

Is Green Growth Desirable, Necessary, Affordable?

Context Indian Economy

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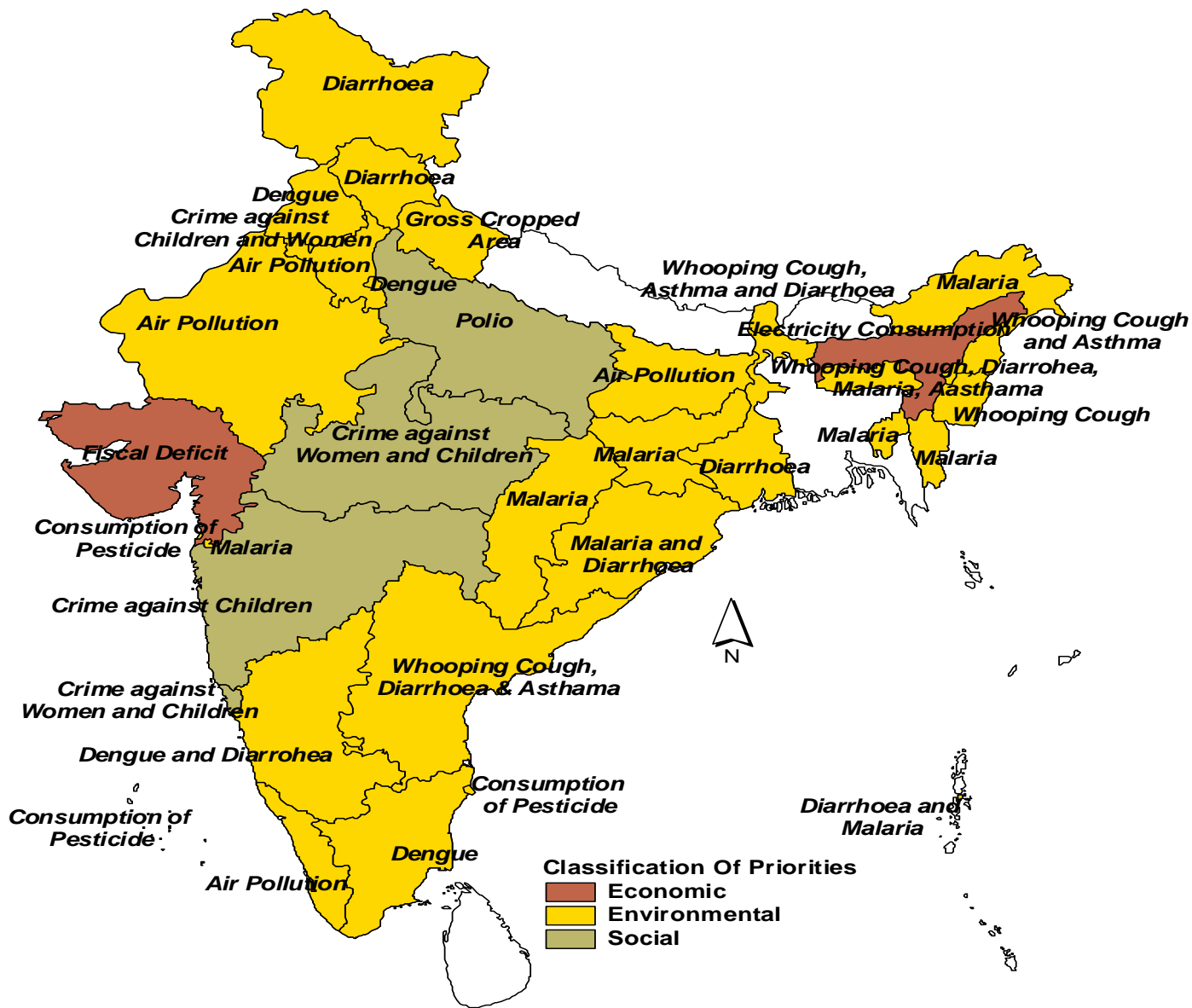
Jadavpur University

Kolkata, India

12 June 2014

@ ICREAR, New Delhi

Desirable?



