

Deep Decarbonisation for Indian Industries: reflections on strategy, policy and international cooperation

Joyashree Roy

Bangabandhu Chair Professor, Asian Institute of Technology,
Thailand

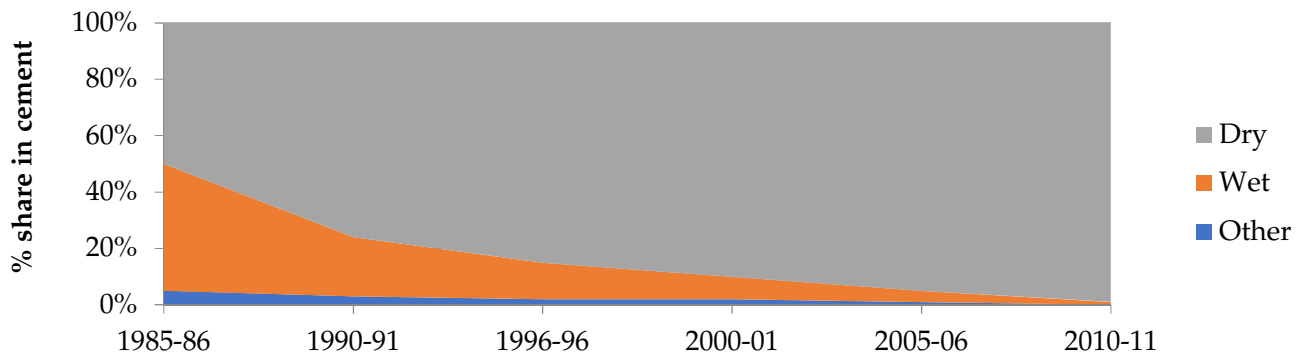
@iets, Vienna, Austria

October 11, 2019

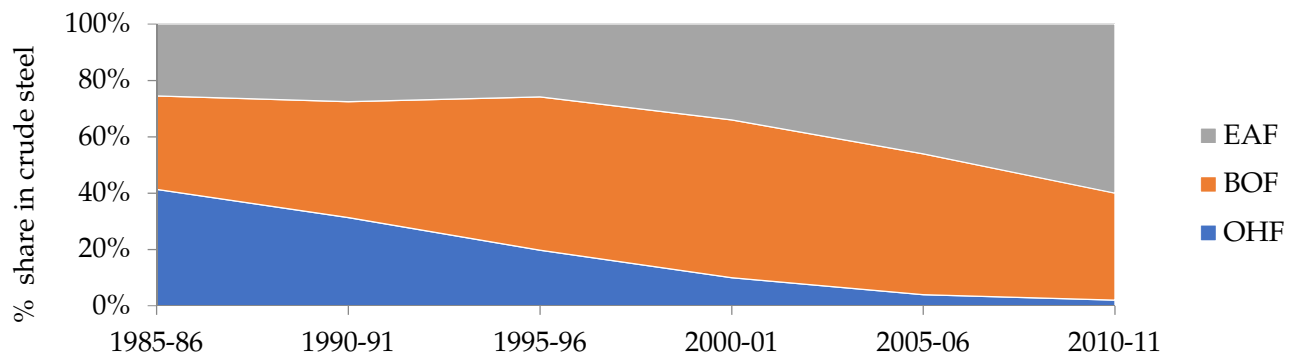
Transformational changes in process technology

