

Climate Policy Modeling: Some Insights for India

Presentation by

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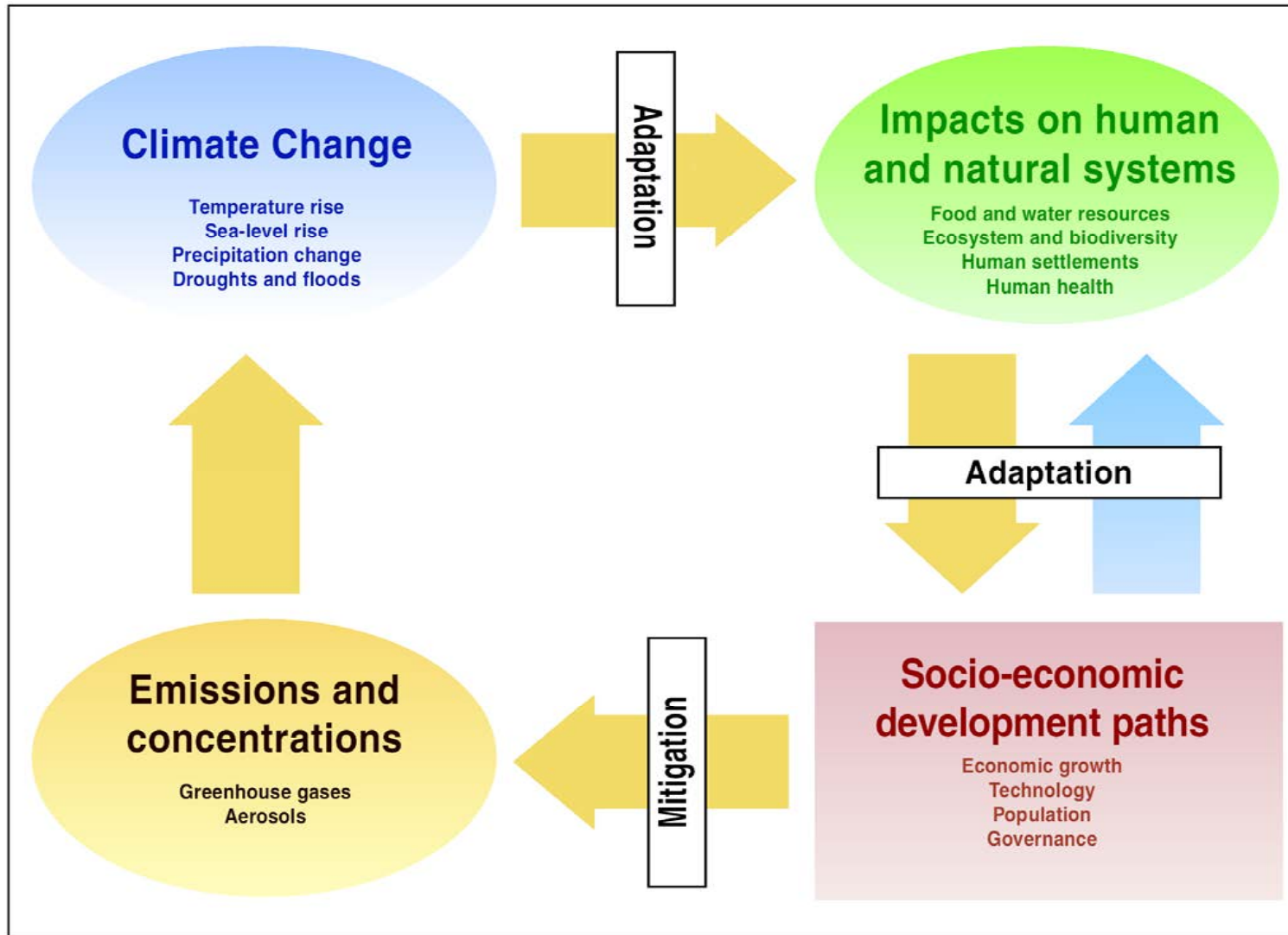
COP 8 Side-event (October 25 - 15:00 to 17:00 hours)

Asia-Pacific Forum for Collaborative Modeling of Climate Policy Assessment

October 25, 2002, Hotel Grand Inter-Continental, New Delhi



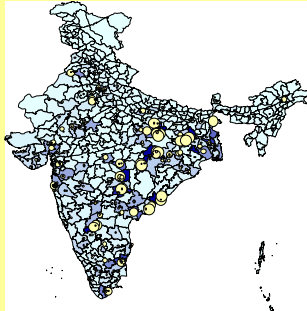
Integrated Framework for Climate Change



AIM Model System

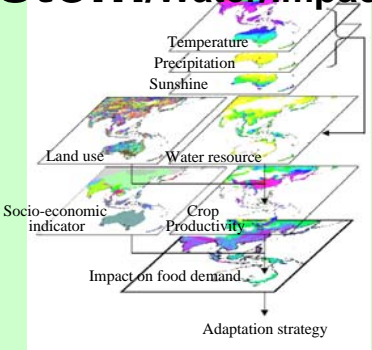
AIM/Energy/Technology/Country

A bottom-up technology selection model of energy use and emissions at country and local level



AIM/Ecosystem/Water/Impact

A set of ecosystem models, including a vegetation dynamics model, a water resource model, an agricultural productivity model and a health impact model



AIM/Bottom-up

A bottom-up technology & land use model for Asia-Pacific region

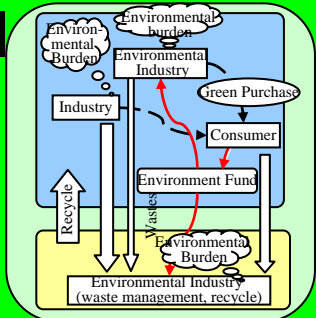
AIM Family

AIM/Top-down

A general-equilibrium-type world economic model

AIM/Material

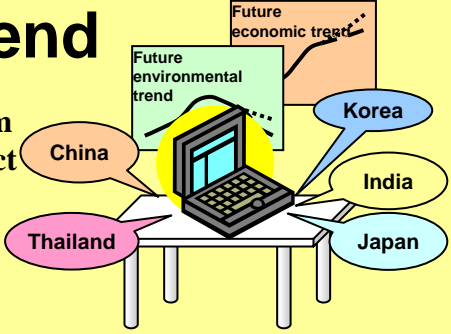
A environment-economy integrated model with material balance and recycling process modules



