



# Role of Energy Efficiency for Low Carbon Transformation of India

Subash Dhar, UNEP DTU Partnership  
Minal Pathak, Imperial College  
P R Shukla, Co-Chair, IPCC, WG III

3rd International Conference of Low Carbon Asia & Beyond  
1st to 3rd Nov , Bangkok

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- Background and Context
- Research questions
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- Scenarios
- Results (Preliminary)
- Key messages.



## Energy Efficiency: Global Underpinnings



**United Nations**  
Framework Convention on  
Climate Change

**Paris Agreement Limit  
global warming to 2 deg C**



**Double the global rate of  
improvement in energy  
efficiency**



**SDG 7 Affordable and  
Clean Energy**



**SDG 13 Take Urgent Action to  
address climate change**

## National Energy Efficiency Initiatives

Energy Conservation Act

Bureau of Energy Efficiency (BEE)

NATIONAL MISSION ON ENHANCED ENERGY EFFICIENCY (NMEEE)

### Successful Initiatives

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



## Ressource consumption and sectoral energy efficiency

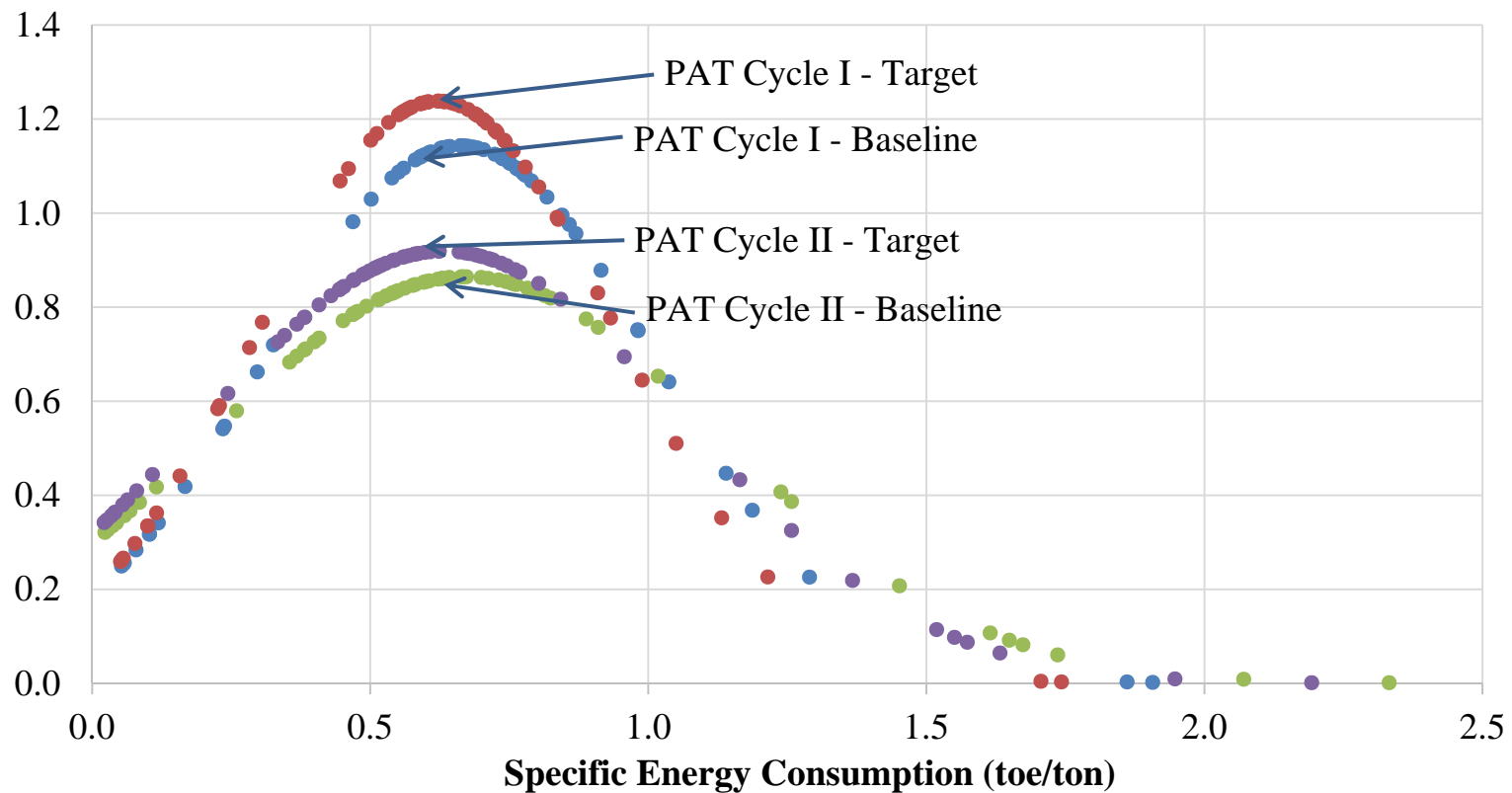
	Per Capita Consumption in kg (2012)		Energy Intensity (PJ/MT)	
	World	India	World	India
<b>Aluminium</b>	8	1.4	16.6	<b>20.9</b>
<b>Cement</b>	520	195	2.72	2.9
<b>Fertilizer</b>	26.1	22.8	28	16.4
<b>Iron and steel</b>	216.6	59.4	18.7	<b>21.4</b>