Map 2.
Topmost Issues of Concern
 Joydip Roy

The Indian Context – Energy and Climate

- India has the largest energy demand in the world after China and the United States.
- Indian demand for energy has more than doubled since 1990, and is forecast to grow by a factor of 4.5 between 2012 and 2035.
- Per capita energy demand in India remains low at 14% of the OECD average, 34% of the average Chinese level.
- India must be able to increase energy use per capita with moderate carbon emissions to meet its development needs.
- India has committed to emission intensity reduction targets of 20-25% on 2005 levels by 2020.

**Globally GHG emissions continue to rise in
Energy supply and Energy End use sectors
Which imply wide spread mitigation actions
to be consistent with low stabilisation scenarios**

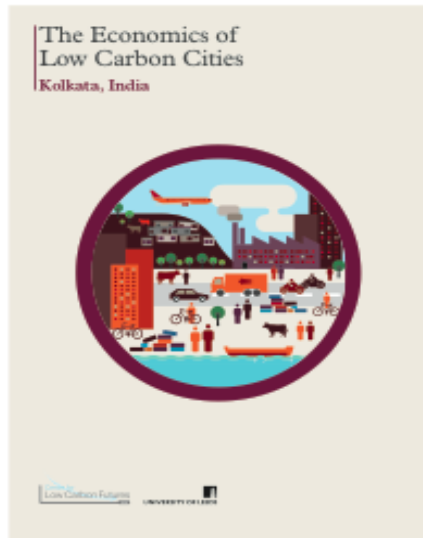


Source of innovation: example industry

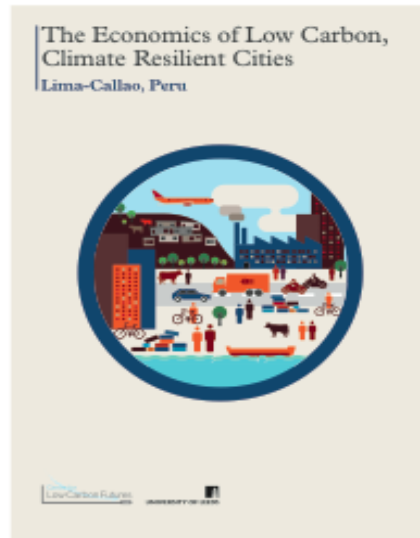
- (1) Energy efficiency (e.g., through furnace insulation, process coupling, or increased material recycling);
- (2) Emissions efficiency (e.g., from switching to non-fossil fuel electricity supply, or applying CCS to cement kilns);
- (3) Material efficiency
 - (3a) Material efficiency in manufacturing (e.g., through re-use of old structural steel without melting);
 - (3b) Material efficiency in product design (e.g., light-weight car design,);
- (4) Product-Service efficiency (e.g., through car sharing, or higher building occupancy);
- (5) Service demand reduction (e.g., switching from private to public transport, new product design with longer life)

NECESSARY?

