption is expected to get double / triple in next few decades
- Leaded to growing imbalance between Supply & Demand
- Gap between Supply & Demand can be fulfil either by increasing generation or by enhancing the efficiency of energy use
- **<u>Enhancing the efficient use of energy, Reduce gab between supply & demand, Reduce environmental emission</u>**



Bureau of Energy Efficiency (BEE)

- Under the provision of EC Act, GOI set up BEE in March 2002
- Objective – Assist GOI in developing policy & strategies for reducing energy intensity of Indian economy
- Role of BEE
  - To prepare standards & labels for Appliance / Equipment (S&L)
  - Develop a list of Designated consumers (DC)
  - Specify certification & accreditation procedure
  - Preparation of Building Code
  - Maintain Energy Conservation Fund
  - Promotional activities in coordination with state & center level agencies
  - Development of energy service company (ESCO)
  - Transforming market for energy efficiency

Energy Conservation Building Code (ECBC)

- Real estate sector expected to grow significantly, with favorable GOI policy (PMAY, RERA, GST, Stamp Duty Benefit…), growing demand for e-commerce, healthcare & logistics
- Building sector constitutes ~33% electrical energy consumption in India
- Estimated that energy consumption of real estate sector is expected to increase ~6 to 15 times in couple of decades
- Energy conservation building code launched in 2007 with **objective to enhance energy efficiency level in existing & new residential or commercial establishment**
- Advancement in energy efficient building technology & management practices and also streamlining implementation & compliance process - ECBC Amended in 2017
- Applicable for large residential / commercial building with **connected load of 100 kW and above or 120 kVA and above**
- Focuses on Building envelop, Heating Ventilation & Air Conditioning (HVAC) system, Interior & Exterior lighting system, Electrical system & Renewable energy use

Energy Conservation Building Code (ECBC)

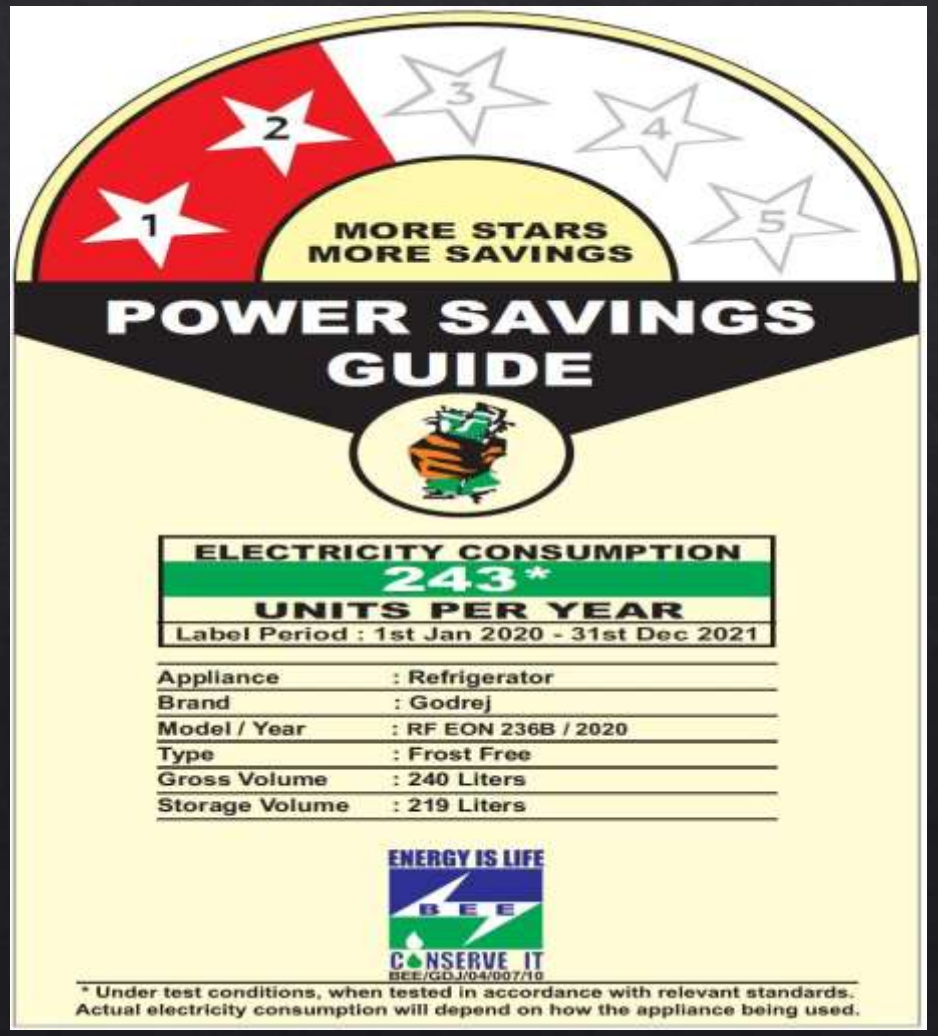
- Star Rating Program for Existing building
- Energy Efficiency Label for Residential Building – In Future
- Building sector incorporated in PAT Cycle 4 (37 hotels) & Cycle 5 (31 hotels)
- Enforcement & Implementation lies with State Gov. ULB & Municipal bodies