Source: Garg, A., Dhar, S., Kankal, B., & Mohan, P. (Eds.). 2017. *Good Practice and Success Stories on Energy Efficiency in India*. Copenhagen: Copenhagen Centre on Energy Efficiency, UNEP DTU Partnership.

**Significant opportunity for India: Sectoral transformations**



## Market Transformation through PAT: e.g., Iron & Steel



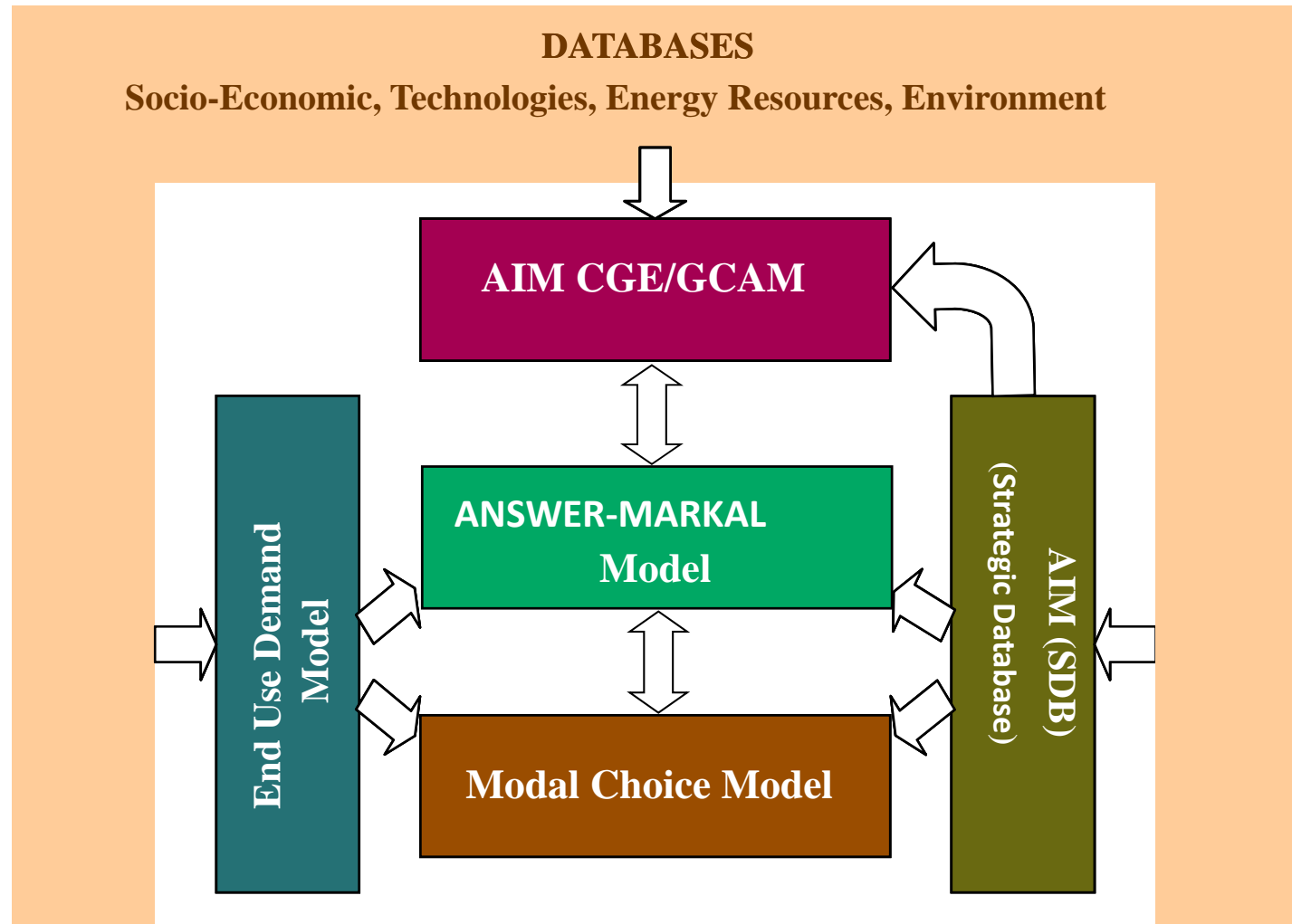
Source: Garg, A., Dhar, S., Kankal, B., & Mohan, P. (Eds.). 2017. *Good Practice and Success Stories on Energy Efficiency in India*. Copenhagen: Copenhagen Centre on Energy Efficiency, UNEP DTU Partnership.