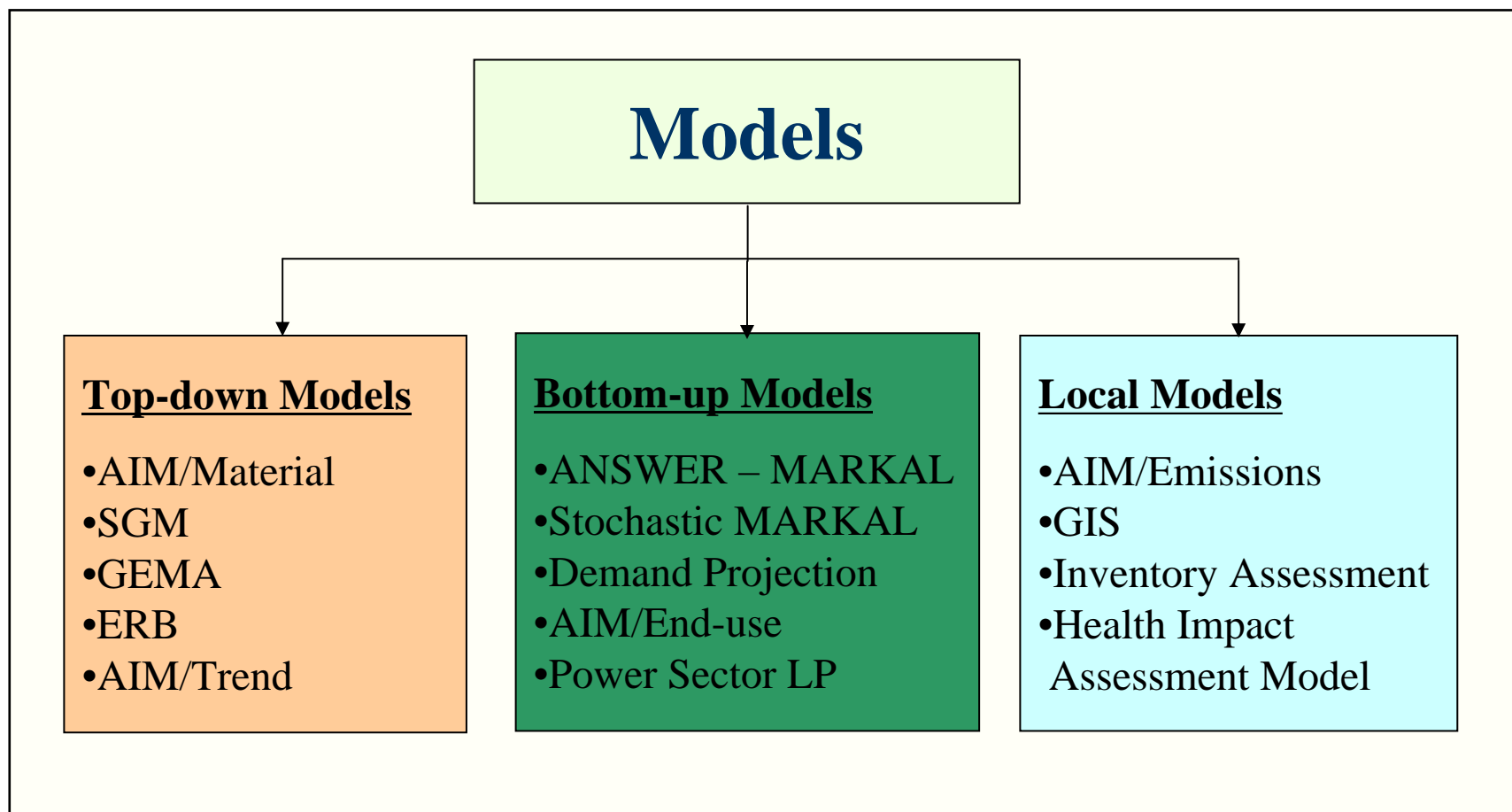
Technology assessment ↑ ↓ Technology needs
Research on new technologies

AIM/Trend

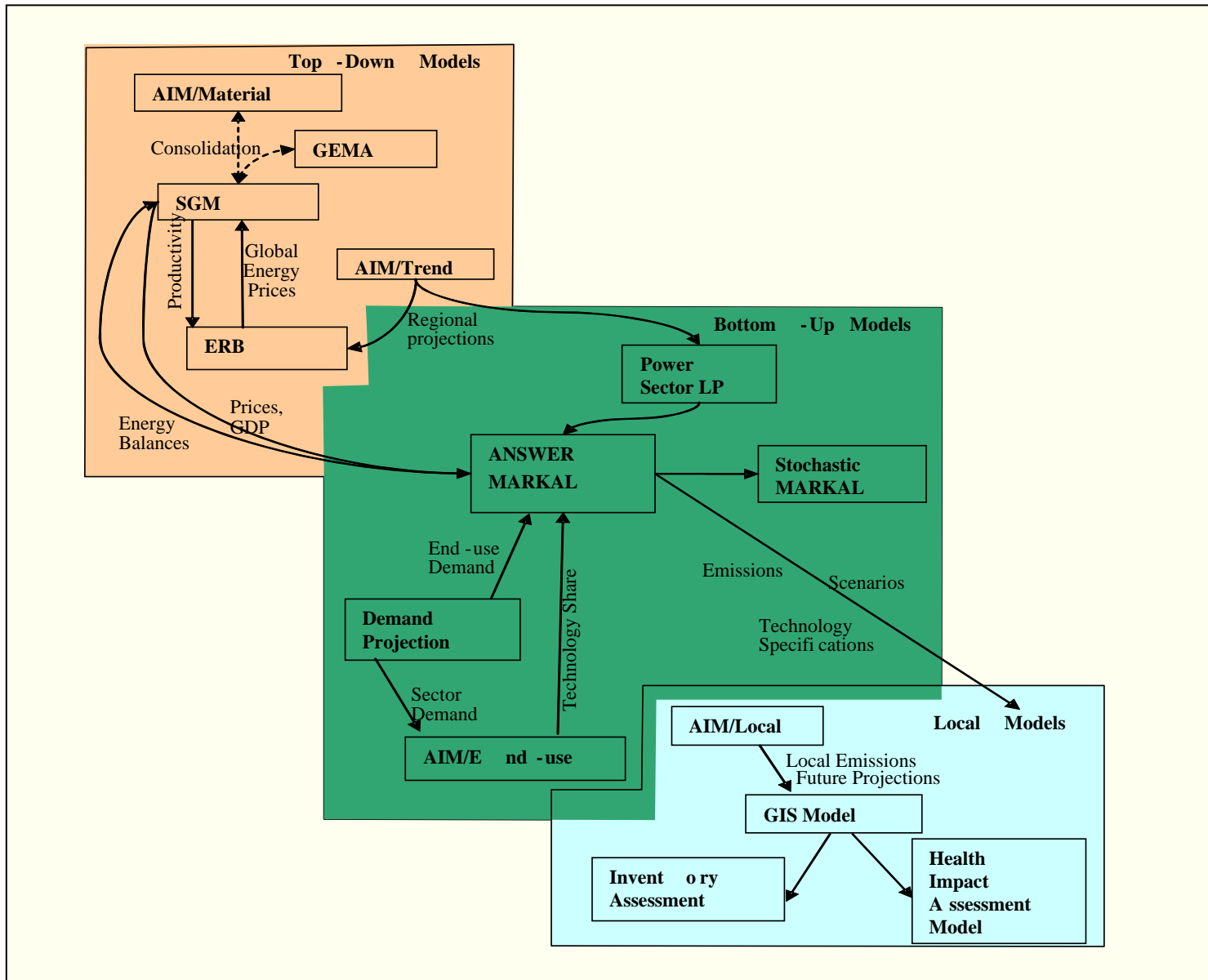
A reduced-form model to project future socio-economic trends and environmental change for all 42 countries