Pace of process change – not similar for all industries

Cement



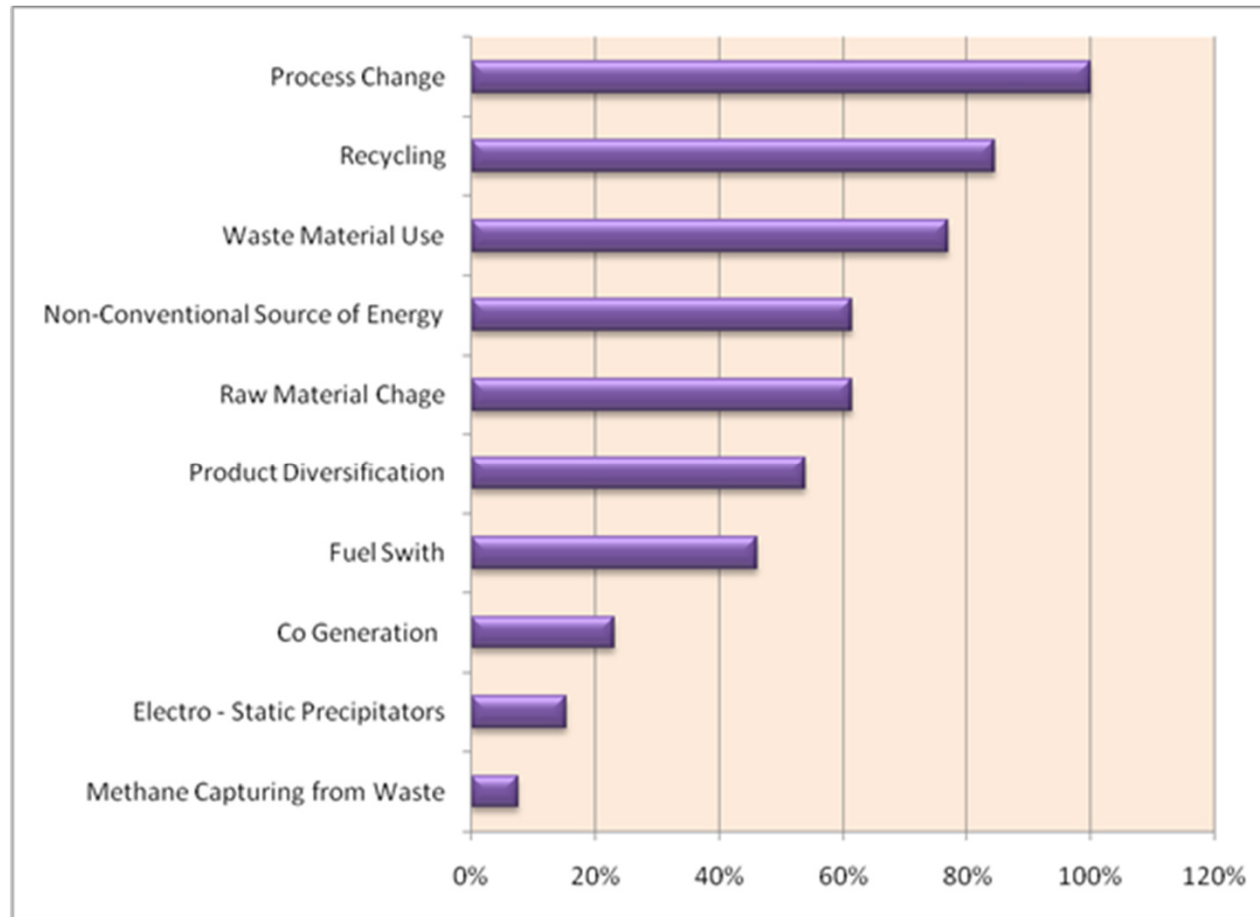
Steel



Source: Dasgupta and Roy 2015



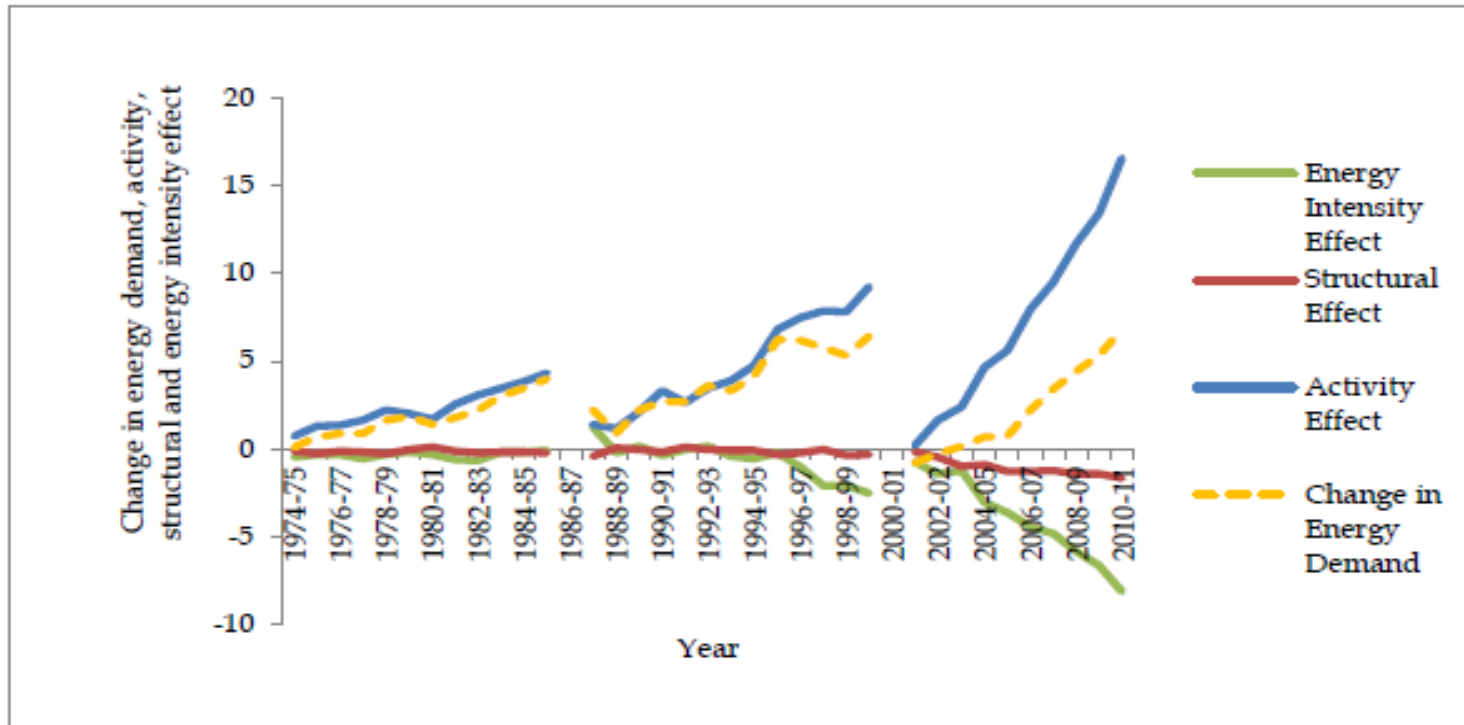
What Indian industries are doing?