## Research Questions

- What role does EE play under low carbon scenarios for India (2oC stabilisation)?
  - How does EI improve under low carbon scenarios?
  - What is contribution of EE in decarbonisation of Electricity?
  - How does EE of energy intensive industries improve?
  - How does EE of transport sector improve?



# Model





## Scenarios

### NDC

- Includes elements from India's NDCs
- Does not include deep climate policies

### 2 Deg C

- Aligns with global 2 Degrees C temperature stabilization goal
- Carbon price aligned to global price trajectory

### SE4ALL + 2 Degrees C

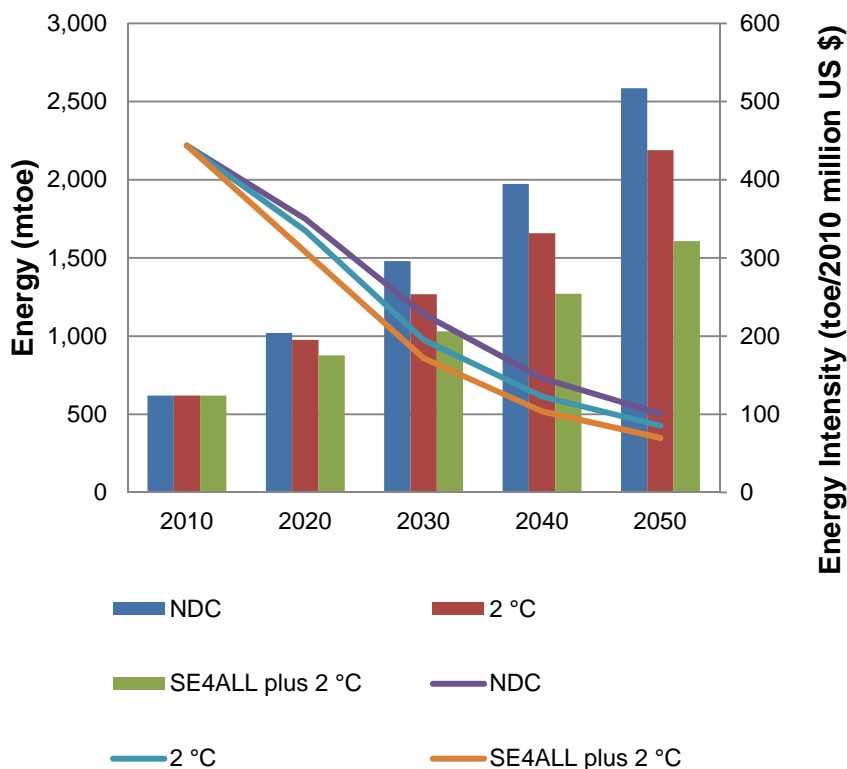
- Aligns with global 2 Deg C goal (Same CO2 Budget) + Aggressive Energy Efficiency goals for India