Studies on the Economics of Low Carbon Cities



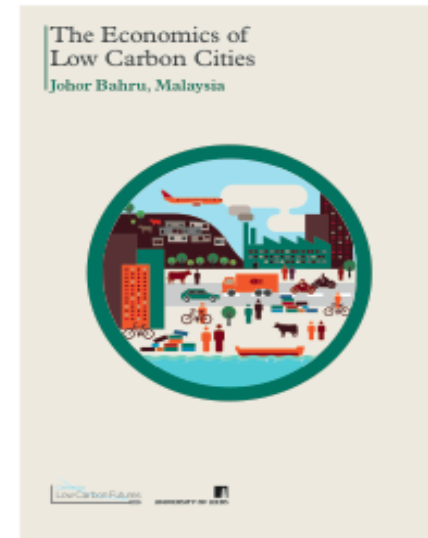
Kolkata, India



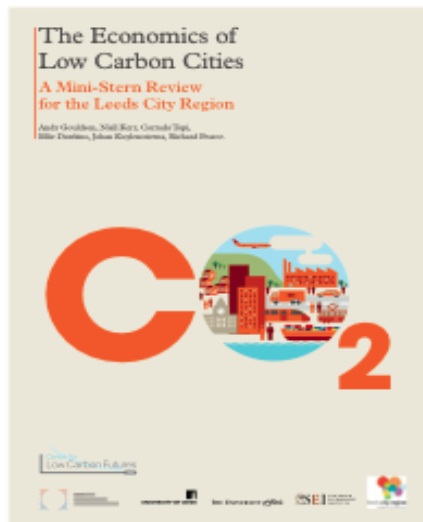
Lima-Callao, Peru



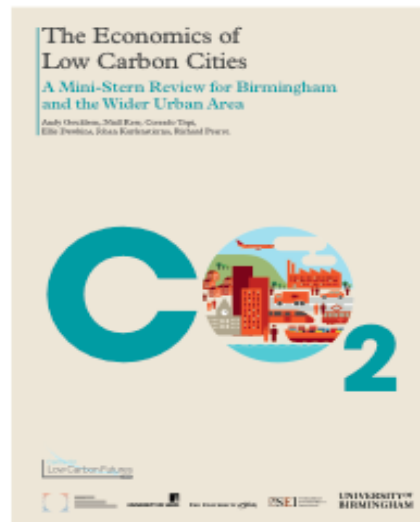
Palembang, Indonesia



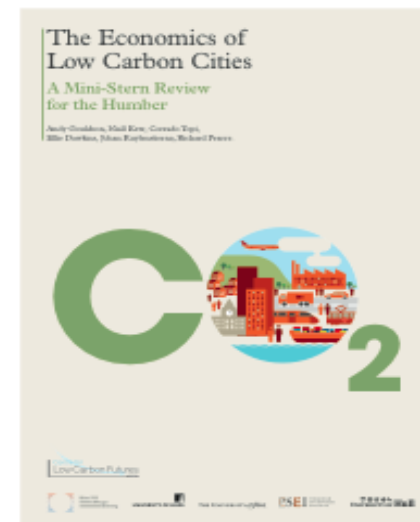
Johor Bahru, Malaysia



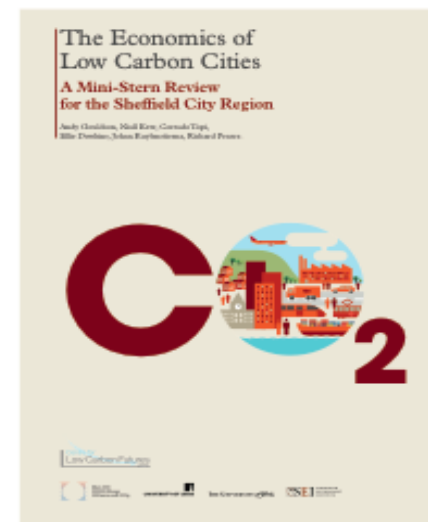
Leeds City Region



Birmingham and the Wider Urban Area



The Humber



Sheffield City Region

A HUGE OPPORTUNITY

- How can a rapidly growing city like Kolkata meet its energy needs and integrate low carbon objectives into its development strategy?
- If Kolkata achieves its target growth rates of 6-7% a year, more than half of the urban economy that will exist in 2025 has yet to be built.
- Locking into a high cost, high carbon development path?
- This rate of growth creates an opportunity to switch to a lower cost, more energy efficient, lower carbon development trajectory.

Our Approach

- Build a **baseline of business as usual trends** that extrapolates current trends to project energy use, bills, carbon emissions.
- Identify **lists of measures** (energy saving and small scale renewables) that could be adopted in each sector.
- Collect realistic data on the **costs** (purchase, installation, running), **benefits** (energy, economic, carbon), lifetimes etc. of measures.
- Forecast **deployment** of each measure in each sector in the city through to 2025
- Aggregate all of the above to build a **‘macro’ picture** of investment needs, payback periods, carbon savings etc.

How to Cut Energy Bills and Carbon Emissions?

- How much **economically attractive potential** is there to promote energy efficiency and reduce carbon emissions in the city?
- How much **realistically available potential** is there to to promote energy efficiency and reduce carbon emissions in the city?
- How much of a difference would **a partial decarbonisation of the electricity supply sector** make?
- How much of a difference would **a fuller decarbonisation of the electricity supply sector** make?

AFFORDABLE?

With **Business as Usual Development, by 2025:**

- Kolkata's energy use will grow by 62%
- Kolkata's bill will double to INR 300 billion.
- Kolkata's carbon emissions will grow by 57%.