Model System for India's Emissions Policy Analysis



Soft-linked Models Framework



Insights from Integrated Climate Change Assessment



Few Key Questions for Emissions Policies

- What is the cost-effective emissions pathways to achieve a specific “GHG concentration stabilization” level?
- What will be the future trends of emissions and intensities?
- How the local and GHG emissions control policies linked?
- What is mitigation supply curve for India?
- How can regional cooperation help in climate change issues?
- What would be the implications of stabilization regime, e.g. 550 ppmv, on India’s energy system during the century
- Is it worth to fund supply-side push of clean technologies like solar PV for GHG mitigation?



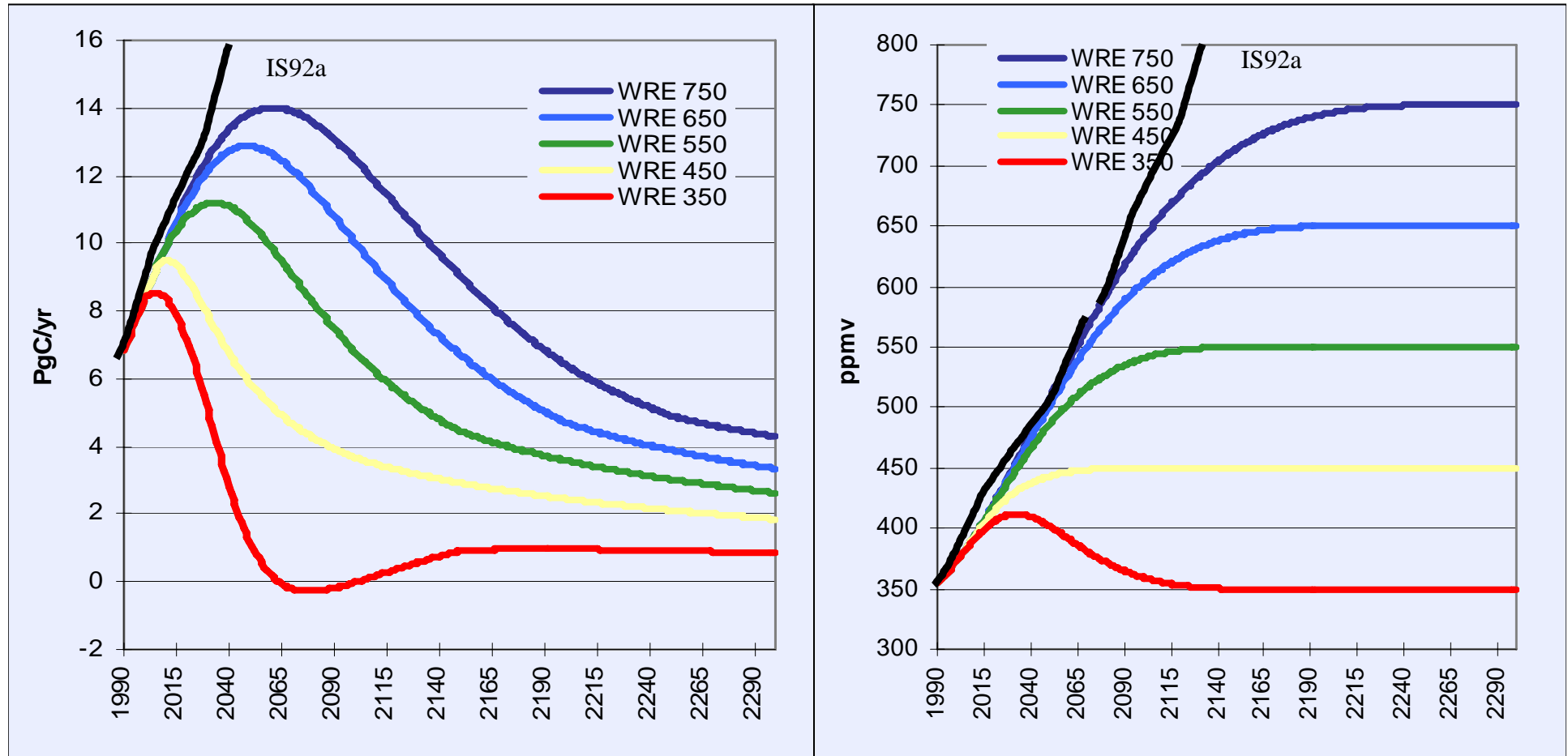
The Framework Convention On Climate Change (UNFCCC)

Objective:

...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. (p.5)