Benefit

1. 50% reduction in energy use by 2030 for new commercial building construction leads to energy saving of 300 billion unit
2. Estimated potential saving by labeling program around 388 billion unit by 2030
3. Estimated potential saving of PAT program around 16 million unit by 2022

Standard & Labeling Program (S&L)

- Objective – To provide consumer informed choice about the potential energy saving & thereby cost saving potential of relevant product
- Mandatory to display energy performance of high energy consumer equipment or appliances
- S&L program covers 23 appliances or equipments which has high energy end use
  - Mandatory appliances - Air Conditioner, Refrigerator, TFL, Distribution Transformer, Color TV, Electric Geyser, LED Lamps
  - Voluntary appliances – Induction Motors, Pump Sets, Ceiling Fans, LPG Stove, Washing Machine, Computer, DG Sets, Chillers, Microwave Oven, Ballast, Office equipment (Printer, Scanner)



Standard & Labeling Program (S&L)

- Rating on scale of 1 to 5; 5 being most energy efficient level
- To adhere to S&L program appliances / equipment to undergo check testing
- Check testing done in NABL certified labs – If appliances fails to meet the standard; list of those equipment published in newspaper to keep customer informed

Benefit –

S&L program leads to energy saving of ~70 billion unit in 2019-20, which translates into monetary saving of INR 39,000 cr

Table 1: Energy and Cost Saving for 250 liters Frost Free Refrigerator with different Star Ratings

Star Rating	Energy Consumption Per Year (Approx.)	Per Unit Charge (Approx.)	Electricity Cost/year	Total Savings (w.r.t No Star Every Year)	Refrigerator Cost (Approx)	Cost Difference	Pay Back Period
	Units (kWh)	Rs.	Rs.	Rs.	Rs.	Rs.	Years
No Star	1100	2.50	2750	0	14000	0	0
1	977	2.50	2443	308	15000	1000	3.25
2	782	2.50	1955	795	15500	1500	1.89
3	626	2.50	1565	1185	16500	2500	2.11
4	501	2.50	1253	1498	17500	3500	2.34
5	400	2.50	1000	1750	18500	4500	2.57

Source: Bureau of Energy Efficiency

Designated Consumers (DC)….?

