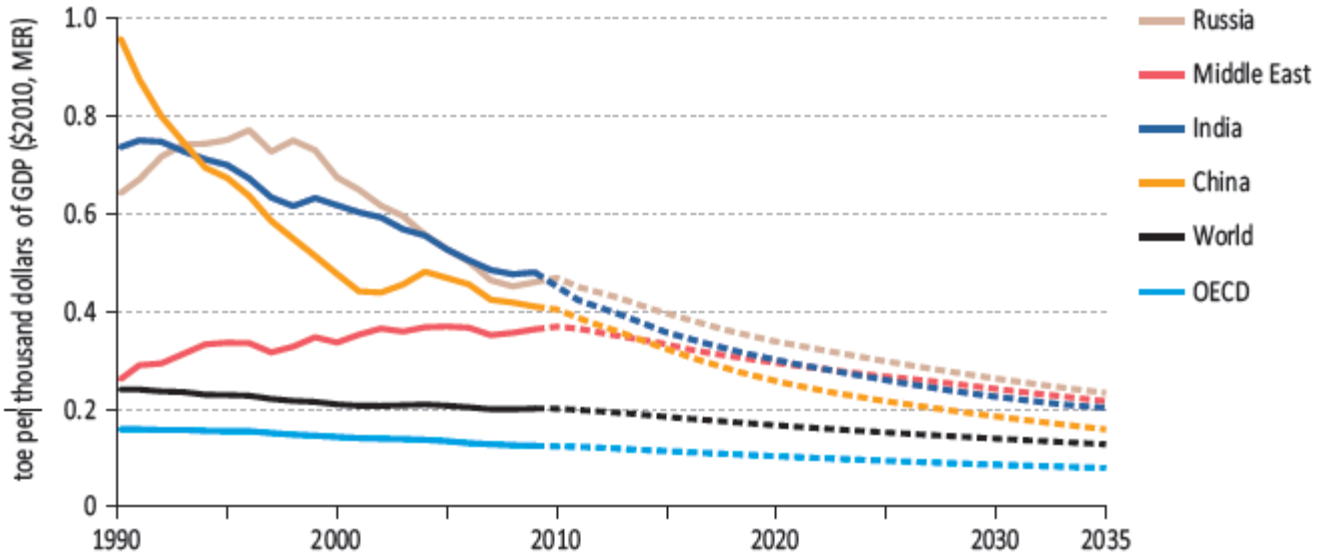
Energy Efficiency Financing Challenges of China and India

Dr. PRADEEP PERERA

PRINCIPAL ENERGY SPECIALIST
South ASIA DEPARTMENT
ASIAN DEVELOPMENT BANK

Energy Intensity Trend in the PRC, India and elsewhere



- **PRC's energy intensity is more than double the world average and OECD average.**
- **PRC's energy intensity sharply declined by 60% since 1990**
- **There has been a sharp decline (1990 – 2000), moderate increase (2000 – 2005) and again decline since 2006.**

PRC: Policy Initiatives under 11th FYP

- 1,000 key enterprise (over 100,000 tce) program targeting the largest energy consumers in the country.
  - Energy Saving responsibility contracts with quantified energy savings to be achieved and penalties for non compliance.
  - Establish corporate energy management units
  - Adapt energy audits and energy metering.
  - Establish dedicated energy management systems.
  - Increase investments in energy efficiency
  - Develop internal incentives and penalties.
- Provincial government expanded the program to include the second tier enterprises.

