An evolution of industrial energy policies in India and their impacts on sustainable energy use

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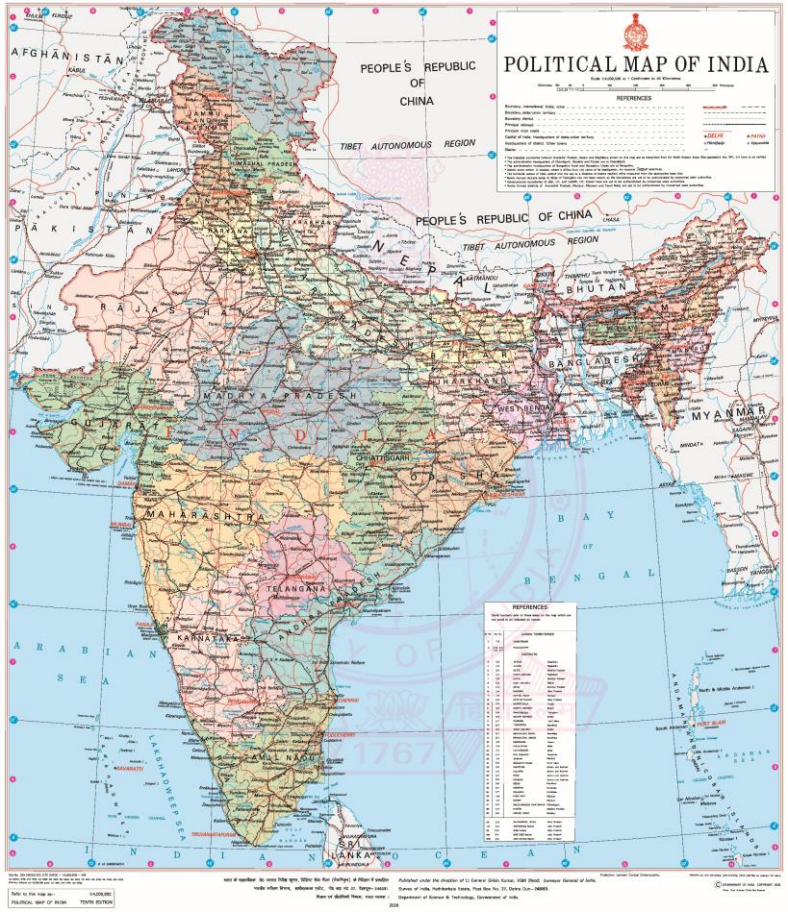
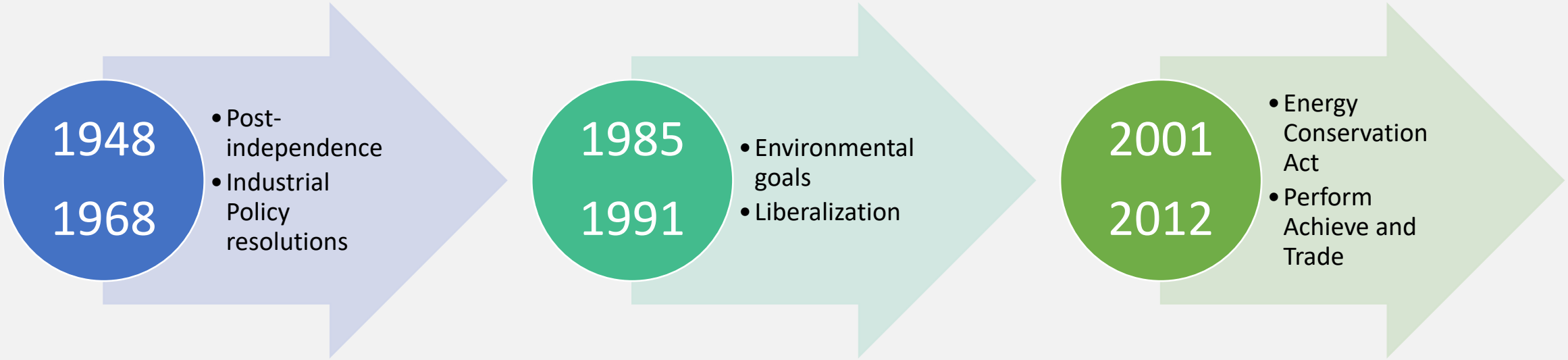
The industrial sector has to grow, but in a resource-efficient manner