- Energy Intensive Industrial Sector whose consumption is more than threshold consumption classified as Designated Consumer

- Aluminum – 7,500 MTOE
- Cement – 30,000 MTOE
- Chlor Alkali – 12,000 MTOE
- Fertilizer – 30,000 MTOE
- Iron & Steel – 30,000 MTOE
- Pulp & Paper – 30,000 MTOE
- Railways – 70,000 MTOE for Zonal & 30,000 MTOE for Workshop
- Textile – 3,000 MTOE
- Thermal Power Station – 30,000 MTOE
- Petroleum Refinery – 90,000 MTOE
- Electrical Distribution Company – 86,000 MTOE or AT&C loss of 100 MU

Responsibility of Designated Consumers

- Designated Consumers shall designate or appoint energy manager or auditor whose primary responsibility includes conducting energy audit, implementation of energy conservation projects, timely submission of forms etc.
- Designated Consumers to Conduct Energy audits by an Accredited energy auditor within three years with effect from the date of submission of the previous energy audit report
- Furnish details of information on energy consumed & details of action taken on recommendation of accredited energy auditor
- After completion of target year every designated consumers to undergo for Monitoring & Verification study (M&V Study)
- Participation in Escert trading / banking of Escerts
  - DC who has overachieved target can sold Escert
  - DC who shortfall to target can purchase Escert
  - Escert – Tradable Energy Saving Certificates in the Market

Certification of Energy Manager / Auditor

- A graduate Engineer (Bachelor of Engineering/Bachelor of Technology) or equivalent with three years of work experience involving use of energy in operation, maintenance, planning, etc.; or
- A post-graduate Engineer (Master of Engineering/Master of Technology) or equivalent with two years of work experience involving use of energy in operation, maintenance, planning, etc.; or
- A graduate Engineer with post-graduate degree in Management or equivalent with two years of work experience involving use of energy in operation, maintenance, planning, etc.; or
- A diploma Engineer or equivalent with six years of work experience involving use of energy in operation, maintenance, planning, etc.; or
- A post-graduate in Physics or Electronics or Chemistry (with Physics and Mathematics at graduation level) with three years of work experience involving use of energy in operation, maintenance, planning, etc.

Certification of Energy Manager / Auditor

Paper No	Name of the Paper	Duration	Max Marks
I.	General Aspects of Energy Management & Energy Audit	3 Hrs	150
II	Energy Efficiency in Thermal Utilities	3 Hrs.	150
III	Energy Efficiency in Electrical Utilities	3 Hrs.	150
IV	Energy Performance Assessment for Equipment and Utility Systems (Open Book Examination)**	2 Hrs.	100

- The candidate appearing for Energy Manager Examination has to pass THREE papers, viz., Paper-I, Paper-II and Paper-III and obtain a minimum of 50% of the maximum marks in each paper.
- The candidate appearing for Energy Auditor Examination has to pass all the above FOUR papers viz., Paper-I, Paper-II, Paper-III & Paper-IV and obtain a minimum of 50% of the maximum marks in each paper.
- Medium of examination ENGLISH
- Paper-I, Paper-II and Paper-III shall consist of objective and descriptive type questions.

Responsibility of Energy Manager

- Prepare an annual activity plan and present to management concerning financially attractive investments to reduce energy costs
- Establish an energy conservation cell within the firm with management's consent about the mandate and task of the cell.
- Initiate activities to improve monitoring and process control to reduce energy costs.
- Analyze equipment performance with respect to energy efficiency
- Ensure proper functioning and calibration of instrumentation required to assess level of energy consumption directly or indirectly.

Responsibility of Energy Manager

- Establish a methodology how to accurately calculate the specific energy consumption of various products/services or activity of the firm.
- Develop and manage training programme for energy efficiency at operating levels.
- Create knowledge bank on sectoral, national and inter-national development on energy efficiency technology and management system and information denomination
- Co-ordinate implementation of energy audit/efficiency improvement projects through external agencies.
- Establish and/or participate in information exchange with other energy managers of the same sector through association

Energy Policy…Why We Need…?

TATA

ENERGY POLICY

Tata Motors - Commercial Vehicle Business Unit reaffirms its commitment to minimize the use of energy through continual improvement of its energy performance.

Towards this end it shall strive to:

- Create and establish framework for achieving energy objectives and targets
- Select, purchase and use appropriate energy, efficient equipments, services and eco-friendly technologies
- Evaluate and compare with appropriate benchmark
- Comply with applicable legal and other requirements
- Build awareness on efficient energy use amongst our work force, customers, dealers, vendors and society

This policy has been communicated to all our work force and shall be made available to the public/ stakeholders on request.