Source: Chakraborty & Roy 2012

Energy Efficiency Energy Efficiency

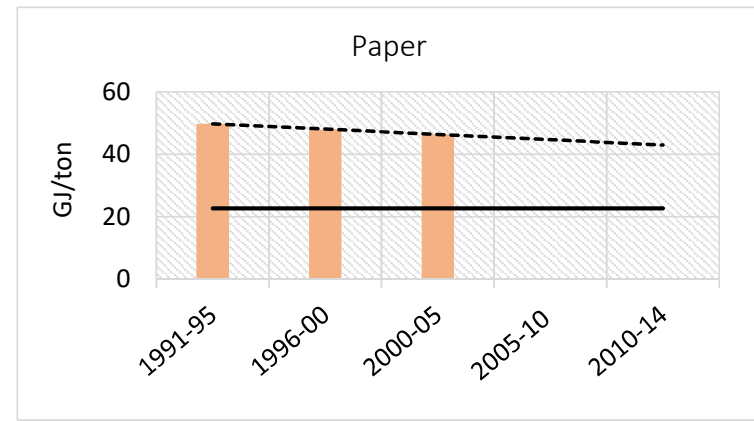
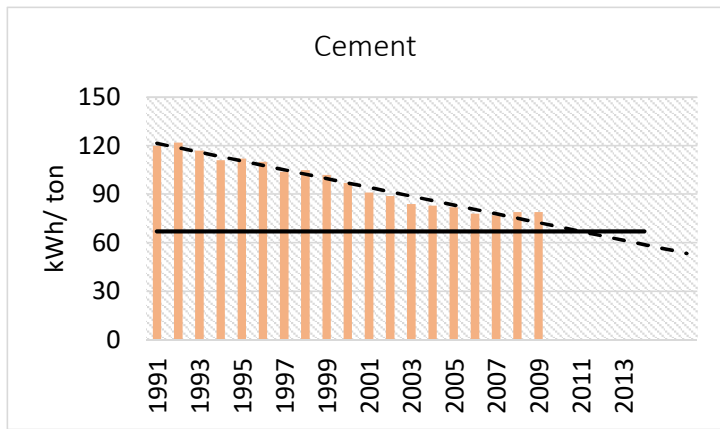
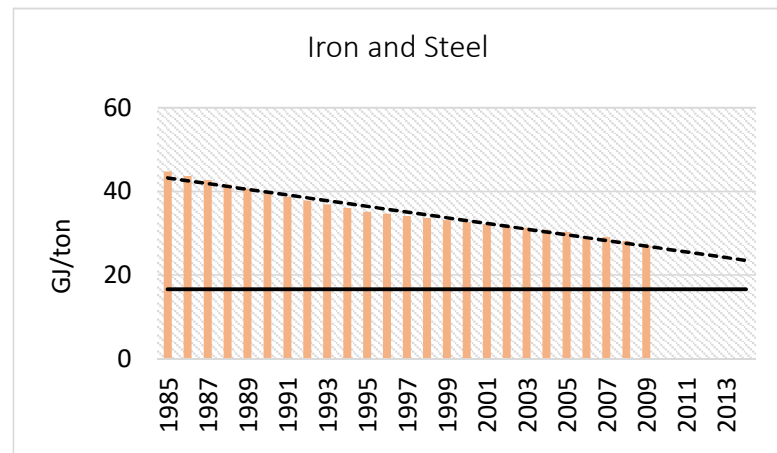
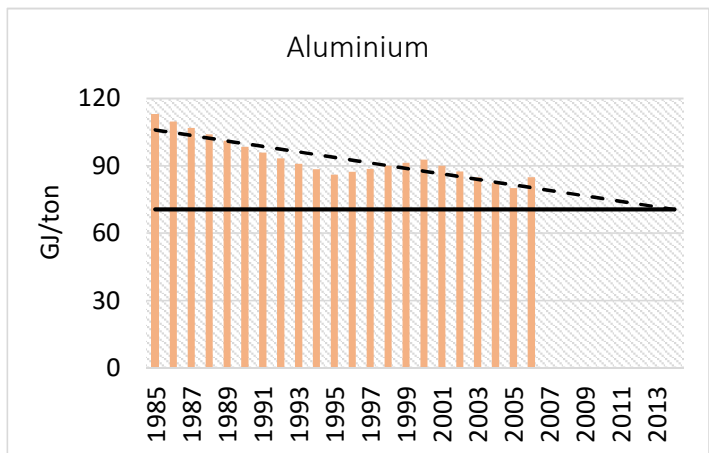
Decomposition of energy demand -Indian manufacturing industries



Based on Annual Survey of Industries, India 1973-74 – 2010-11
Dasgupta and Roy (2017)