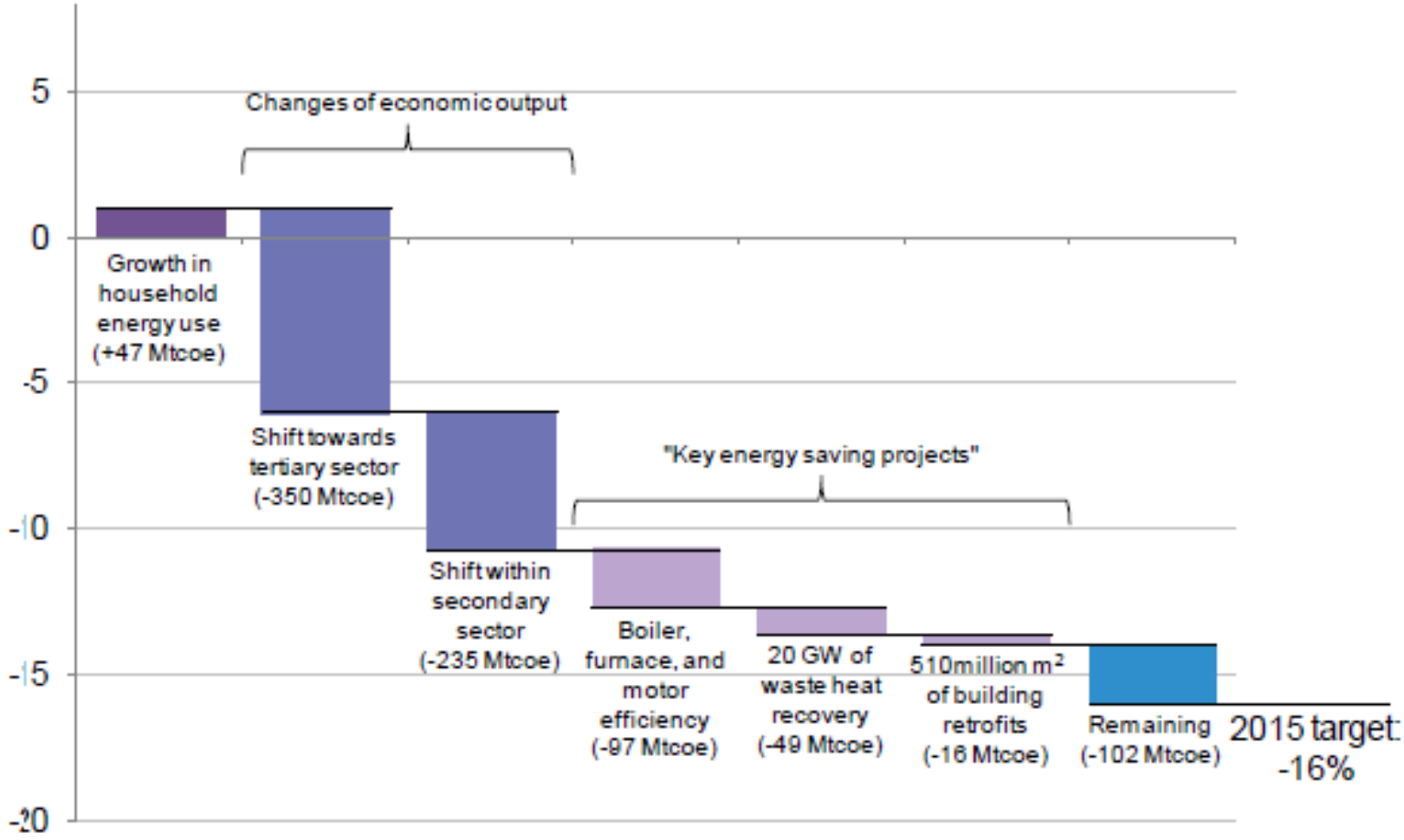
Policy Initiatives under 11th FYP

- Capital subsidies for energy efficiency investments. (RMB 200 – 250 per mtce saved). More than $ 15 billion was allocated by government during 2007 – 2009.
- Provincial level monitoring and supervision systems were established.
- Regulations on phasing out and elimination of obsolete inefficient industrial capacity.
- Compensation for eliminating backward capacity
- Differential energy pricing and taxation for technologies earmarked for elimination.
- More stringent energy efficiency requirements on approval of new capacity.