Date: September 10, 2012

Ravi Pisharody
Executive Director - Commercial Vehicles

TATA MOTORS

ITC Limited
Pspd Unit : Bhadrachalam
(An ISO 9001, ISO 14001 company)

ENERGY POLICY

We at itc pspd Unit : Bhadrachalam DIVISION commit ourselves to continuously improve our Energy performance in all our activities, products and services.

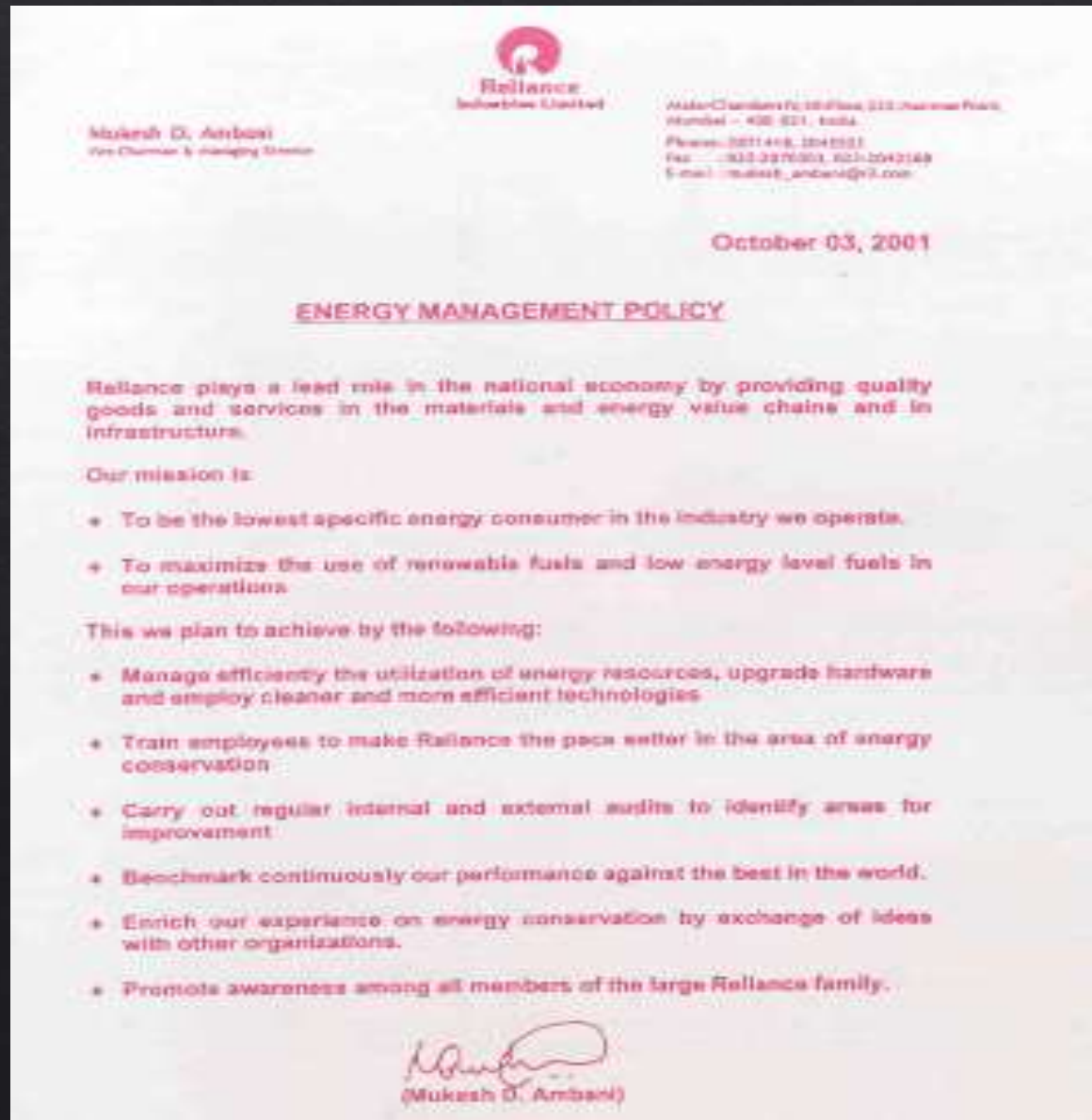
To meet above goals we will strive for

- Maximization of cogeneration
- Adopting appropriate energy conservation Technologies to all our projects.
- Replacement of energy inefficient equipment with energy efficient equipment.
- Conducting conservation studies including audits by engaging external specialists in the respective areas.
- Creating awareness among employees and nearby population through campaigns, publicity about the need for energy conservation.
- Bench marking of energy consumption levels with the best in class, Internationally.
- Recognizing the efforts of employees in energy conservation initiatives and suitably rewarding them.
- Closely monitoring and controlling the energy consumption by utilizing effective energy management systems.
- Maximizing the recovery of waste energy.
- Reducing Specific Energy Consumption at least by 2% annually.

PRADEEP DHOBALE
Chief Executive
Itc pspd Unit : Bhadrachalam

Energy Policy

- Shows organization commitment to energy conservation & environmental protection
- Foundation for setting objective with short & long term goal
- Integrating energy management into organizations culture & operations
- Helps to develop strategy for achieving short & long term goal
- Shows support from top/senior management of organization



Reliance
Industries Limited

Mukesh D. Ambani
Vice Chairman & Managing Director

October 03, 2001

ENERGY MANAGEMENT POLICY

Reliance plays a lead role in the national economy by providing quality goods and services in the materials and energy value chains and in infrastructure.

Our mission is:

- To be the lowest specific energy consumer in the industry we operate.
- To maximize the use of renewable fuels and low energy level fuels in our operations.

This we plan to achieve by the following:

- Manage efficiently the utilization of energy resources, upgrade hardware and employ cleaner and more efficient technologies.
- Train employees to make Reliance the pace setter in the area of energy conservation.
- Carry out regular internal and external audits to identify areas for improvement.
- Benchmark continuously our performance against the best in the world.
- Enrich our experience on energy conservation by exchange of ideas with other organizations.
- Promote awareness among all members of the large Reliance family.

(Mukesh D. Ambani)