## Scenario Drivers

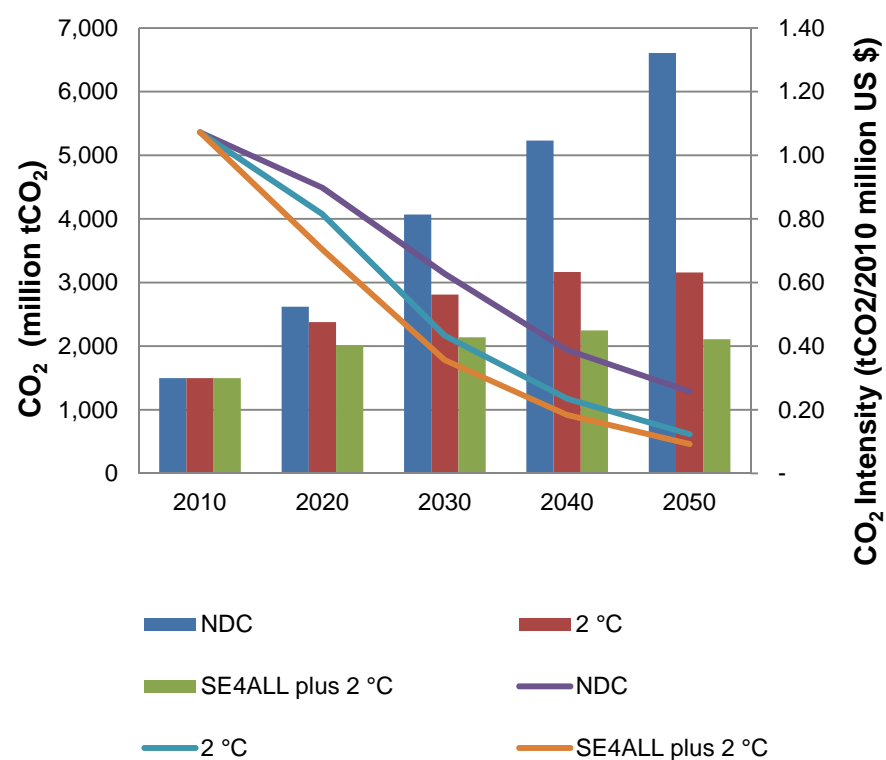
	2010	2030		2050	
		NDC & 2°C Scenario	SE4ALL plus 2°C Scenario	NDC & 2°C Scenario	SE4ALL plus 2°C Scenario
<b>Population (million)</b>	1206	1476	1434	1620	1509
<b>Households</b>	247	365	356	502	473
<b>GDP (2010 Billion \$)*</b>	1397	6489	6002	25664	23007
<b>GDP per capita GDP (\$)</b>	1158	4397	4186	15842	15247