Energy Efficiency Improvement During 12th FYP (2011 – 2015)

- National target of 16% improvement in energy intensity and 17% improvement in carbon intensity over 2010
- The measures initiated in the previous program was implemented with increased coverage.
- The scope of Key Enterprise program was expanded to include 10,000 enterprises consuming more than 5,000 tce.
- Supervision and Monitoring mechanisms to verify energy savings was strengthened.
- Development and promotion of new EE technologies.
- Further developing energy performance contracting.
- Instituting corporate energy management systems in key enterprises.

Possible Strategy for Meeting Energy Intensity Targets



Source: Bloomberg New Energy Finance analysis. Note: Figures in brackets denote change in energy consumption relative to a scenario with economic growth to 2015 with 2010 energy intensity.

PRC Energy Saving Efforts under the 12th FYP (2011 – 2015)

- PRC has achieved 18.2% reduction in energy intensity during 12th FYP.
- Subsidy program expanded to cover ESCOs and smaller projects. (>100 tce and < 10,000 tce) with additional local government top up.
- Subsidies cover 10 % – 15% of investment cost.
- Exemptions from income tax for eligible ESCOs
- US $ 113 billion during 11th FYP to achieve energy savings of 379 million tce at an average cost of $ 300 per tce.
- US $ 200 billion during 12th FYP to achieve 400 million tce at an average cost of $ 500 per tce.

Key Initiatives 12th FYP

- **Allocation of responsibilities for achieving energy intensity reductions to local governments**
- **Improved energy consumption statistics and monitoring and piloting real time data collection.**
- **New capacity in energy intensive industries tightly controlled and subject to energy assessment.**
- **Speed up phasing out of backward capacity of energy intensive industries. Targets allocated to provinces.**
- **Provinces and enterprises failing to phase out backward capacity to be penalized.**
- **Promoting upgrading and retrofitting of traditional industries**.

Key Energy Saving Efforts Implemented under 12th FYP

- Upgrading efficiency of industrial & heating boilers (2% - 5% improvement)
- Waste heat and back pressure recovery in industrial plants (20 GW of electricity generation)
- Variable frequency drive motors (2% - 3% improvement)
- Energy efficiency improvement in space heating (500 million sq. m with improved heat supply systems) with meters.
- Deploy automated Energy Management Systems in large industries.
- Promote advanced technologies in steel, petro chemical, chemical, cement and non ferrous industries.
- Install desulphurization systems in key industries.

Key Energy Efficiency Policies of India

- **India's primary energy supply has increased to 862 mtoe in 2016 compared to 440 mtoe in 2000.**
- **Energy intensity of economy has reduced by 37% from 2000 to 2016.**
- **Import dependency has increased to 36% in 2016 from 10% in 2000.**

- **National Mission for Enhancement of Energy Efficiency**

Perform Achieve and Trade (PAT) Scheme

Market Transformation for Energy Efficiency (MTEE)

Energy Efficiency Financing Platform (EEFP)