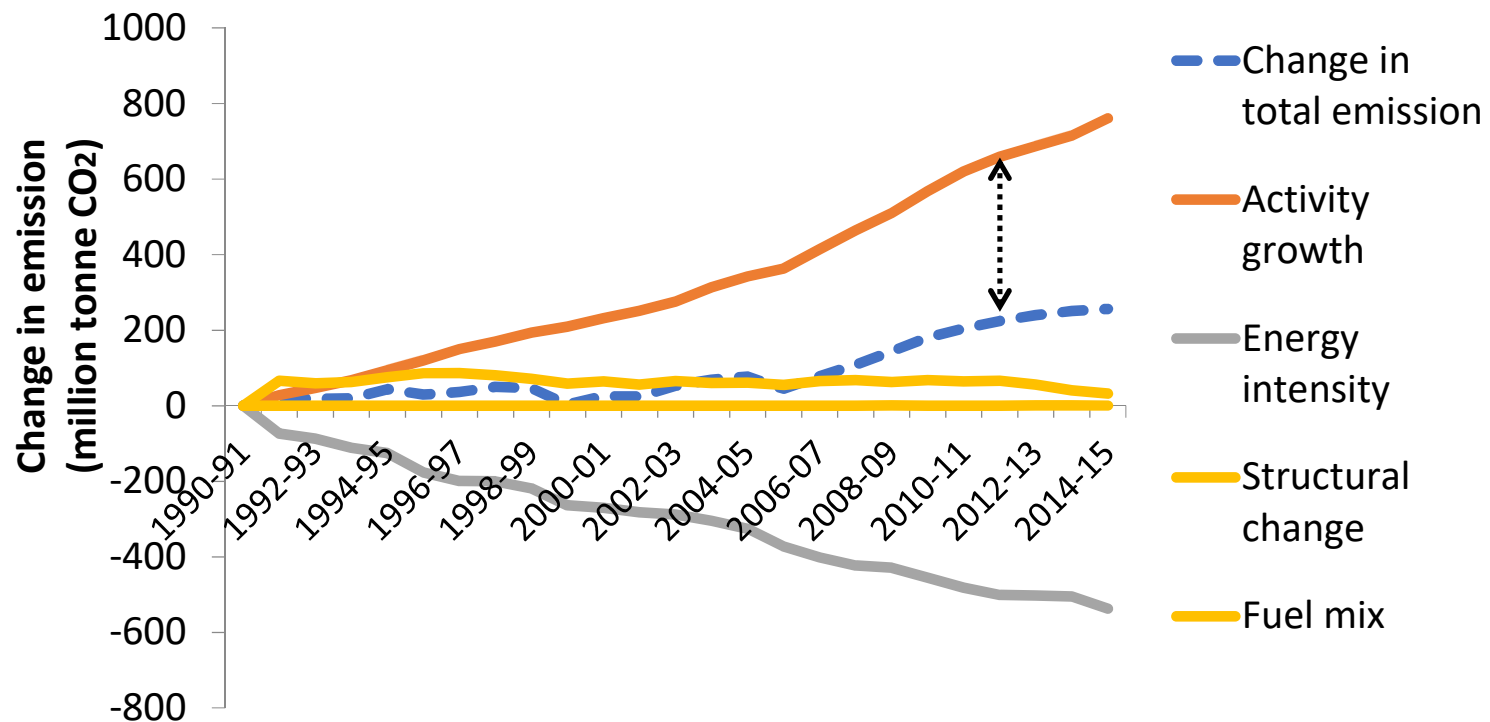
Catching up with BAT

Energy efficiency performance of Indian industries vis-à-vis world

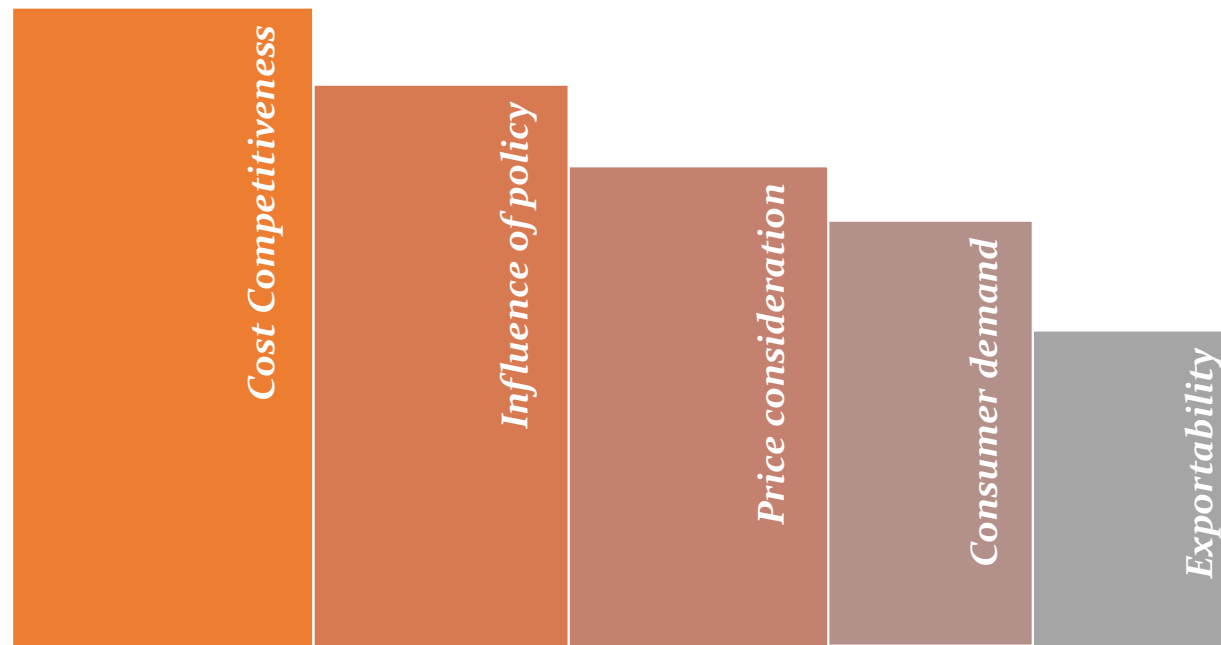


Source: Dasgupta and Roy 2015

Primary energy emission decomposition- All India

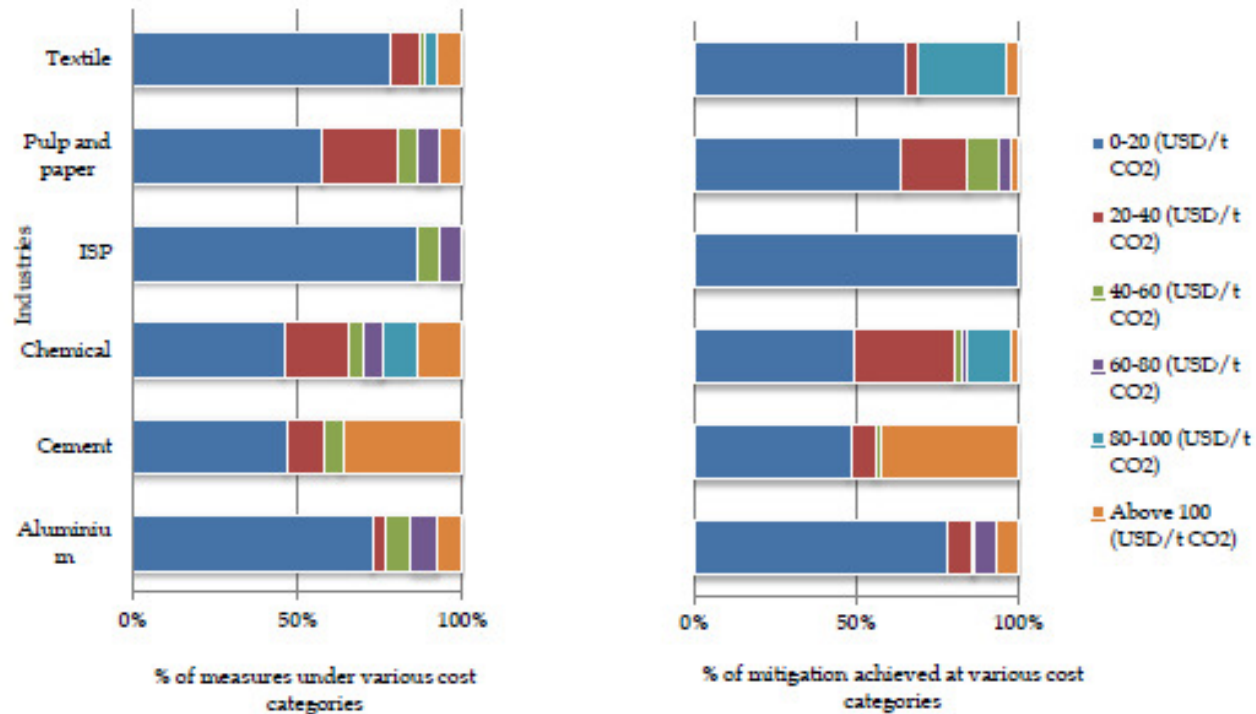


Driving forces behind actions



Source: Chakraborty & Roy 2012

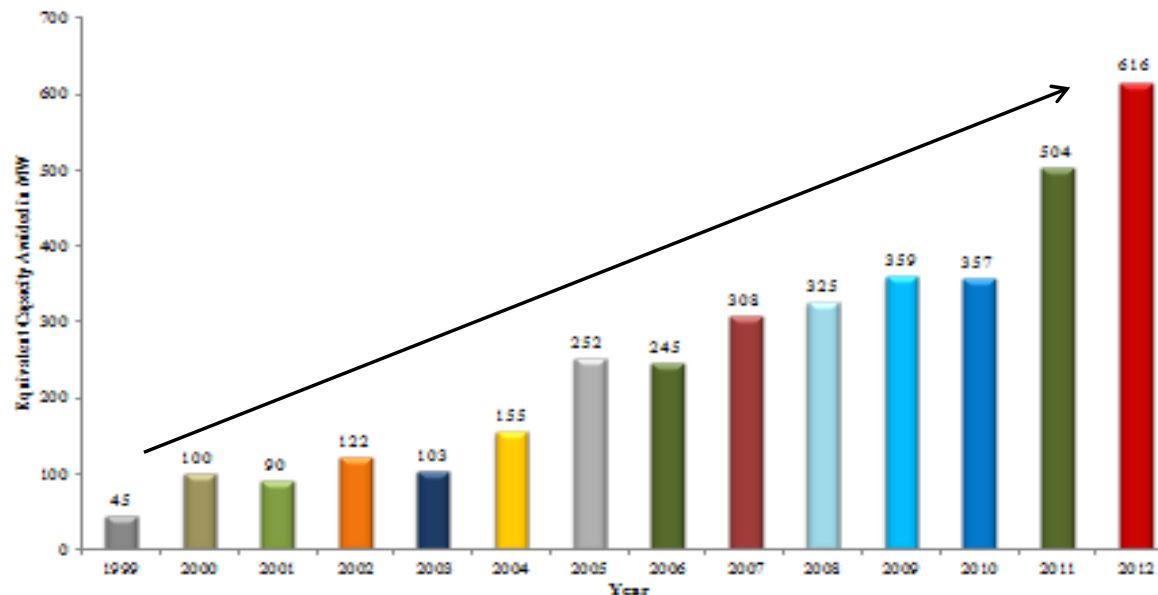
Costs associated with the energy efficiency measures ($\text{USD}_{2010}/\text{tCO}_2$)