- A South Asian country with an economy size **~3.9** billion USD and energy consumption **~1.2** Gtoe.
- Thinking within the paradigm of sustainable development globally led the way to revisit the policy goals - efficient use of natural resources and GHG mitigation gained significant importance.
- As per IEA 2023, India's Energy Intensity of GDP (MJ per unit of GDP in USD-PPP) is **~500** compared to ~280 in Germany.
- Contribution of the industry sector to GDP ~ **25%**, share in energy consumption **~40%.**
- Being a developing nation, the challenge lies in balancing output growth with sustainable energy use

Evolution of industry-energy policy in India

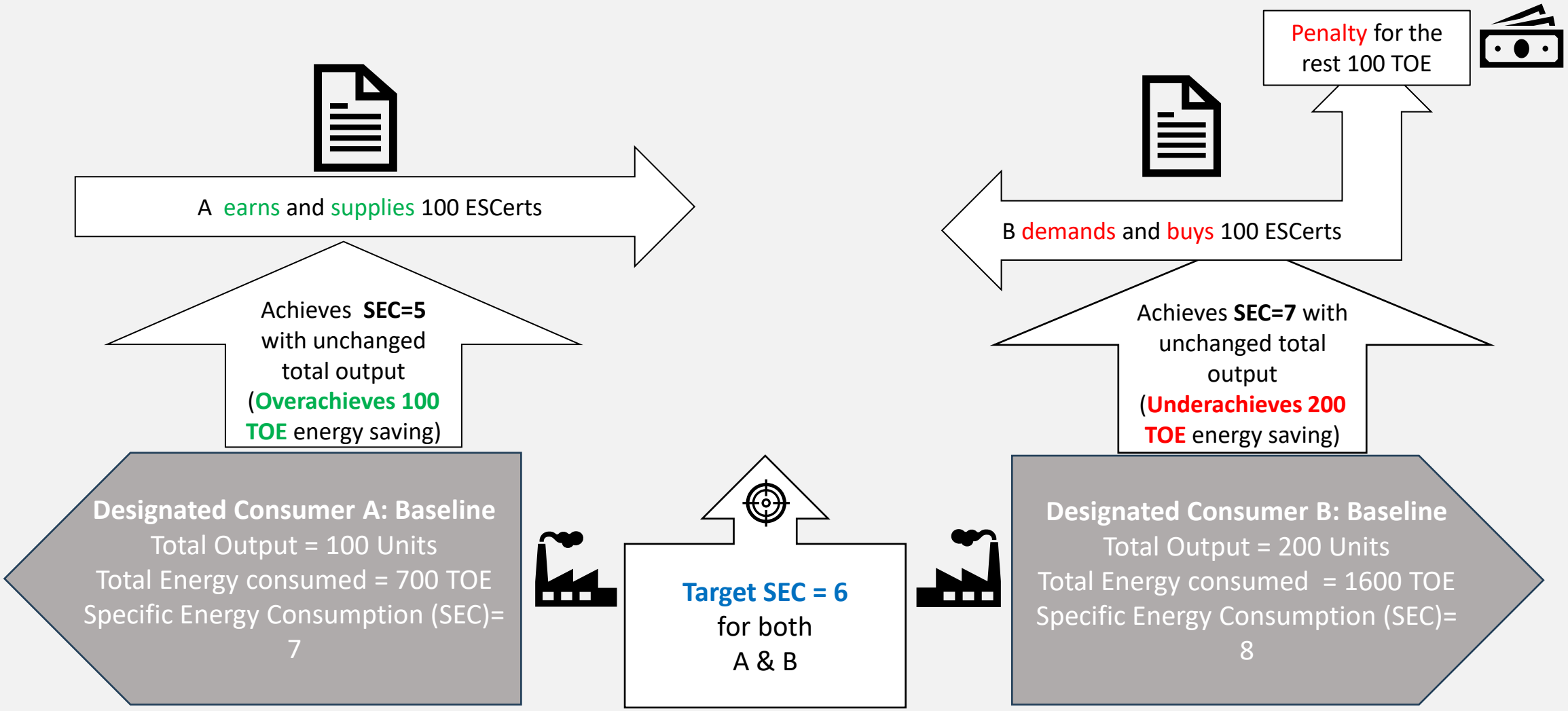


Perform Achieve and Trade Scheme

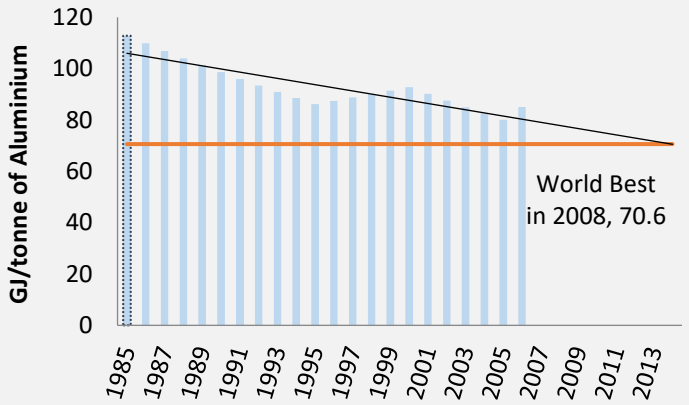
Source: Bureau of Energy Efficiency (BEE)

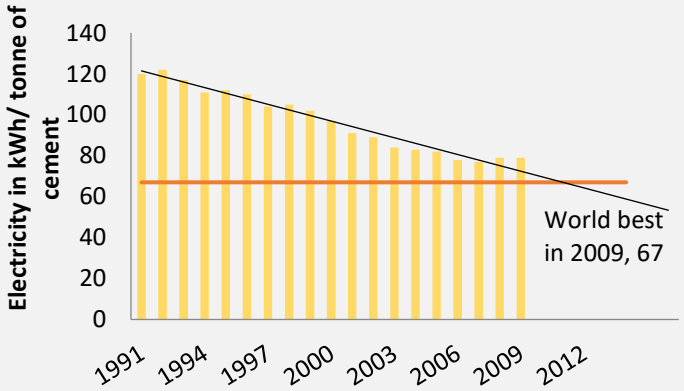
- Framework for Energy Efficient Economic Development
- Market Transformation for Energy Efficiency
- Energy Efficiency Financing Platform
- Perform, Achieve and Trade

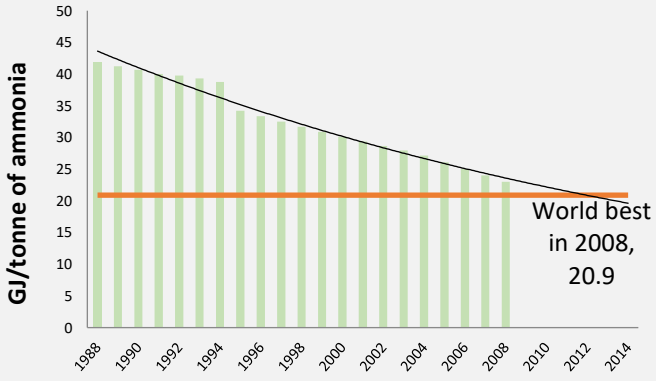
Perform Achieve and Trade Scheme (PAT) mechanism

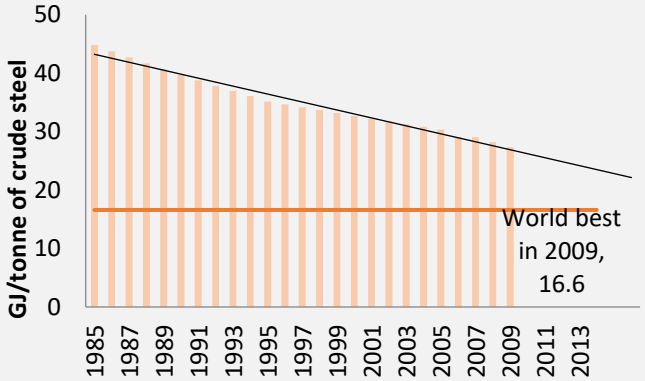


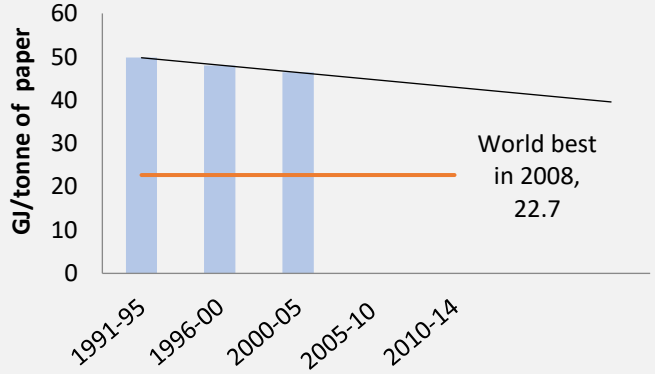
Energy intensity trends prior to PAT was implemented