# Energy Intensity Vs CO<sub>2</sub> Intensity at aggregate level

### Energy and energy intensity

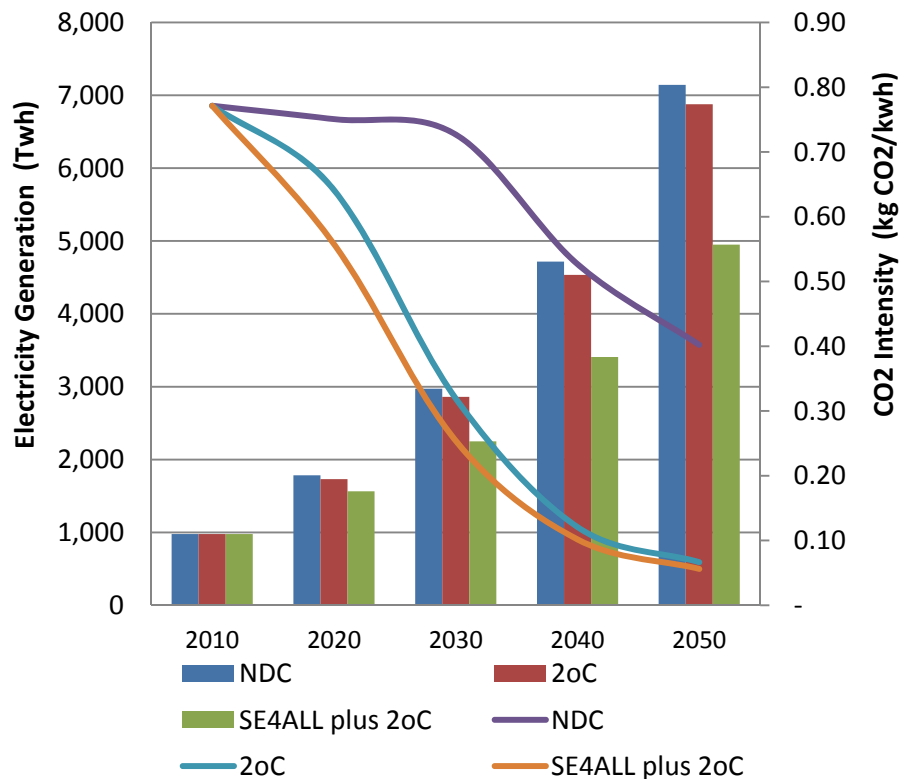


### CO<sub>2</sub> emissions and emission intensity

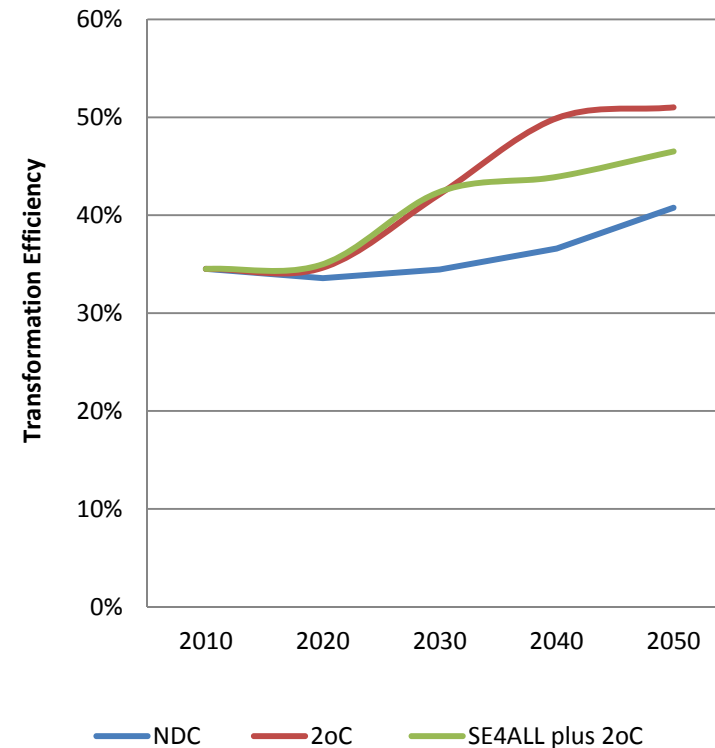


# Electricity Generation: CO<sub>2</sub> Intensity and EE

Electricity generation