- achieving near-zero emission intensity levels in the industry sector would require additional realization of long-term step-change options and these options are associated with higher cost

Energy Conservation Awards (since 1991)

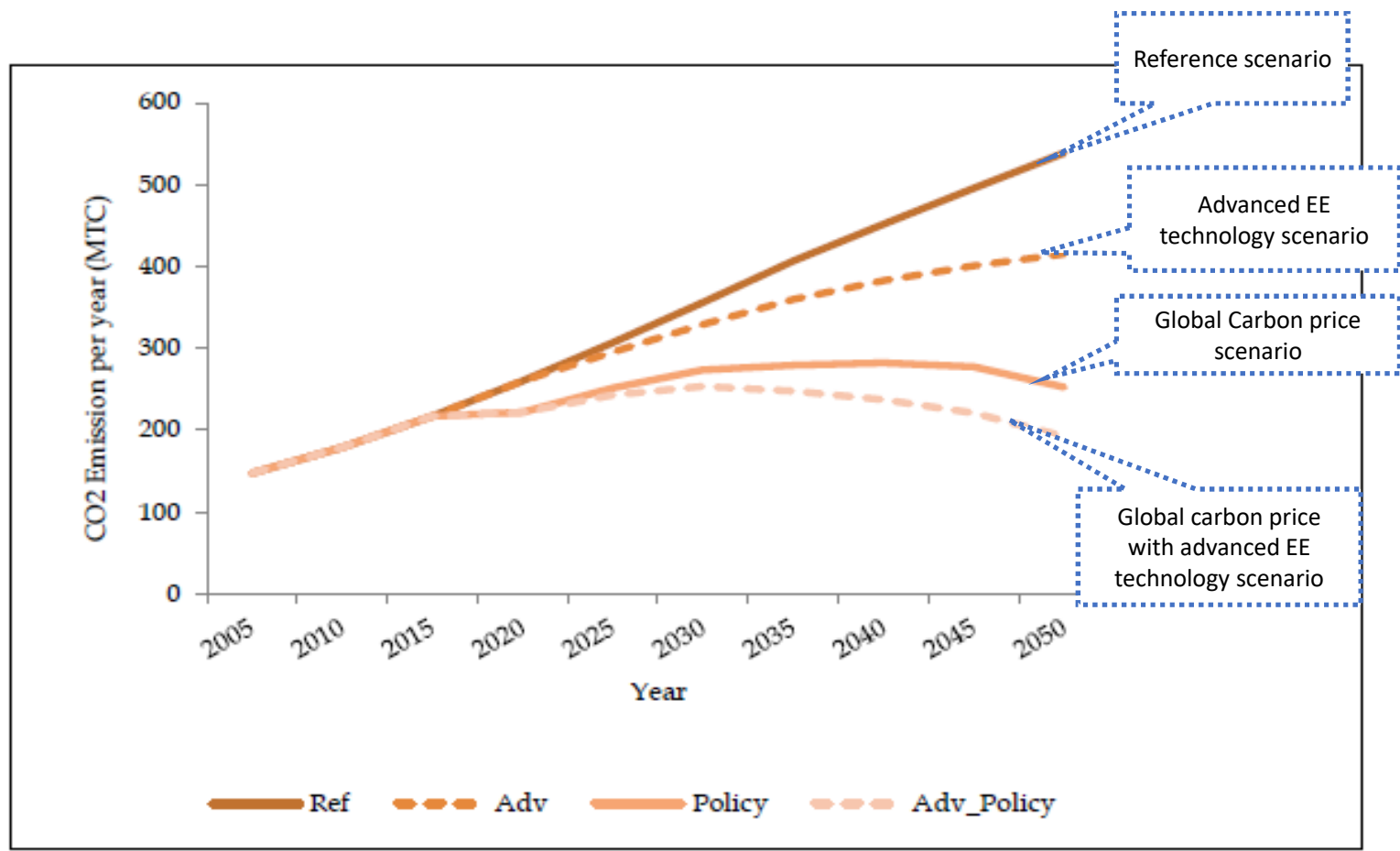
- Participation (voluntary) increased from 123 units in 1999 to 773 in 2012
- Investment energy conservation in 2012 = INR. 1948 Crores
- Monetary saving achieved in 2013 = INR. 2886 Crores in 2013
- A payback period of 8 months