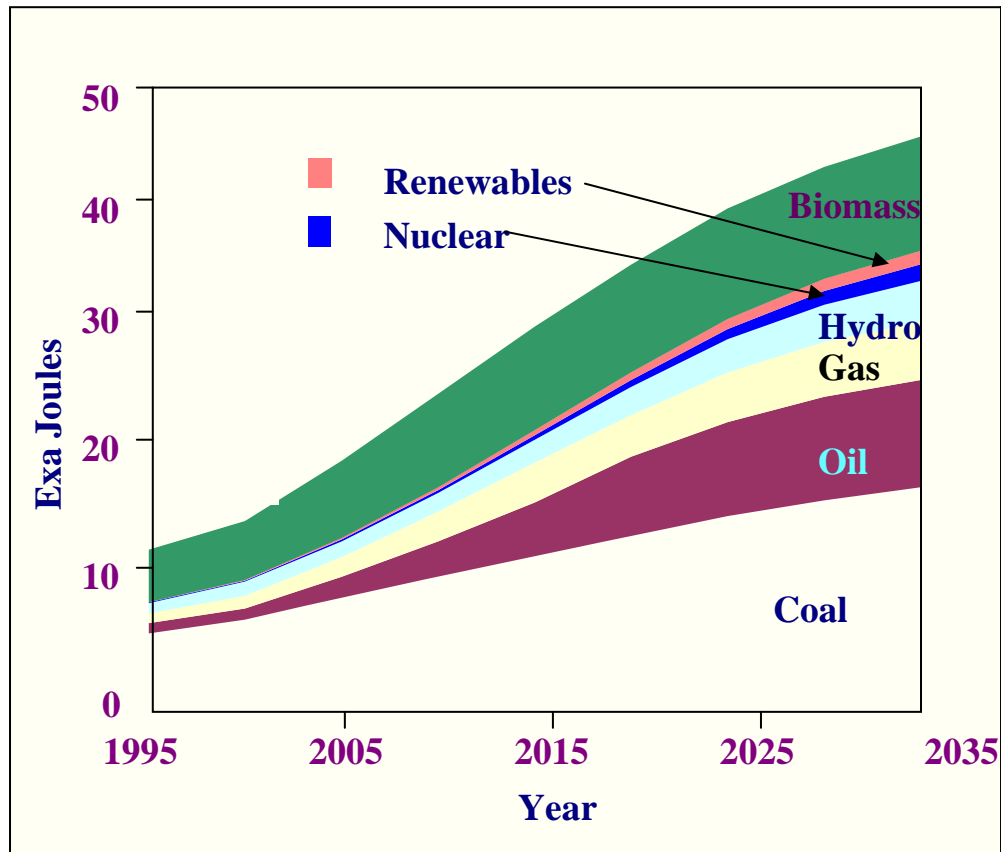


Emissions and Concentrations

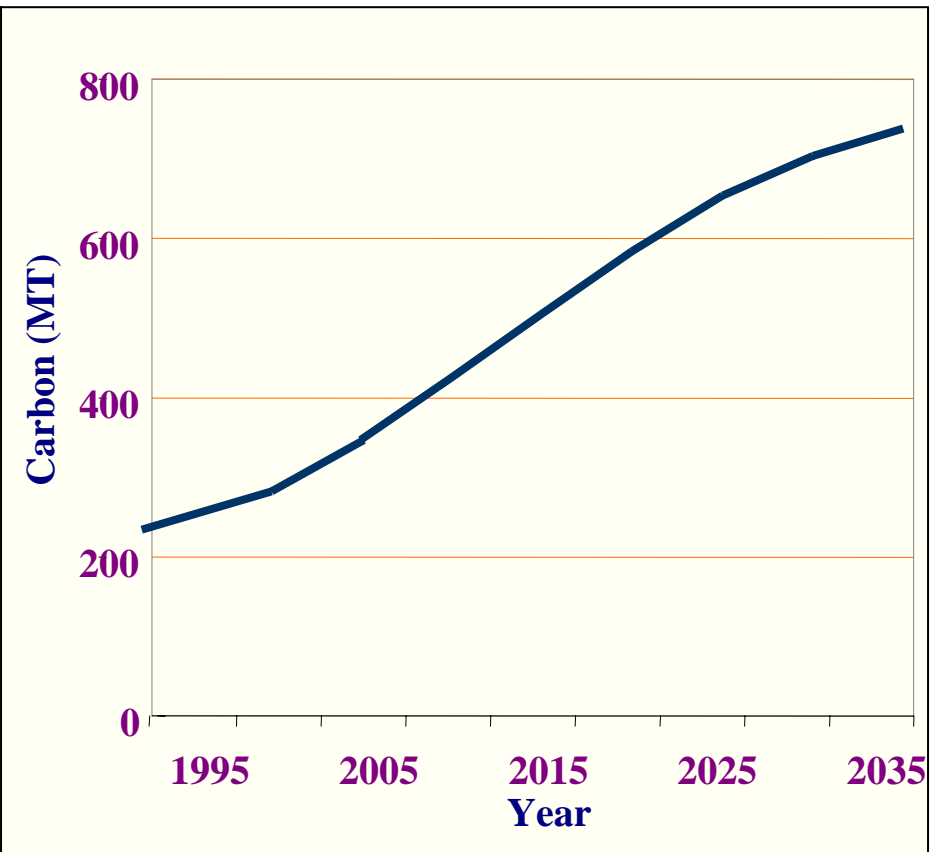


Energy and Carbon Emissions for India: AIM/ENDUSE Model

Energy Consumption

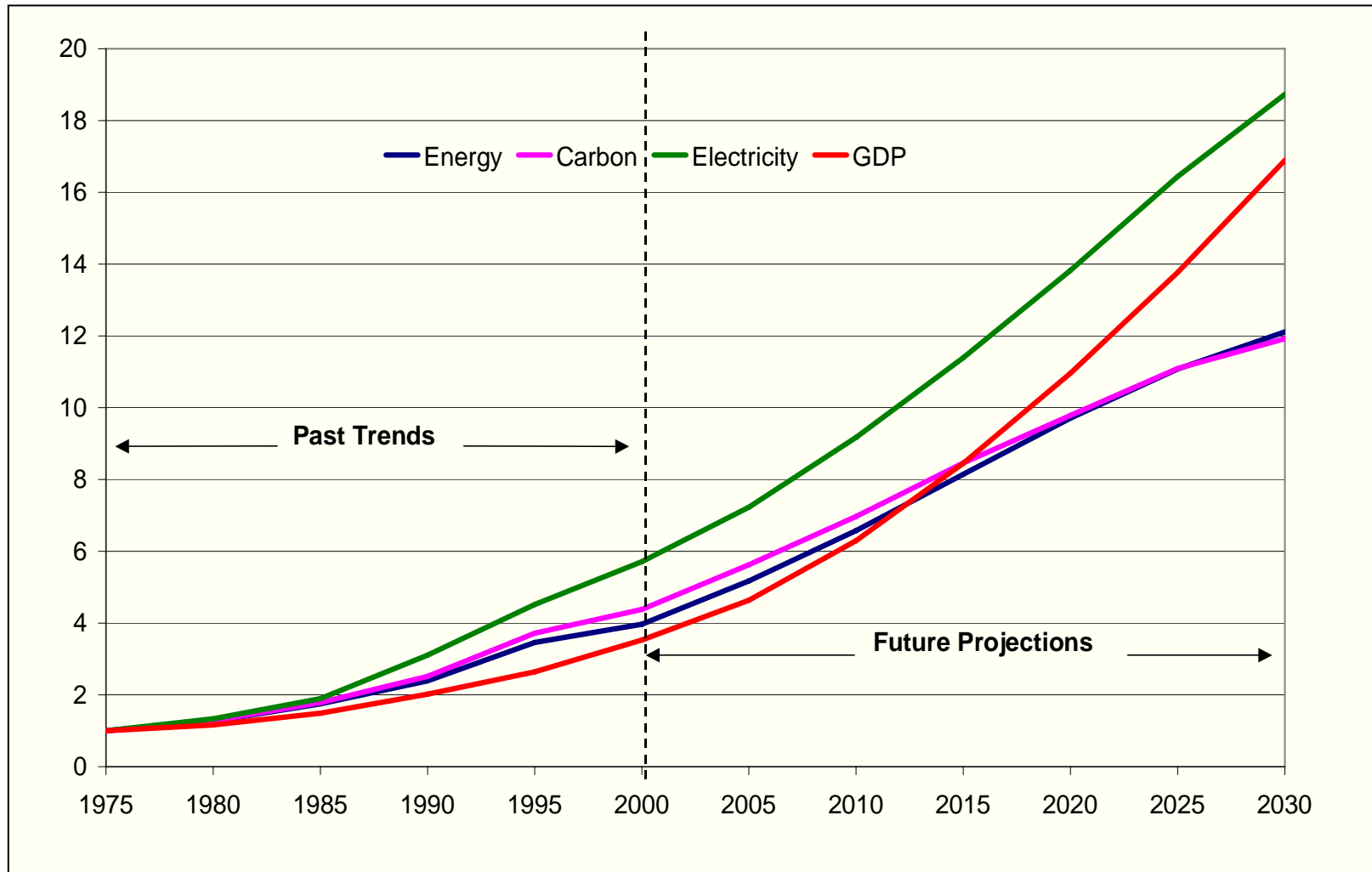


Carbon Emissions