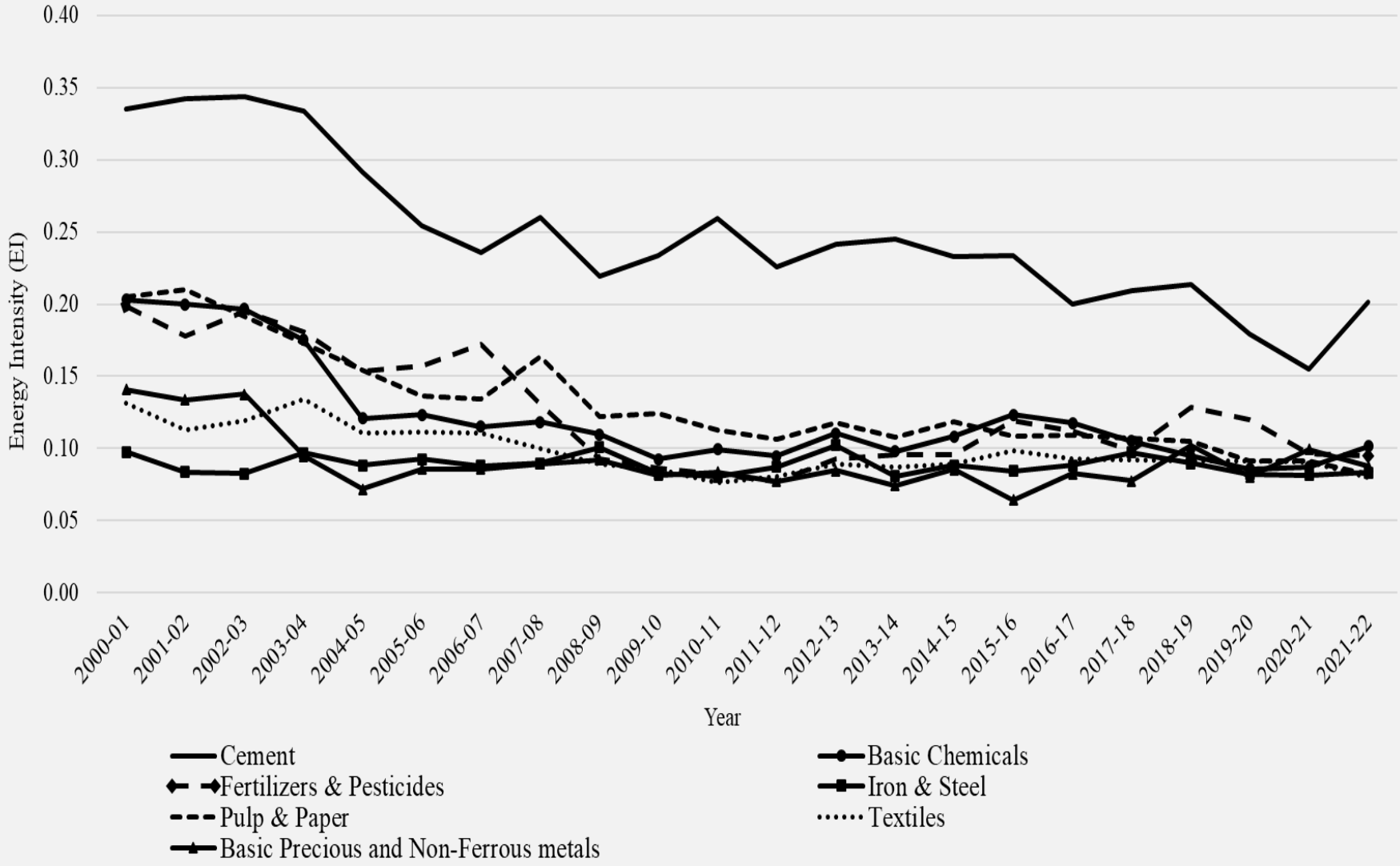




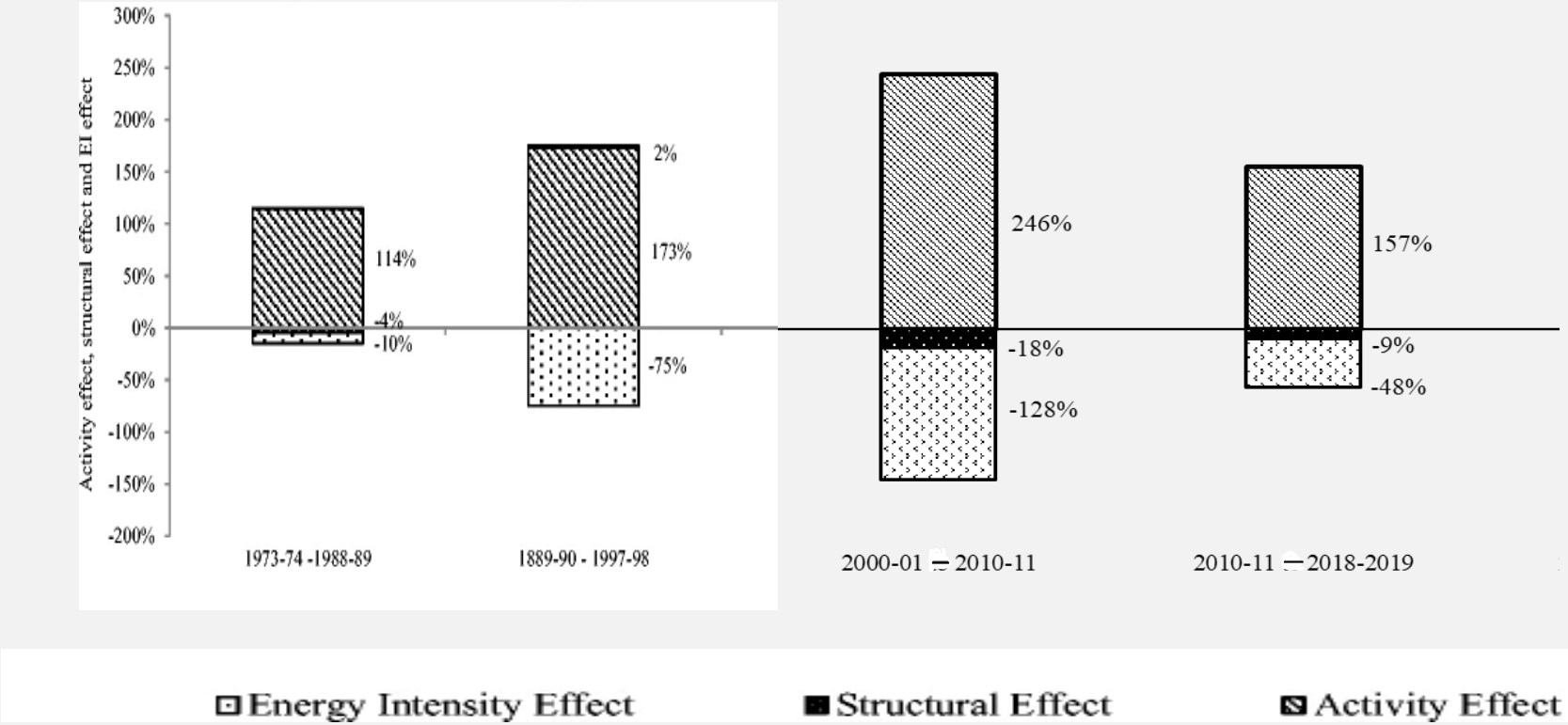


Data source: (CSE, 2010), (Reddy & Ray , 2011), (Jain, 2010), (Saxena, 2010), (Schumacher & Sathaye, 1999), (TERI, 2006)