Electrical energy saving in terms of equivalent avoided Capacity in MW

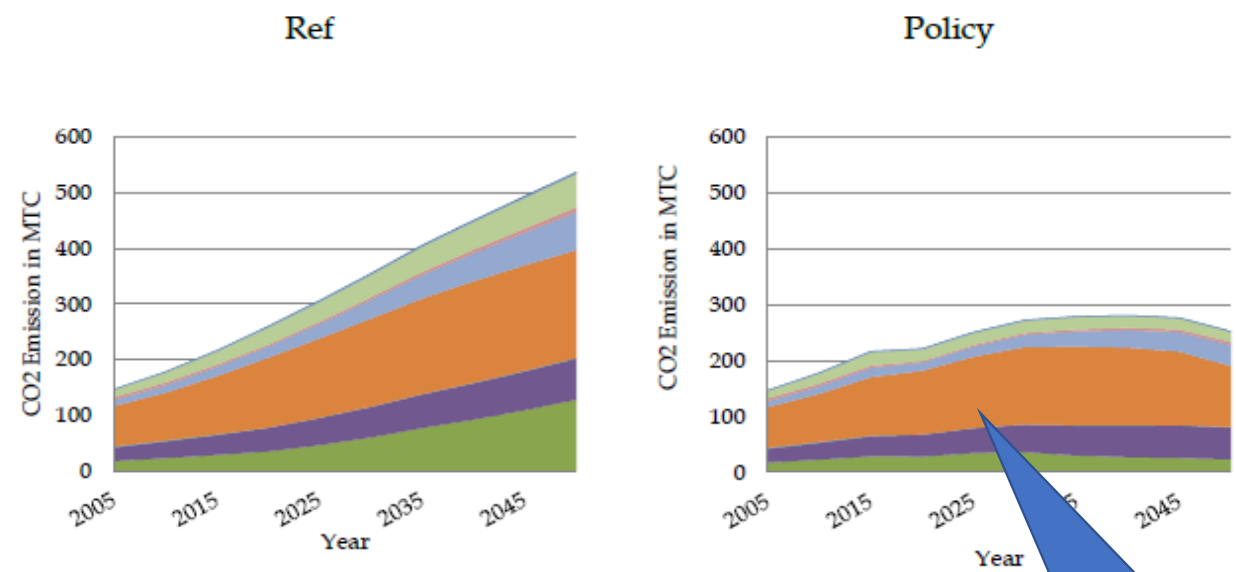
Bureau of Energy Efficiency, Government of India, 2014

Results from GCAM



Source: Dasgupta, Roy et.al (2017)

Potential beyond energy intensive industries

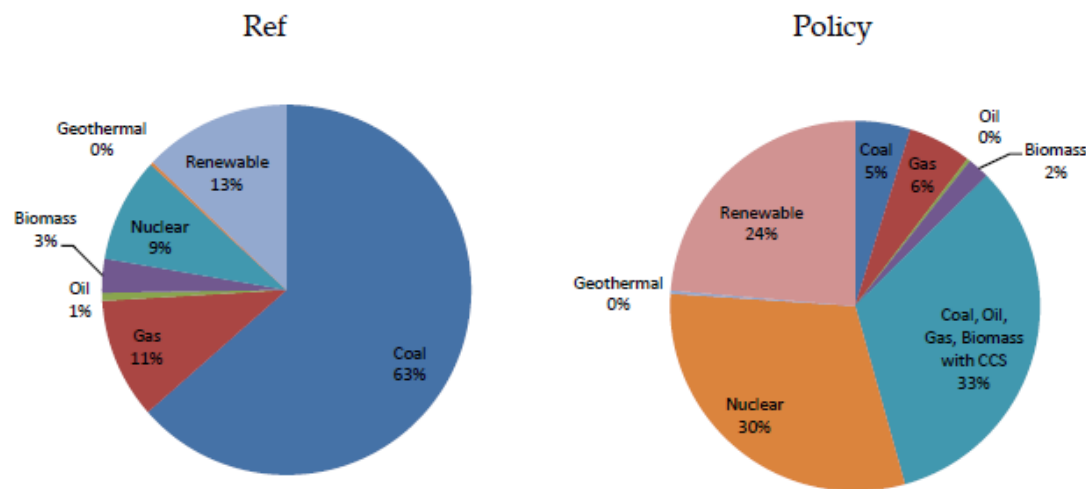


- Cement
- Machine drive
- Process heat cement
- Process heat iron and steel
- Process heat paper pulp and print
- Feedstock
- Other industrial energy use
- Process heat chemical and
- Process heat non ferrous metals
- Process heat textile and leather

Source: Dasgupta, Roy et.al (2017)