and CO<sub>2</sub> intensity of electricity

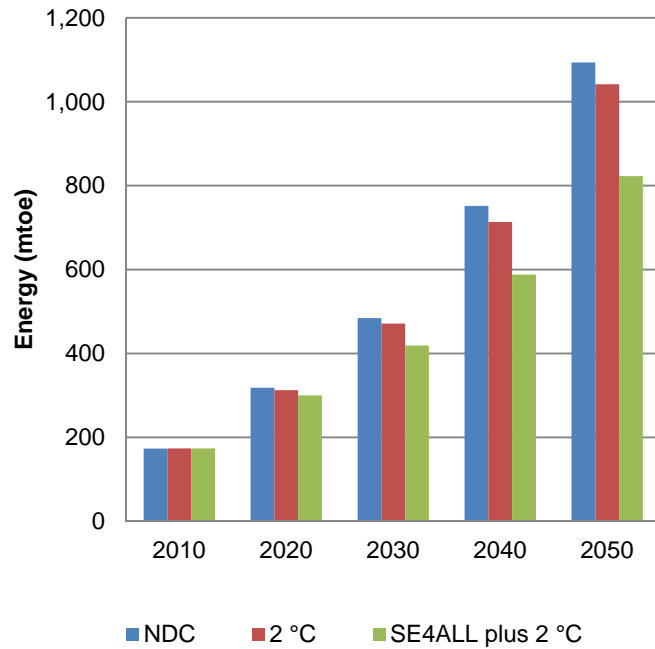


Transformation efficiency for fossil based electricity generation

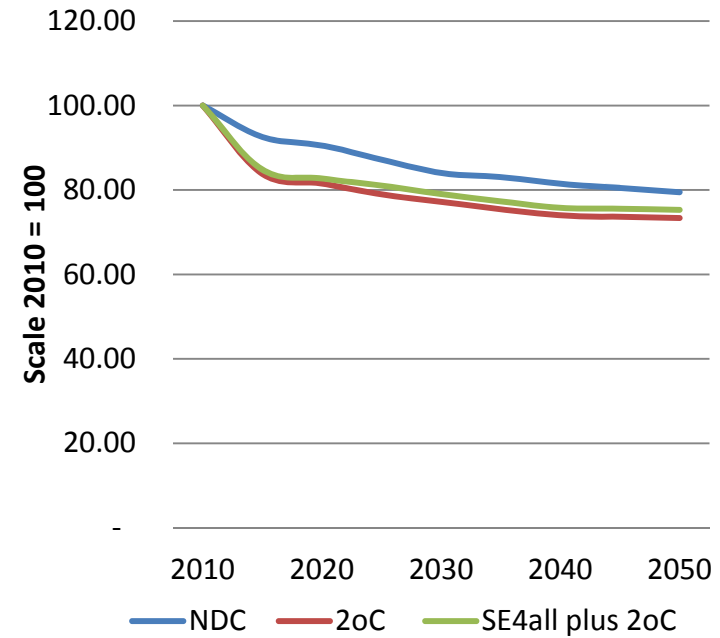


# Industry : Energy demand and EE improvement

Energy demand from industrial sector

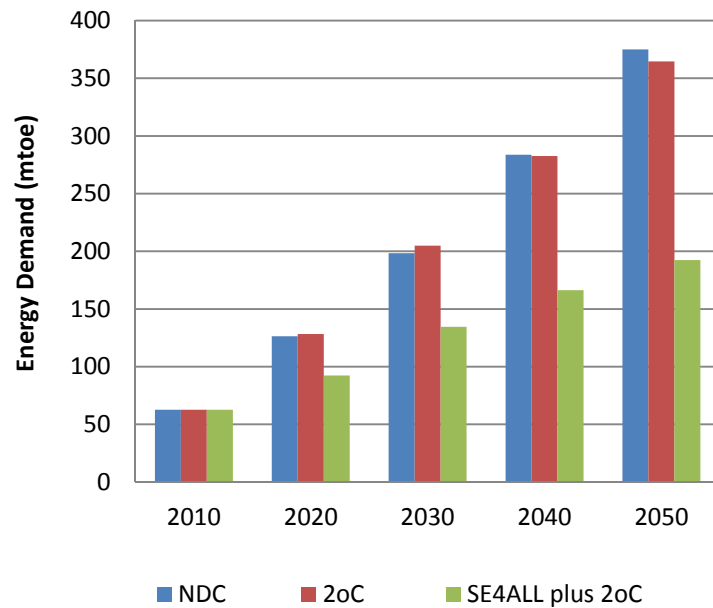