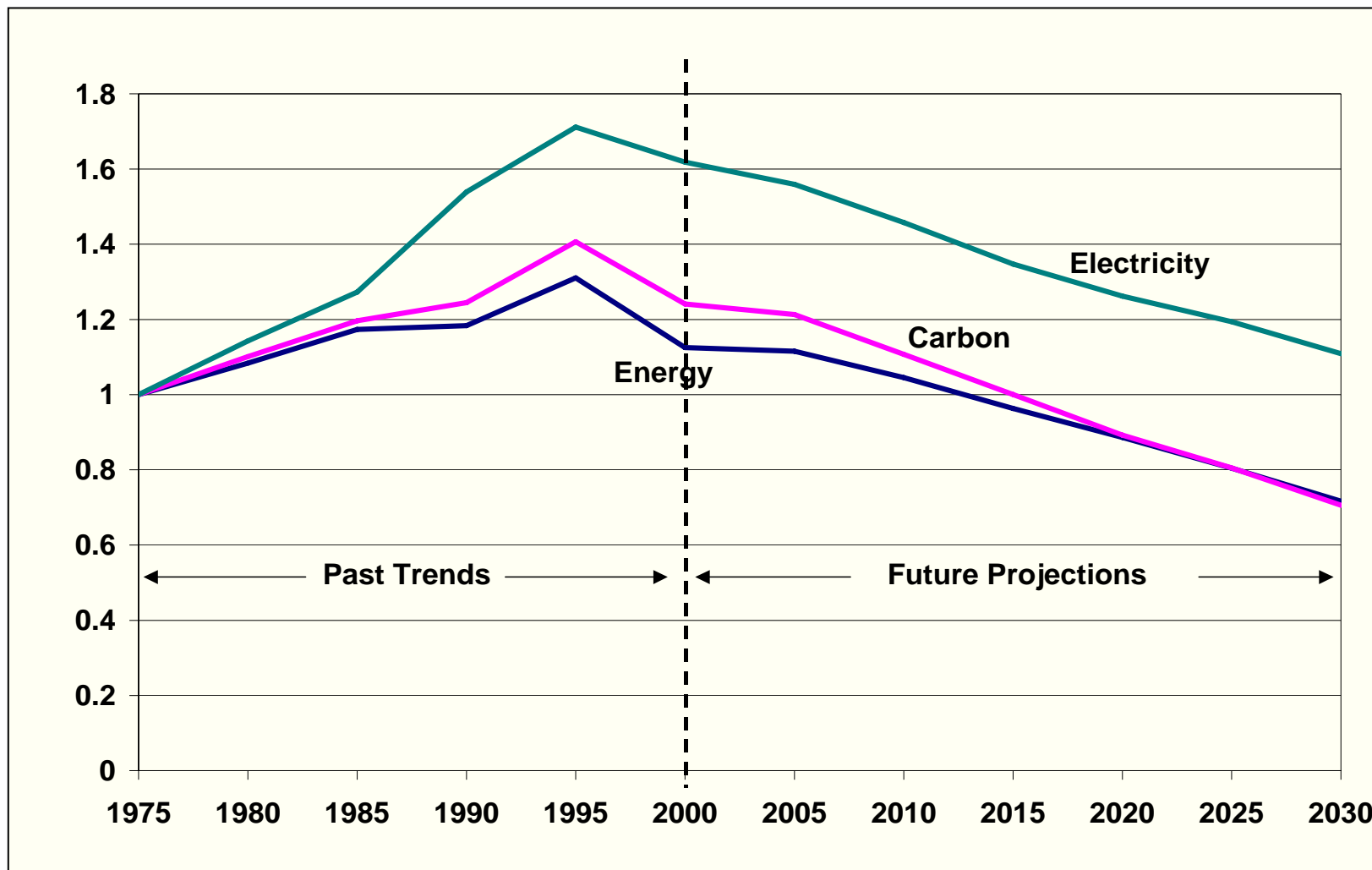


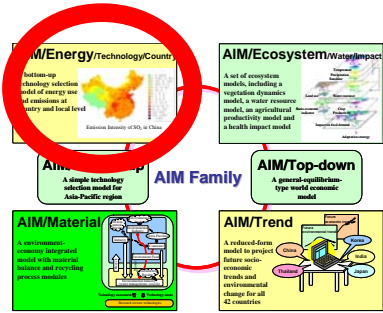
Energy, Carbon, Electricity and GDP

(History and Projections for Reference Scenario)



GDP intensities of Energy, Electricity and Carbon (Reference Scenario)