Implications for power generation

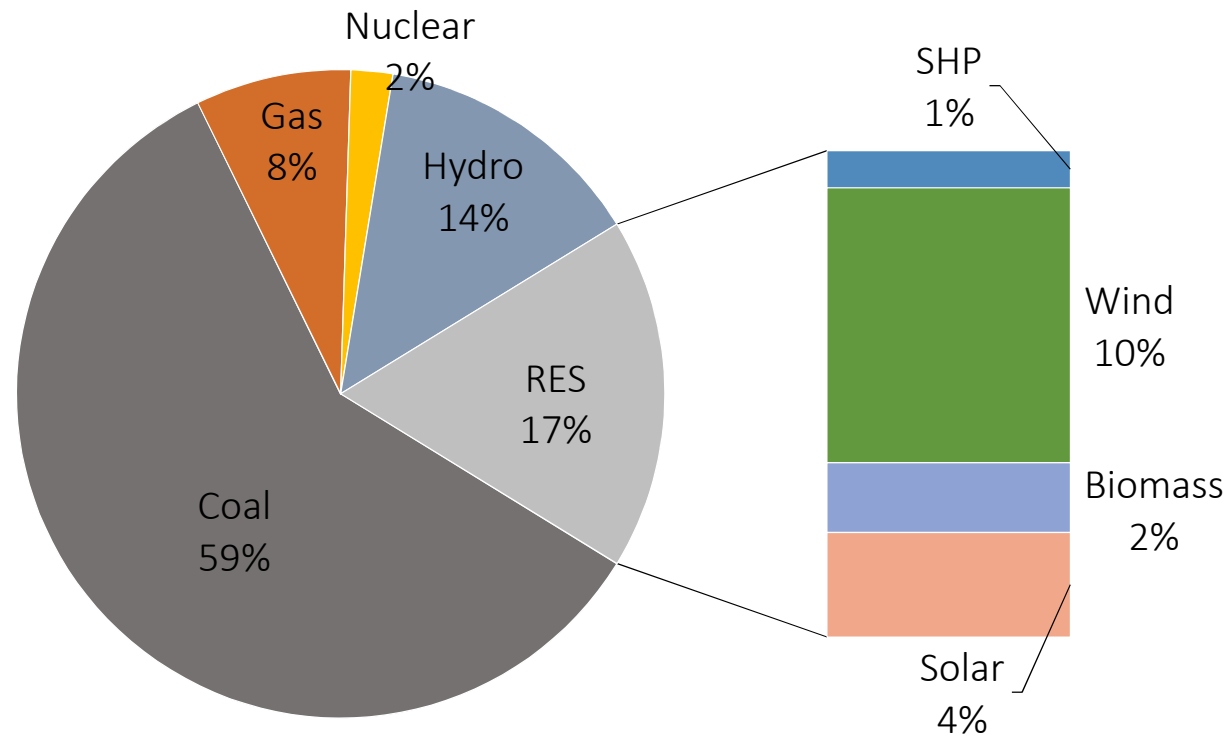
Long run green growth in industry requires large scale electrification



Projected consumption of fuel use for electricity generation in Indian in 2050: comparison of Reference scenario and green growth policy scenario

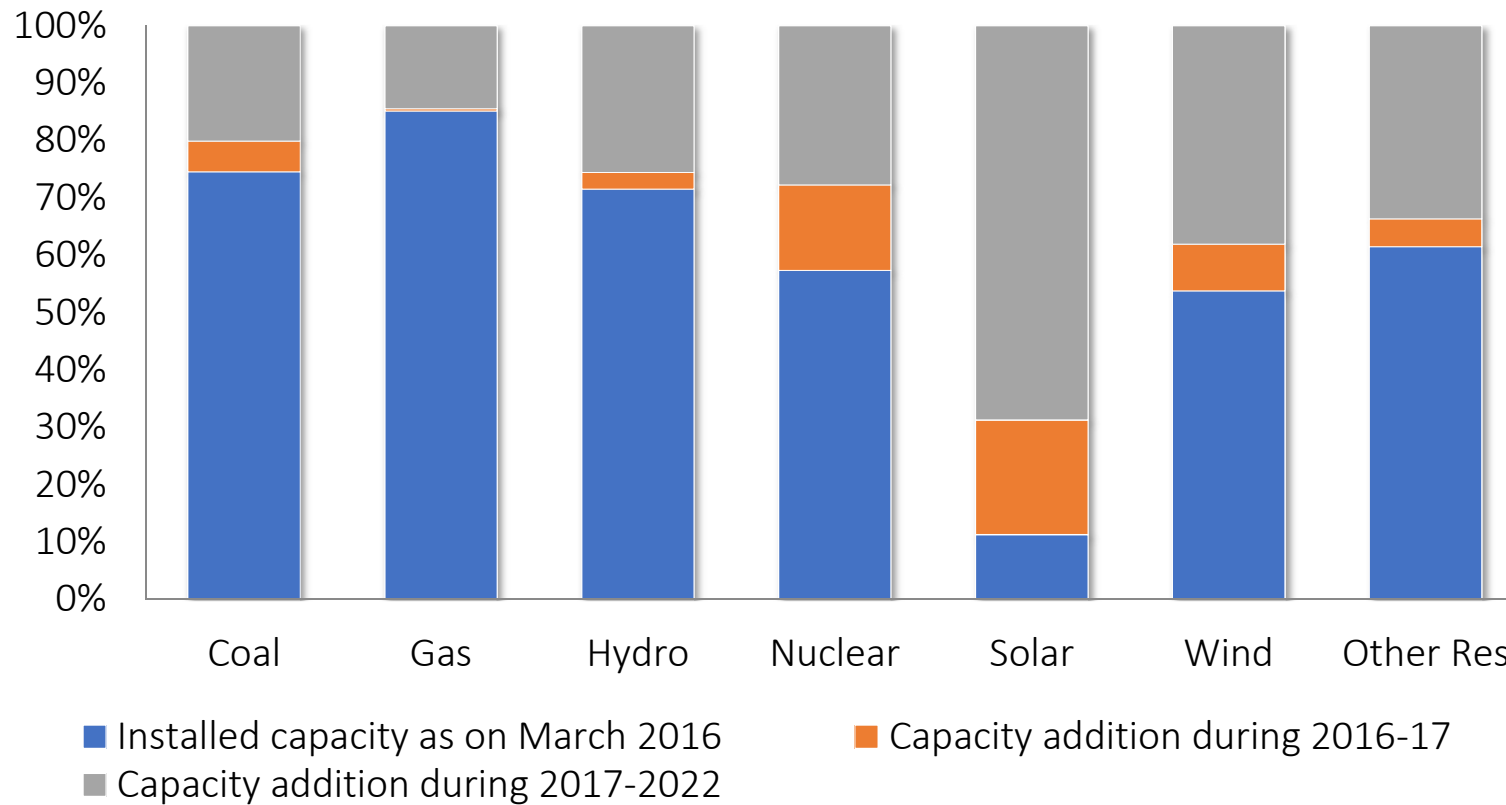
Source: Dasgupta, Roy et.al (2017)