Energy Intensity improvement in cement sector

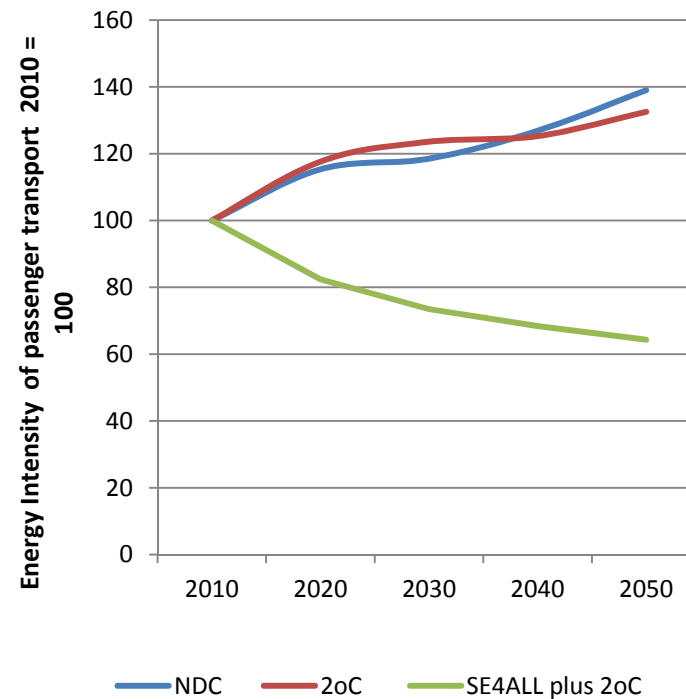


# Transport: Energy and EE Improvement

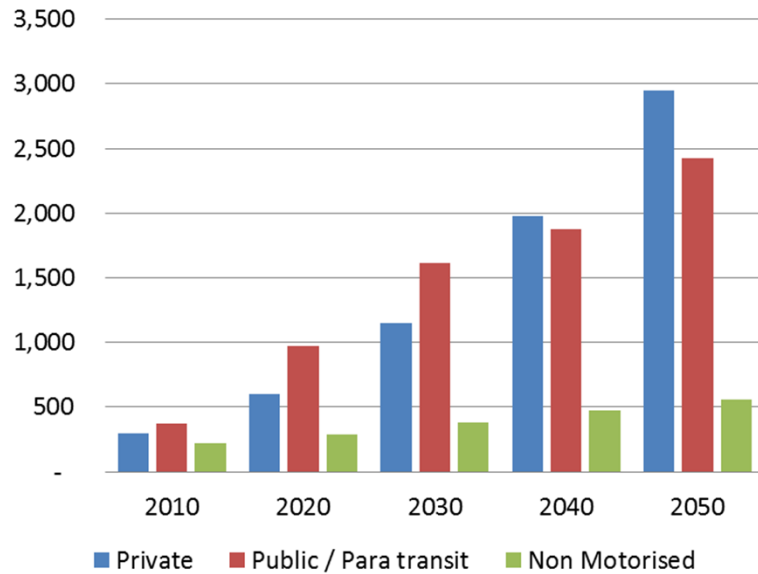
Energy demand from transport sector



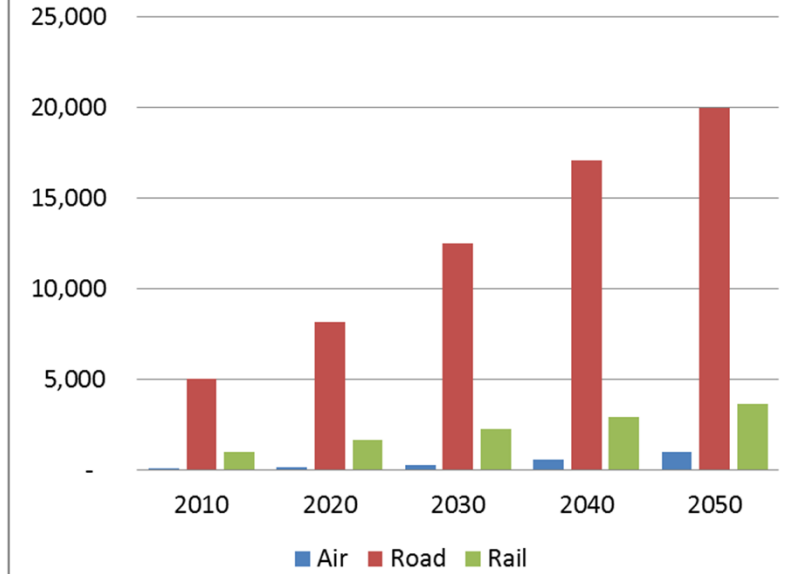
Energy Intensity improvement in transport sector