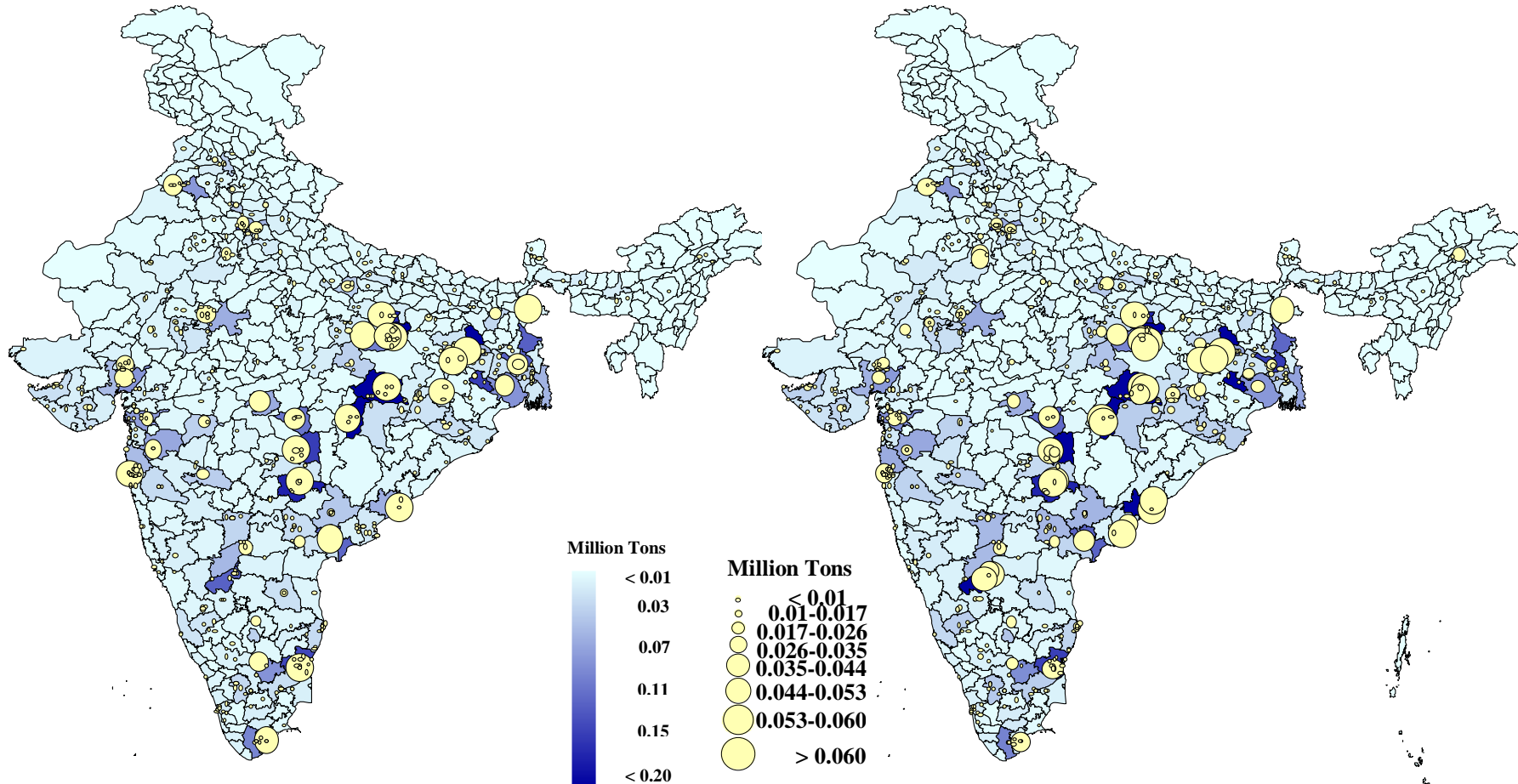




SO₂ Emission AIM/Emission Model

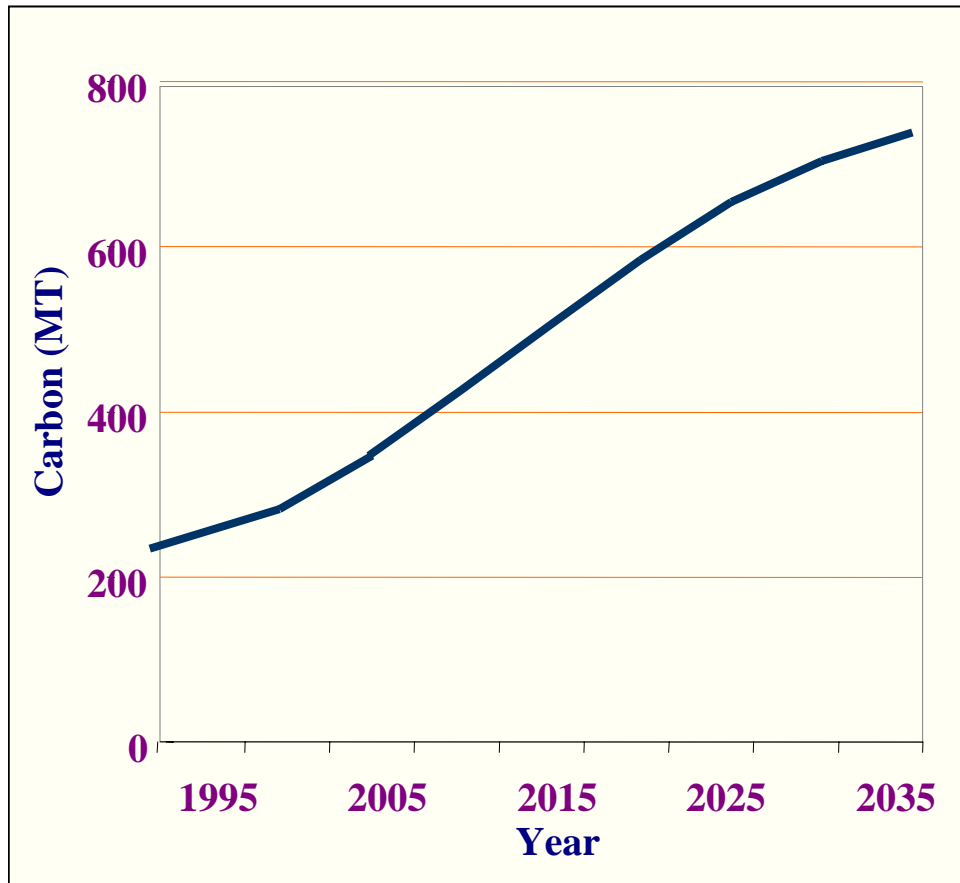
2000

2030

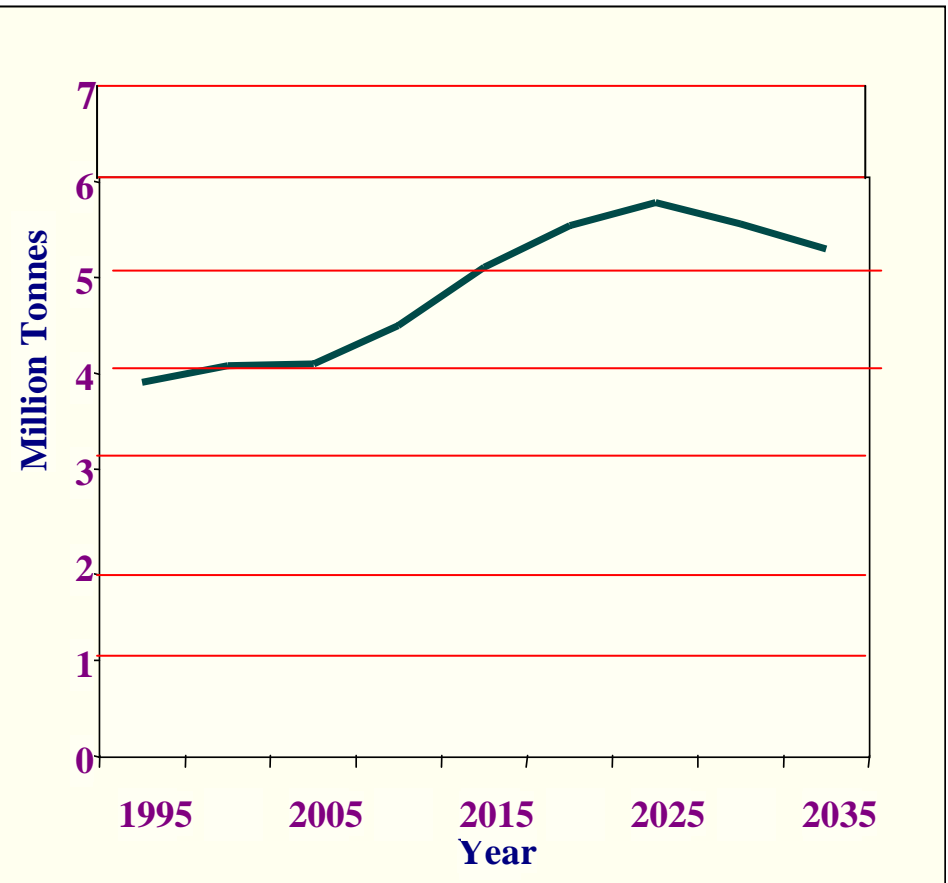


GHG versus Local Emissions in India

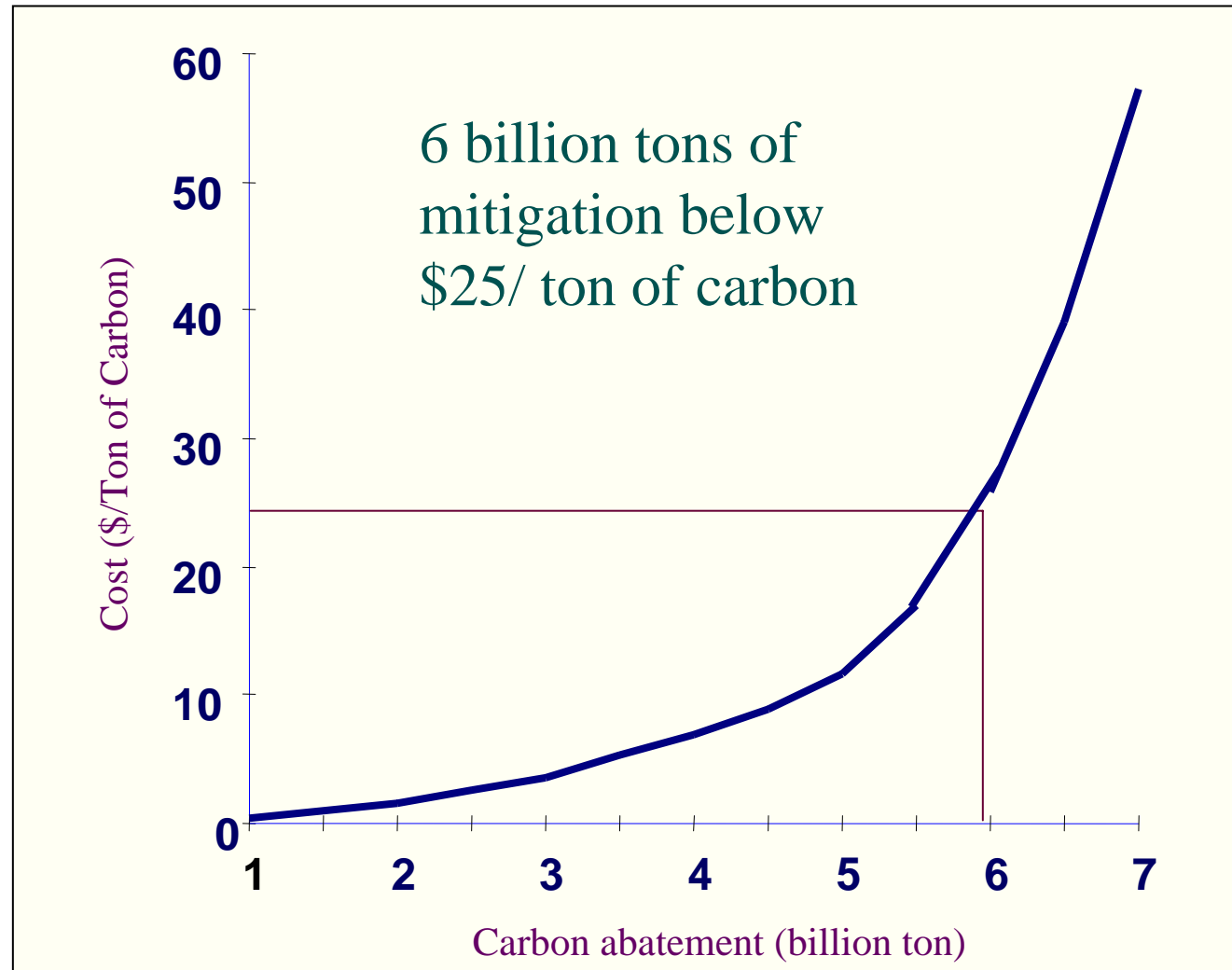
Carbon Emissions



SO₂ Emissions



Carbon Mitigation Supply Curve (2005-2035)



Carbon Mitigation

(under different Post-Kyoto Scenarios)