With **Energy Efficient, Low Carbon Development, by 2025:**

- Kolkata could secure INR 200 billion of investment to exploit cost effective measures across all sectors.
- Kolkata could save INR 25 billion a year from its total energy bill if it made these investments.
- Kolkata could cut its carbon emissions by 15.8% compared to business as usual.

Political Awareness and **institutional capacities** for delivery need to be built if these opportunities are to be exploited.

How to Cut Kolkata's Energy Bills and Carbon Emissions?

The Transport Sector- Top 6 Measures

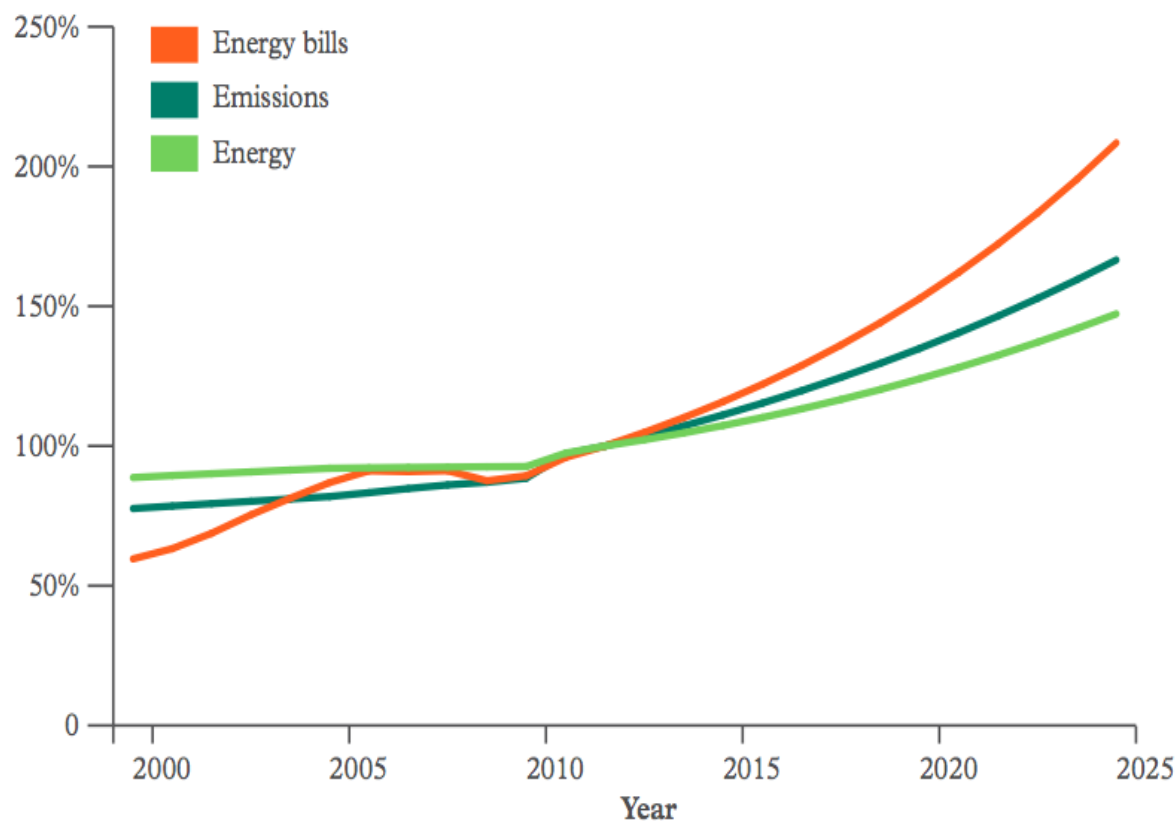
Top 6 Cost Effective Measures

1. Car efficiency standards
2. Commercial efficiency standards
3. Demand management
4. Cycling Infrastructure
5. Bus rapid transit
6. Tram recapitalisation

Top 6 Carbon Effective Measures

1. Commercial efficiency standards
2. Demand management
3. Bus rapid transit
4. Car efficiency standards
5. Tram recapitalisation
6. Cycling Infrastructure

The Residential Sector - Business as Usual



Household energy use will grow by 47% by 2025.

Household energy bills will grow by 107% by 2025.

Household carbon emissions will grow by 66% by 2025.