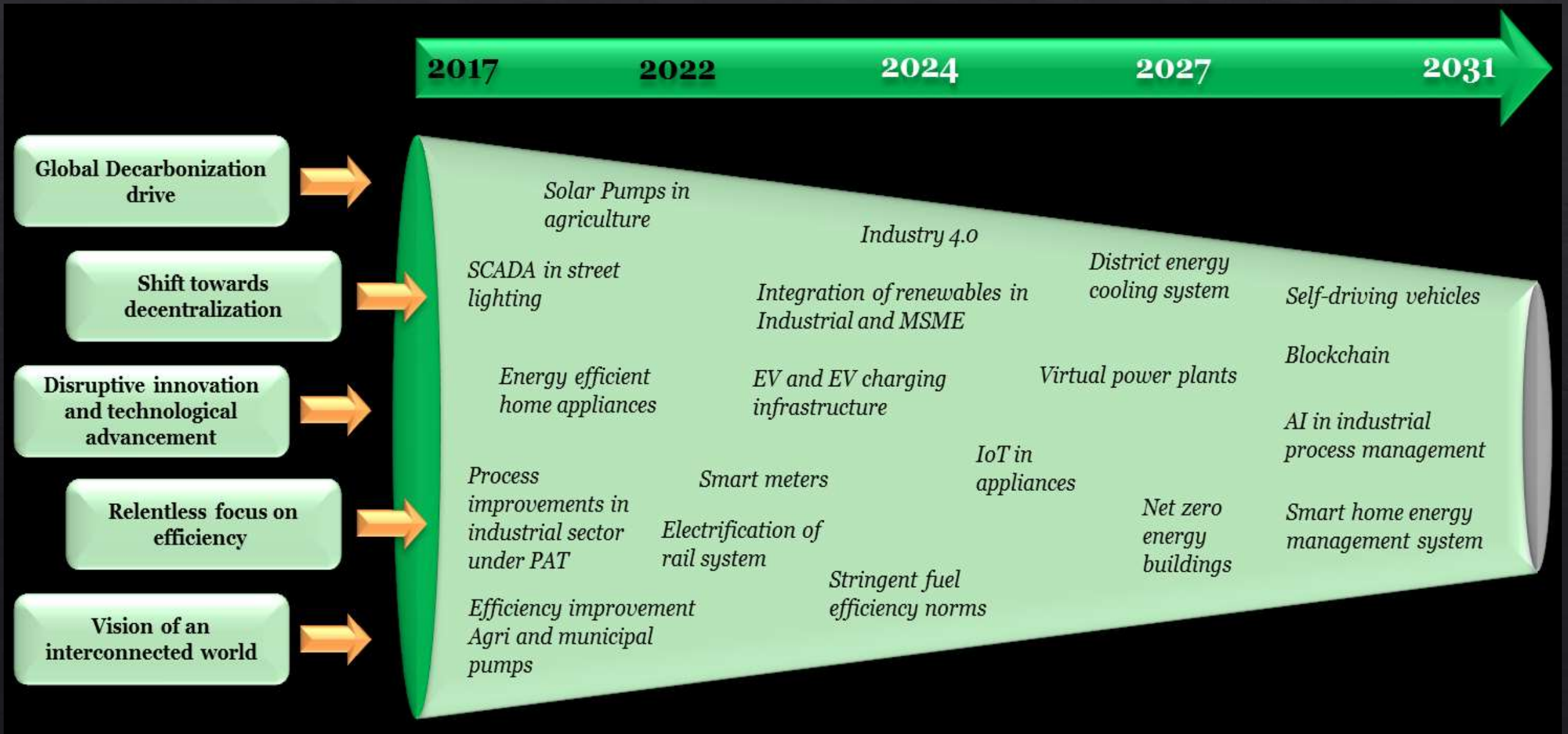
Overview - National / International Energy Conservation Program

- Municipal Demand Side Management System
  - To unlock India's immense potential for saving energy & cost of supply water by retrofitting old inefficient water pump with efficient pump set
  - Conduct energy audit, preparation of detailed project report, implementation of EE through ESCO's
  - Progress – As of March 2020, 390 ULB in 22 states & 3 UT conducted investment grade energy audit
- Agriculture Demand Side Management System
  - Progress – In 2019-20, 11,000 pump set replaced with 5 star energy efficient, leads to energy saving of 0.18 billion unit
  - Till March 2020, ~75,000 pumps sets were replaced

Overview - National / International Energy Conservation Program

- Unnat Jyoti Affordable LED for ALL (UJALA)
  - Bulk purchase of LED, resulted into reduction in purchase price & same can be passed on to customer
  - 36.66 cr LED sold out, resulting annual energy saving of 48 billion units
- Street Lighting National Program (SLNP)
  - Replacement of inefficient street lights with LED
  - January 2021, 1.146 cr LED installed, resulted into annual energy saving of 7.7 billion unit
- Faster Adaption & Manufacturing of Electric Vehicle (FAME)
  - Increase demand for EV's, Charging infrastructure creation, Technology up gradation etc.

Future Outlook & Key Development



BUT…..Equitable Partners in Low Carbon Economy Journey

- Renewable Energy (Solar, Wind or Hybrid)
- Afforestation / Reforestation (Creation of Carbon Sink)
- Favorable Financial Mechanisms & Policy Framework
- Technological Innovation & Up gradation
- Biodiversity & Sustainable Habitat
- Sustainable Agriculture / Organic Farming

THANK YOU..!