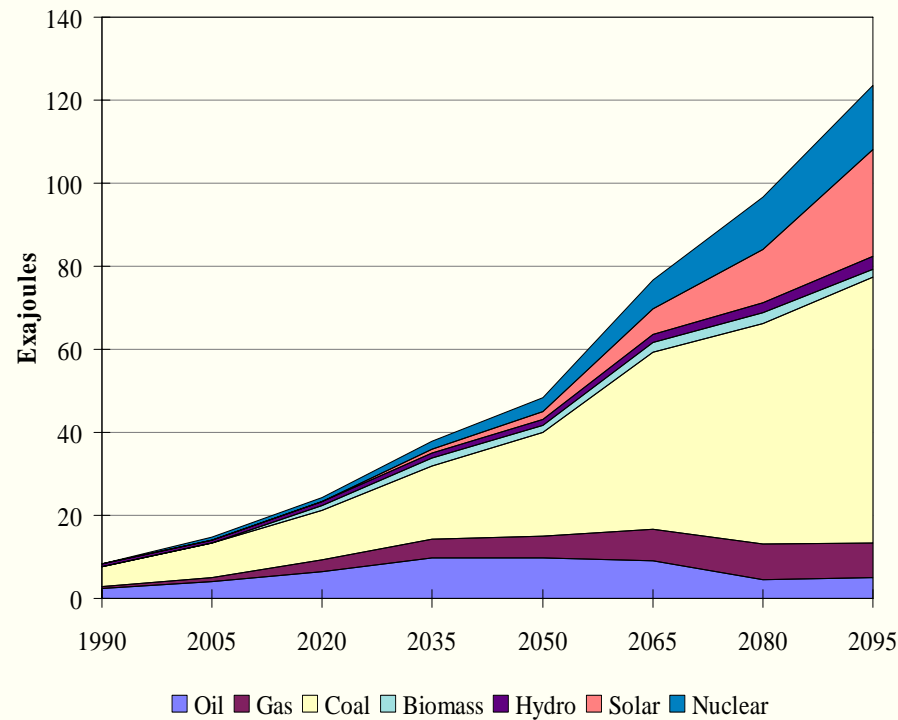
(in Million Ton)

| Scenario | Kyoto Period 2000-2012 | Medium Term 2000-2030 | Long Term 2000-2100 |
|----------|---------------------------|--------------------------|------------------------|
| 750 ppmv | 138 (3%) | 743 (5%) | 11334 (11%) |
| 650 ppmv | 301 (7%) | 1555 (11%) | 23666 (23%) |
| 550 ppmv | 449 (10%) | 2503 (17%) | 33284 (32%) |