The Residential Sector - Top 10 Measures

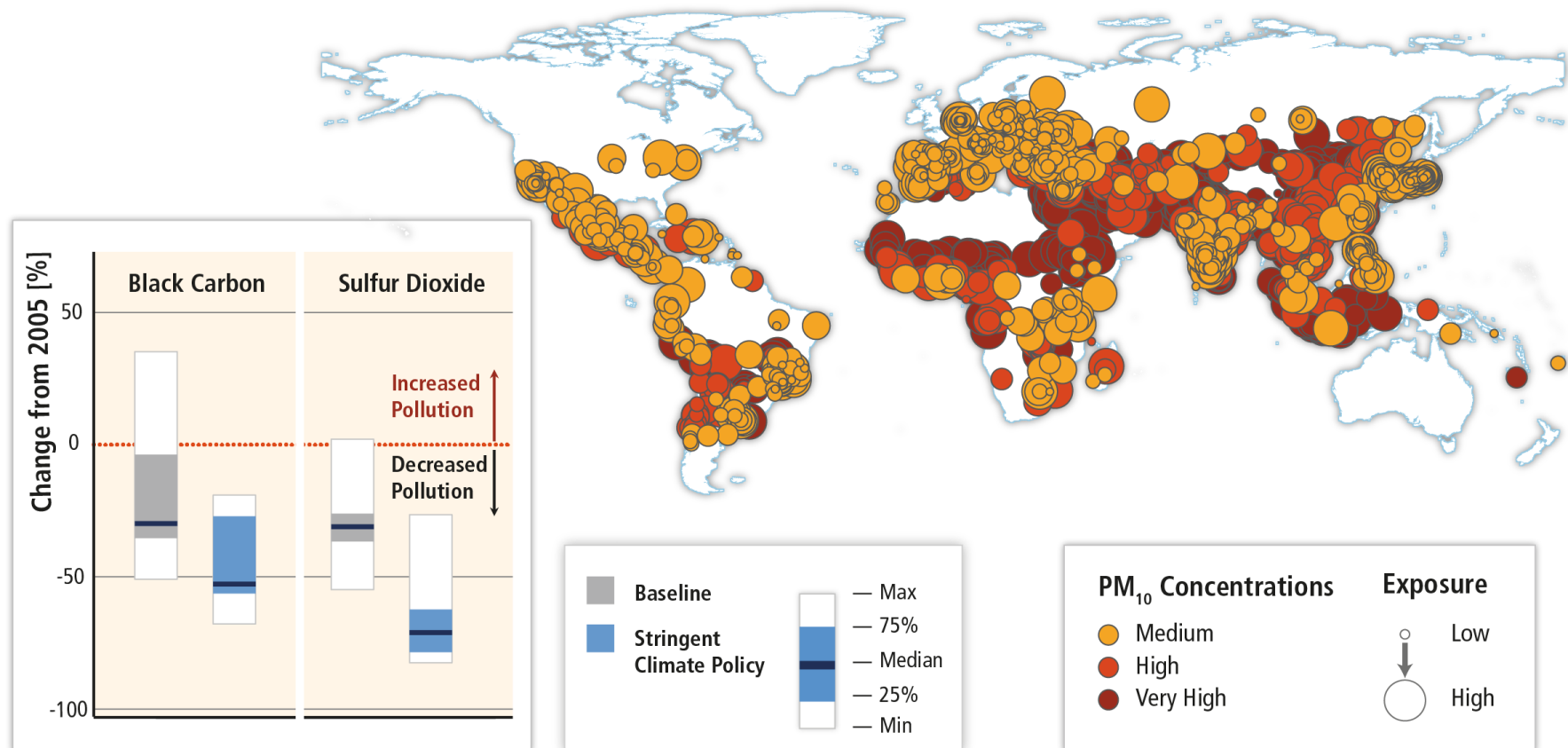
Top 10 Cost Effective Measures

1. Behaviour change
2. Solar panels with subsidy
3. Efficient refrigerators
4. Efficient air conditioning
5. Solar water heating with subsidy
6. Efficient entertainment appliances
7. Efficient electric water heating
8. New building standards for new apartments
9. Efficient fans
10. Efficient lighting