Declining energy intensity in aggregate manufacturing

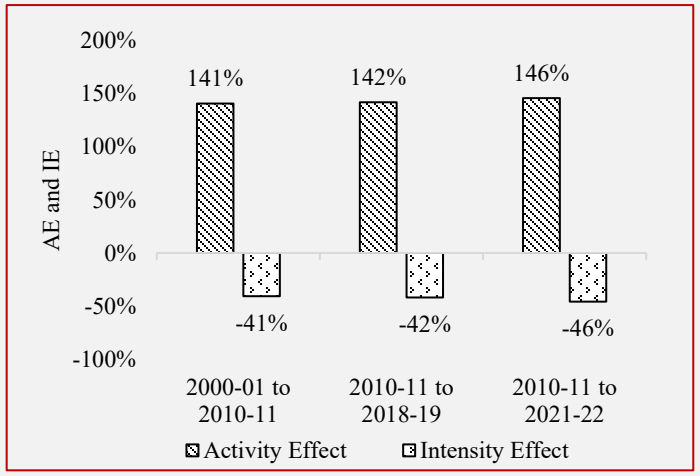


Decomposition of energy demand for the Indian manufacturing sector

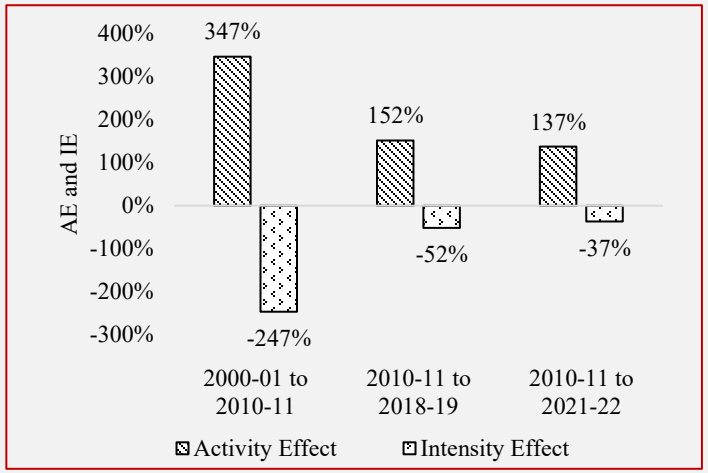


Source: (Figure from 1973-74 to 1998-99 to 2011-12) Dasgupta, S. and Roy, J. (2017) Analysing energy intensity trends and decoupling of growth from energy use in Indian manufacturing industries during 1973-74 to 2011-12

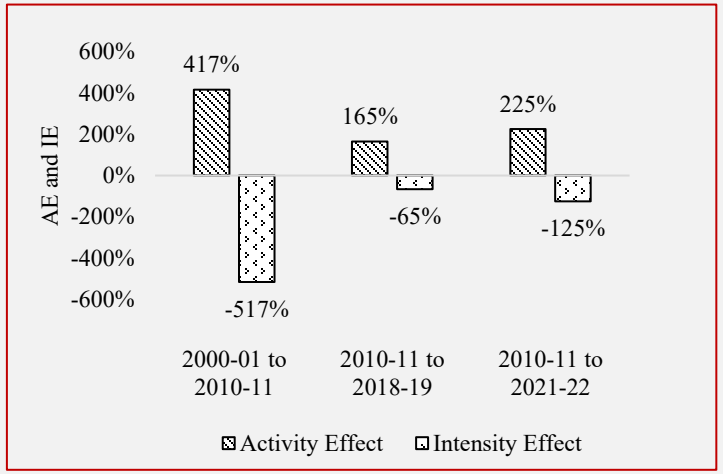
Decomposition results of the PAT industries