Fuel mix in installed capacity, as on March 2017



Source: CEA, 2017

Capacity expansion

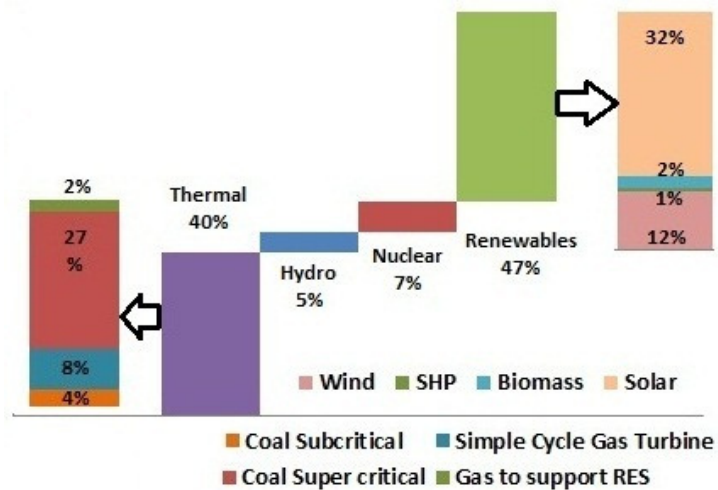


Source: CEA, 2016

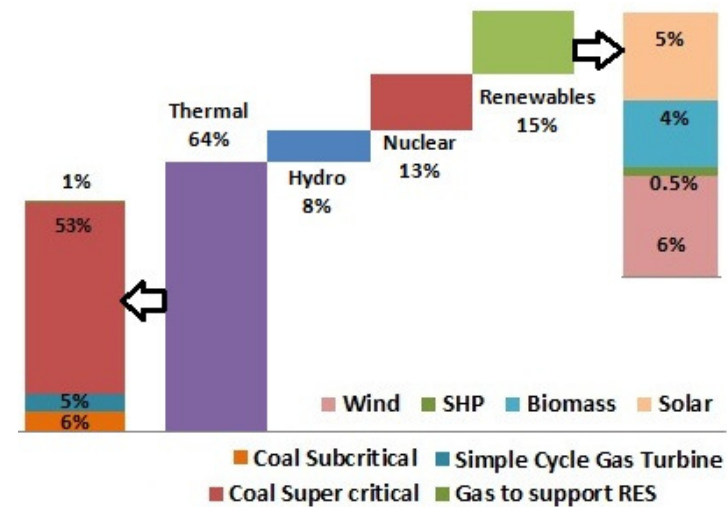
4. Future emission scenarios: Alternative pathways

Future low carbon scenarios: NDC Scenario

Installed capacity 2050



Generation 2050



Uptake of systemic policies and contribution of renewable energy in selected Indian states

Policies to support Renewable Energy	Maharashtra	Gujarat	Karnataka	Rajasthan
Rebate on Municipal Taxes for promoting renewable energy	√			
Renewable Energy Re-purchase Obligation	√	√	√	√
Facilitating land acquisition for projects leading to generation of renewable energy	√	√	√	√
Special Tariff for Renewable Energy, Feed-in Tariff, Feed in Premium		√	√	
Single Window System for Projects for Renewable Energy Generation			√	√
Share of renewable in total power generation (in %)	15.54	10.85	22.25	10.19

India: drivers of success and failure stories

- **National Biodiesel Mission of 2003**
- **New technology with Missing new routines and new regulators**
 - **Mobility sector: Intermediate transport**
 - **National Mission of Biodiesel**
- **Enhanced Energy Efficiency National Mission 2008**
- **Pre conceived new technology with new routines and new regulators**
 - **Policy, price, global partnership, trained manpower**
 - **PAT: new market system, institutional innovation**

How to operationalize

- “Technology is at least as important in reducing emissions as demographic change and economic development” – IPCC (2014)
 - *Three major dimensions: capacity building; enabling environments; and mechanisms for technology transfer*
- In its Intended Nationally Decided Contributions (INDCs) submitted to UNFCCC India has committed to cut emission intensity of GDP by 30-35 percent by 2030 from 2005 level.
 - *Thrust is on mobilizing finance, technology transfer and capacity building to achieve this target*

Development of technology transfer framework in global context

COP	Decision
COP 1 , Berlin- 1995	Decided to review at each COP the implementation of Article 4, paragraphs 1(c) and 5, of the Convention as a separate agenda item under “Matters relating to commitments”
COP 4, Buenos Aires- 1998	Established a consultative process to achieve agreement on a technology transfer framework
COP 7, Marrakesh- 2001	Adopted the technology transfer framework
COP 13, Bali- 2007	Decision on the development and transfer of technologies under the Subsidiary Body for Implementation
COP 14, Poznan-2008	Poznan strategic program on technology transfer adopted
Cop 16, Cancun- 2010	Established the Technology Transfer Mechanism

Thank you

Acknowledgement

Global Change Programme Research Team

Jadavpur University, India

<http://juglobalchangeprogram.org/>