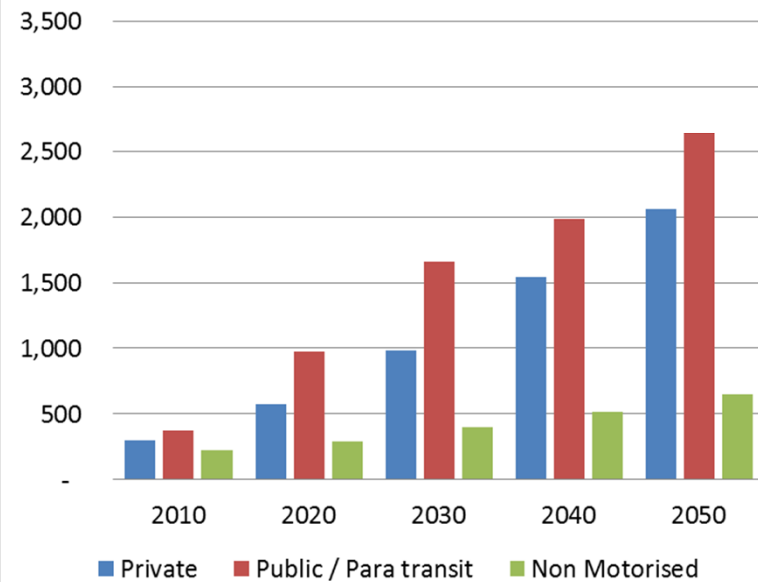
**Passenger Transport Demand - Urban NDC (Bpkm)**



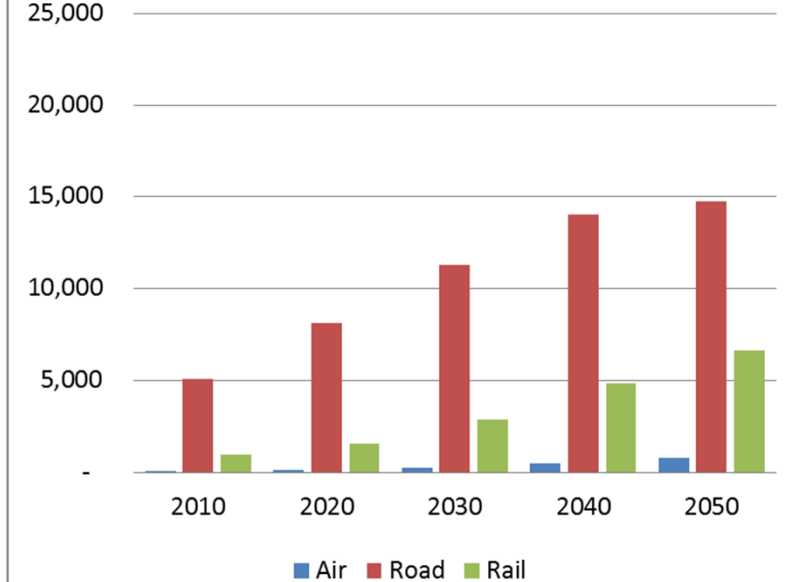
**Passenger Transport Demand - Inter-city NDC (Bpkm)**



**Passenger Transport Demand - Urban Sustainable Mobility (Bpkm)**



**Passenger Transport Demand - Inter-city Sustainable Mobility (Bpkm)**

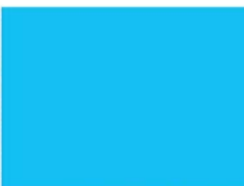


## Key Messages / Conclusions

- NDC related actions would meet 33% -35% CO<sub>2</sub> intensity target for 2030
- Stronger climate mitigation action aligned with global 2°C will improve EE
- Sectoral transformations (especially electricity and Transport) offer significant opportunities for achieving deep cuts
- Such deep cuts require both hardware improvements in technology and soft measures especially in transport and building sector







# GOOD PRACTICE AND SUCCESS STORIES ON ENERGY EFFICIENCY IN INDIA

INDIA ENERGY EFFICIENCY SERIES



## Thanks

UNEP DTU Partnership

<http://www.unepdtu.org/>