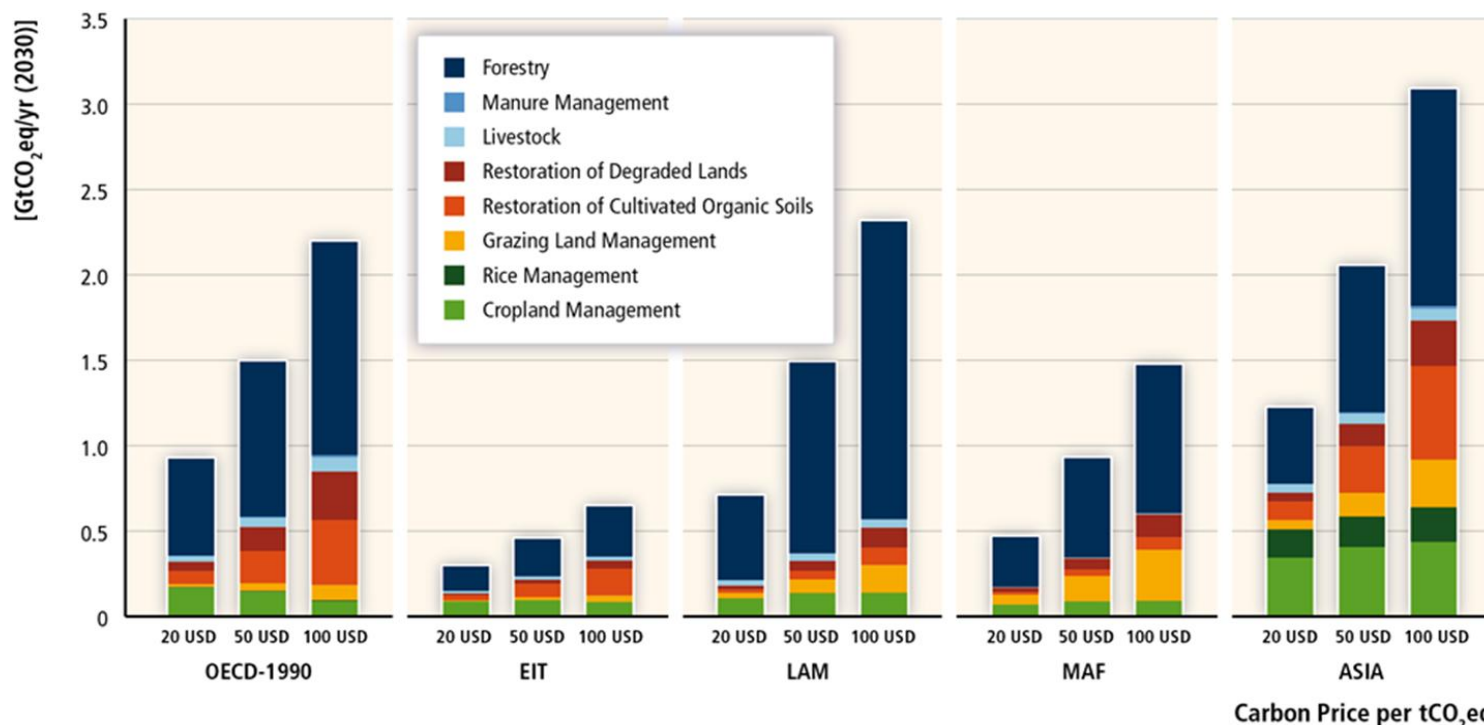
Top 10 Carbon Effective Measures

1. Efficient lighting
2. Solar panels
3. Efficient refrigerators
4. New building standards for new apartments
5. Efficient entertainment appliances
6. Fuel switching coal to LPG
7. Efficient air conditioning
8. Efficient fans
9. Solar water heating
10. Efficient electric water heating

Mitigation can result in large co-benefits for human health and other societal goals. Important differences across technologies.



What is the potential of the mitigation options for reducing GHG emissions in the AFOLU Sector?



- Global economic mitigation potentials in agriculture in 2050 are estimated to be 0.5–10.6 GtCO₂eq/yr.
- Reducing food losses & waste: GHG emission savings of 0.6–6.0 GtCO₂eq/yr.
- Changes in diet: GHG emission savings of 0.7–7.3 GtCO₂eq/yr.
- Forestry mitigation options are estimated to contribute 0.2–13.8 GtCO₂/yr.

Thank you

Jadavpur University