Perform Achieve & Trade (PAT) Scheme

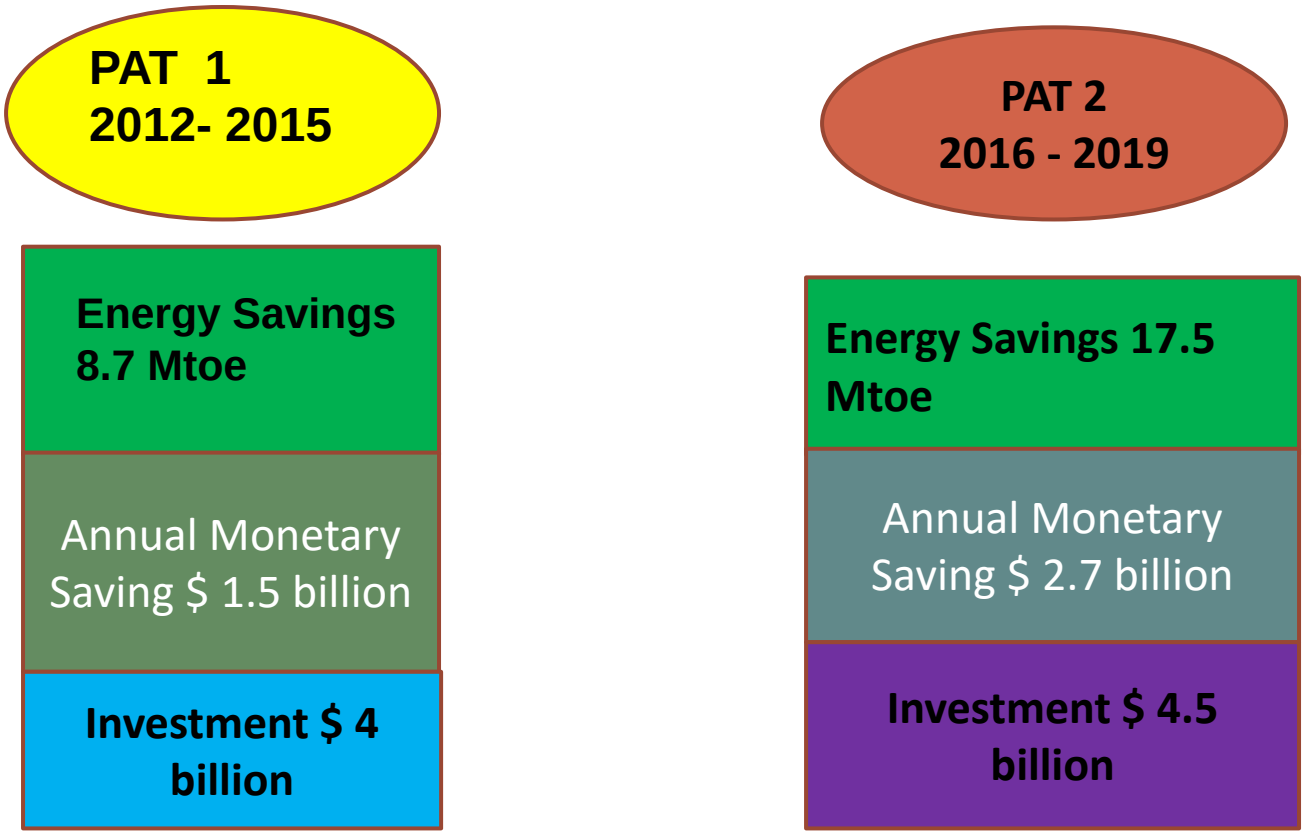
- Covers energy intensive industries and utilities.
- Combine regulatory targets with trading mechanism.
- The Designated Consumers (DC)s are set targets for energy efficiency improvement after taking into account baseline energy efficiency and industry benchmarks.
  - Product mix
  - Capacity expansion & capacity utilization
  - Energy import and export by the consumers