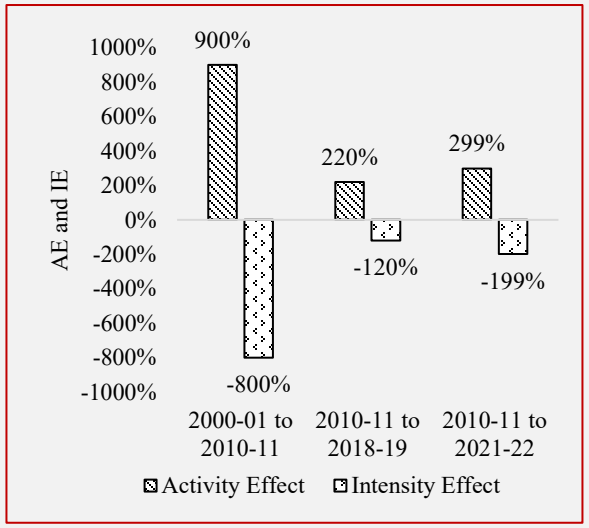
7a) Cement



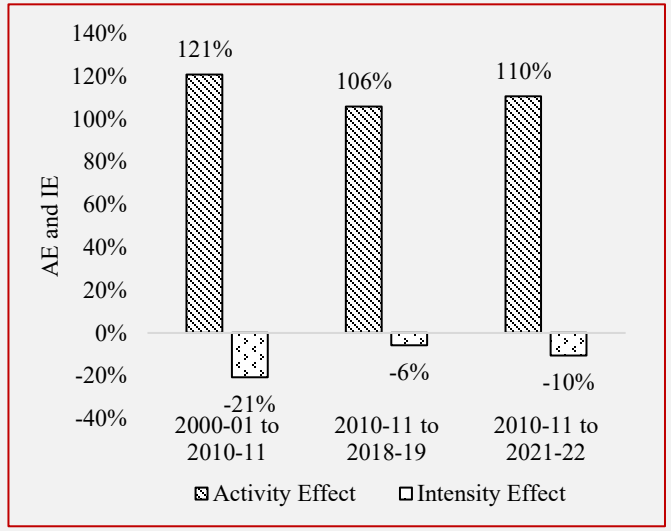
8a) Basic Chemicals



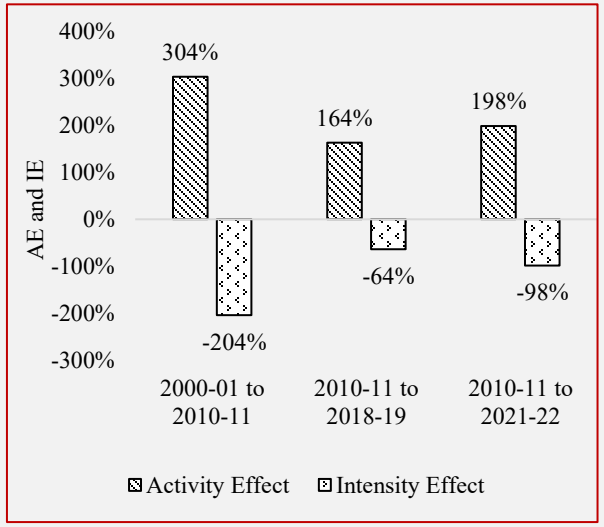
9a) Fertiliser & Pesticides



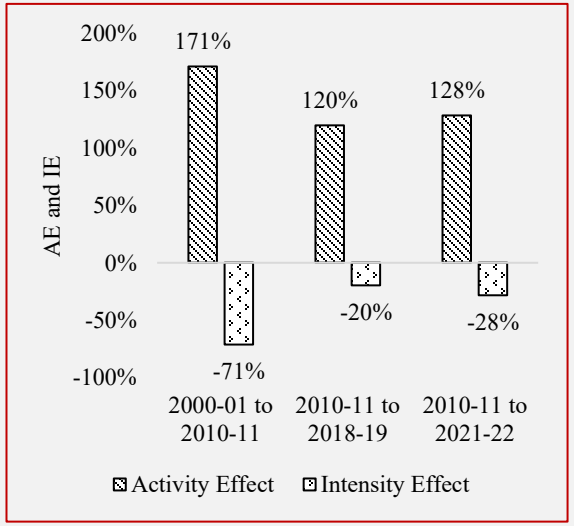
10a) Pulp & Paper



11a) Iron & Steel



12a) Textiles



13a) Basic Precious and other non-ferrous metals

Comparison between PAT industries and Aggregate Manufacturing sector

Percentage of growth in AE offset by SE and IE

Sectors	Pre-PAT period		Post-PAT	
	SE	IE	SE	IE
PAT industries	-2%	-44%	0%	-23%
Aggregate Manufacturing	-7%	-52%	-5%	-30%

- AE has reduced in the post-PAT period as compared to the pre-PAT period for both the Aggregate Manufacturing sector as well as the PAT industries.
- Potential of IE in offsetting of AE has also declined for both Aggregate Manufacturing sector as well as the PAT industries in the post-PAT as compared to the pre-PAT period.
- A negative SE indicates a reduction in the share of high energy intensive industries. Accordingly, it can be observed that it is higher in the Aggregate Manufacturing sector as compared to the PAT industries.

- The anticipated improvements in energy efficiency under the PAT scheme have not been uniformly realized across the sectors.
- They recognise several structural and institutional challenges that may have constrained the scheme's effectiveness.
    - Difficulties in setting appropriate targets,
    - the need for sustained capital investments in energy-efficient technologies,
    - inefficiencies in the PAT trading mechanism,
    - limited data transparency,
    - weak monitoring and verification systems,
    - the inadequate enforcement capacity of State Designated Agencies (SDAs)

Thank you

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