Key Aspects of PAT Scheme

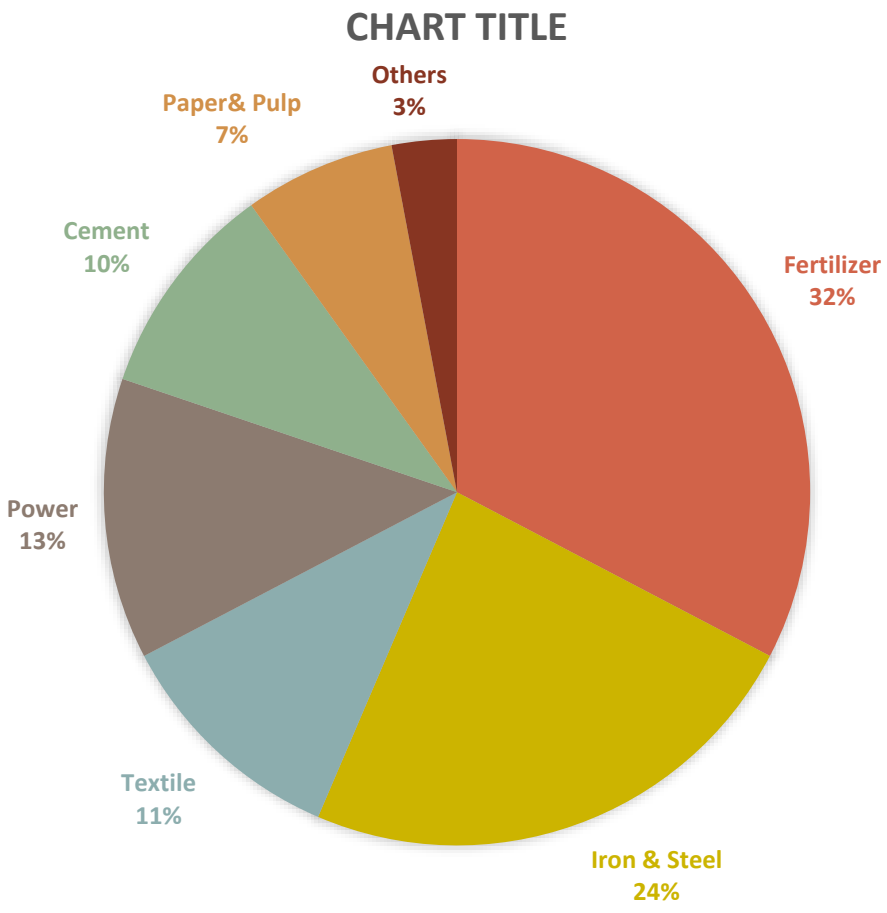
- Tradable ESC (Energy Saving Certificates) were issued to DCs that had achieved the target for excess energy saving achieved.
- **1 ESC = 1 million ton of oil equivalent**.
- ESCs can be purchased by entities that could not achieve the target.
- Non compliance requires a payment of penalty set at INR 1 million (US % 15,000).
- The ESCs can be banked for use in next PAT cycle.
- ESCs are issued after an energy audit performed by independent M&V agency.
- Government has set up a regulatory framework for PAT scheme and market mechanism through Indian Energy Exchange and Power Exchange.

PAT Scheme

- PAT 1 covered energy intensive industries such as iron & steel, cement, fertilizer, power generation, paper, textile.



PAT 1 Energy Saving Distribution

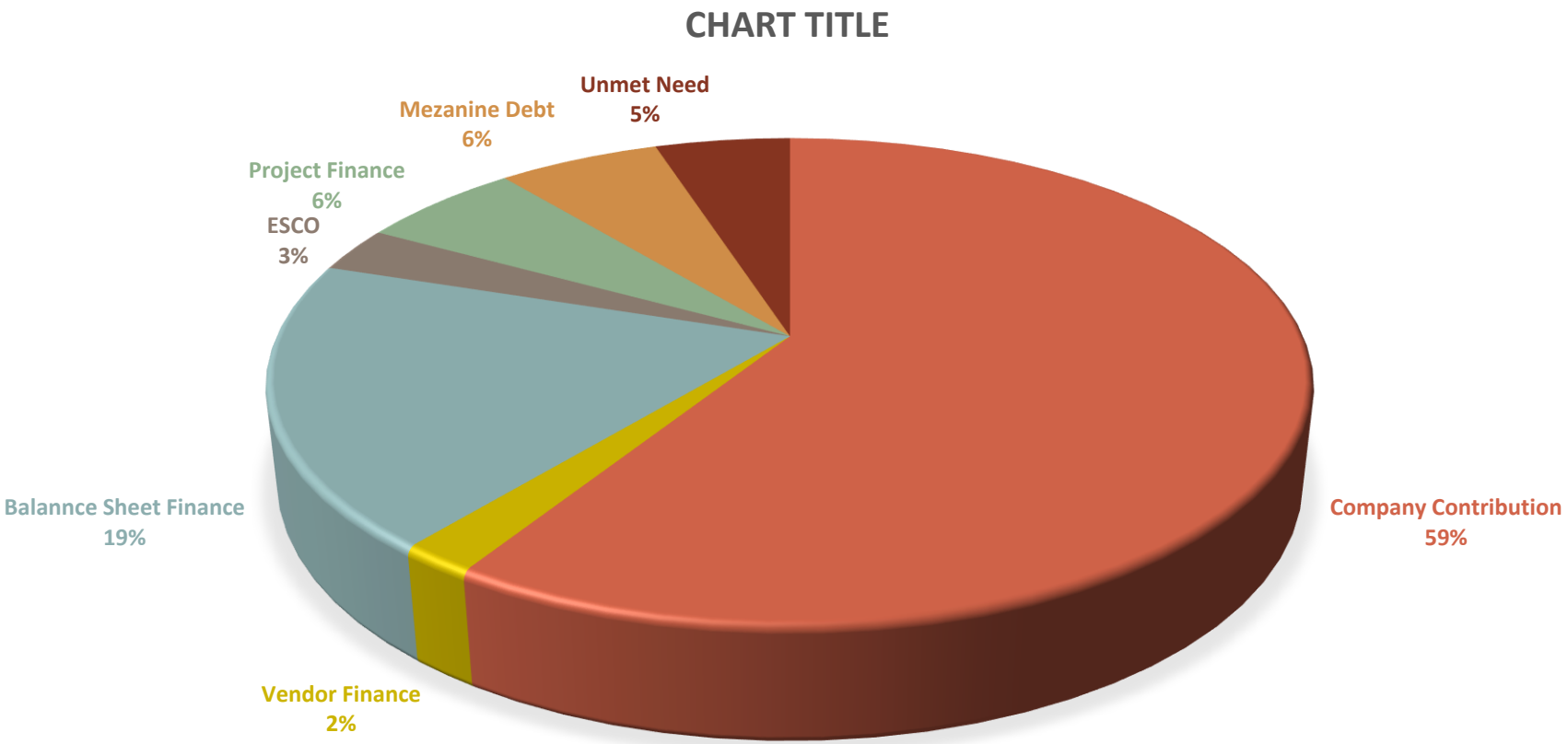


Investments under PAT 1 were mainly low cost such as ;

- Changes to process control
- Variable speed drives
- Waste heat recovery & vertical rolling mills in cement industry
- Top gas recovery in steel

PAT II added electricity, distribution, refineries and railways.

How EE Financed in India



Financial Instruments for EE in India

- PRGFEE (Partial Risk Guarantee Fund for EE)
  - Provide credit guarantees to FIs lending to EE projects
  - Guarantee first loss of 10% of EE portfolio and 50% of each loan in the portfolio.
  - Guarantee Fee : 1%
  - Only projects implemented by accredited ESCOs.

- Venture Capital Fund for EE (VCFEE)
  - Provide equity finance for EE projects implemented by ESCOs.
  - VCFEE equity investment is capped at 15% of total equity or $ 300,000.

Technical Barriers to EE Investments

Plant Level	Risk of Production Loss Unavailability of adequate technology Lack of technical and Maintenance skills Absence of Energy Management and energy data
Corporate Level	Lack of awareness and motivation for EE investment at senior management Complexity in decision chain to implement EE projects Absence of Corporate policy on EE Lacks for Strategic focus on E
National Level	Inadequate incentives for EE Investments Lack of Focus on R & D on EE Non Enforcement of Industry Standards

Finance Barriers to EE

Financing Limitations

- Lack of limited recourse financing
- Difficulty in Collateralizing EE projects
- Lack of understanding of EE technologies by bankers

Project Economics

- Small Project size
- High Transaction Cost
- Absence of Project aggregators

Risk Perception

- Inadequate credit risk mitigation mechanisms
- Tight eligibility criteria for government supported guarantee schemes
- Absence of independent M&V mechanisms

Conclusion and Summary

- **China has achieved improvement in energy intensity of 34% compared to 2005.**
- **The energy conservation efforts have avoided close to 750 mtce of energy consumption roughly equal to the energy consumption of India.**
- **More than half of energy intensity reduction is due to structural changes in the economy.**
- **The 13th FYP (2016 – 2020) set a target for further reduction of energy intensity by 15%.**
- **India has established market based incentive mechanism (PAT) for EE in Industries**
- **However, India lack dedicated financing arrangements for EE.**