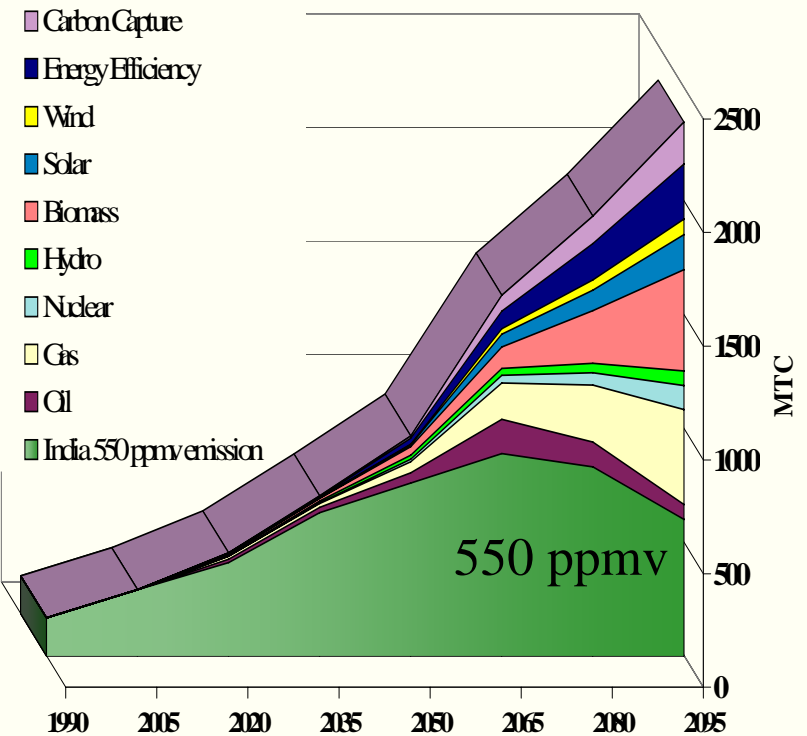


Indian Energy System Transformation Under 550 ppmv Stabilization

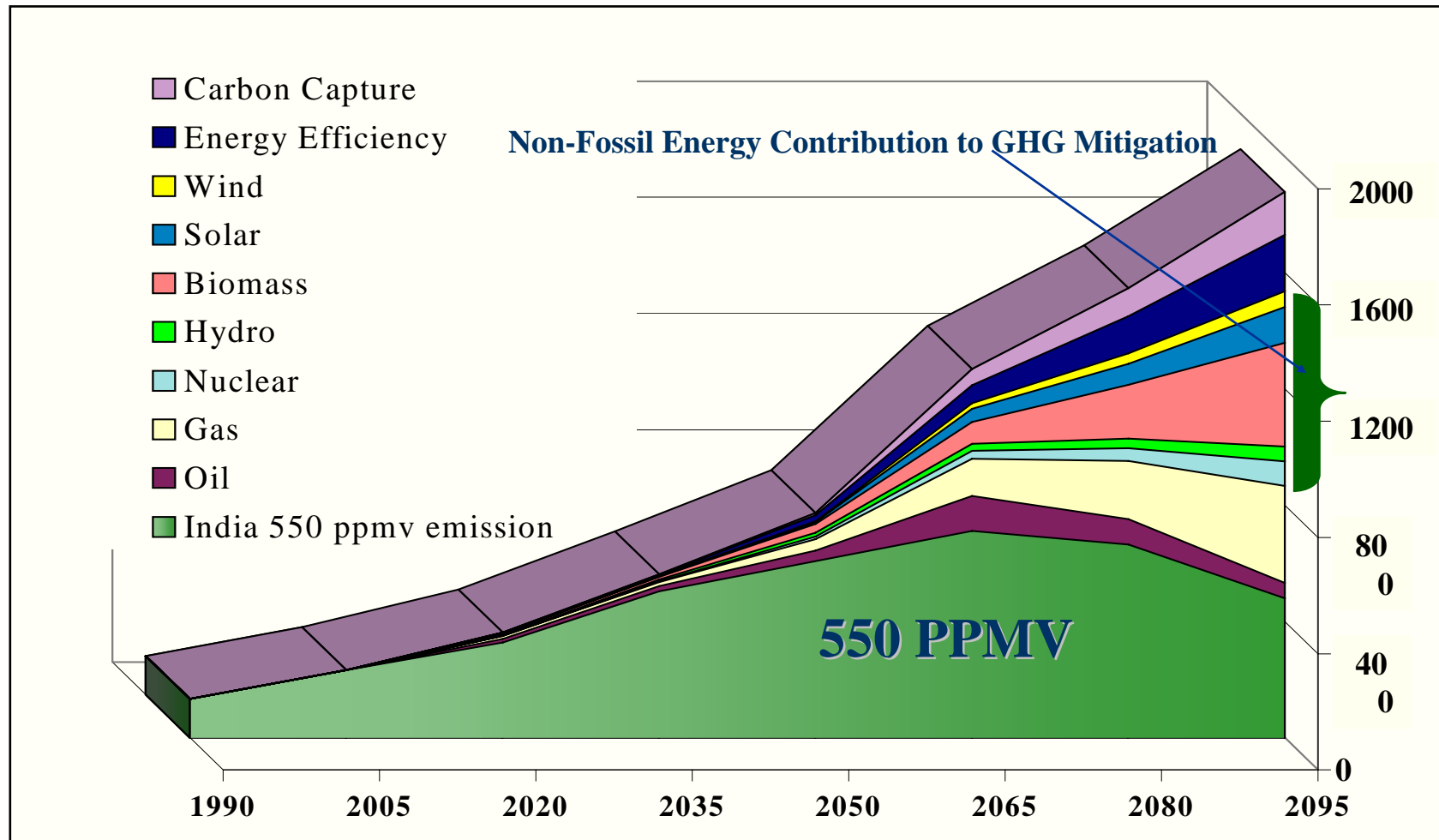
Base Case Energy System



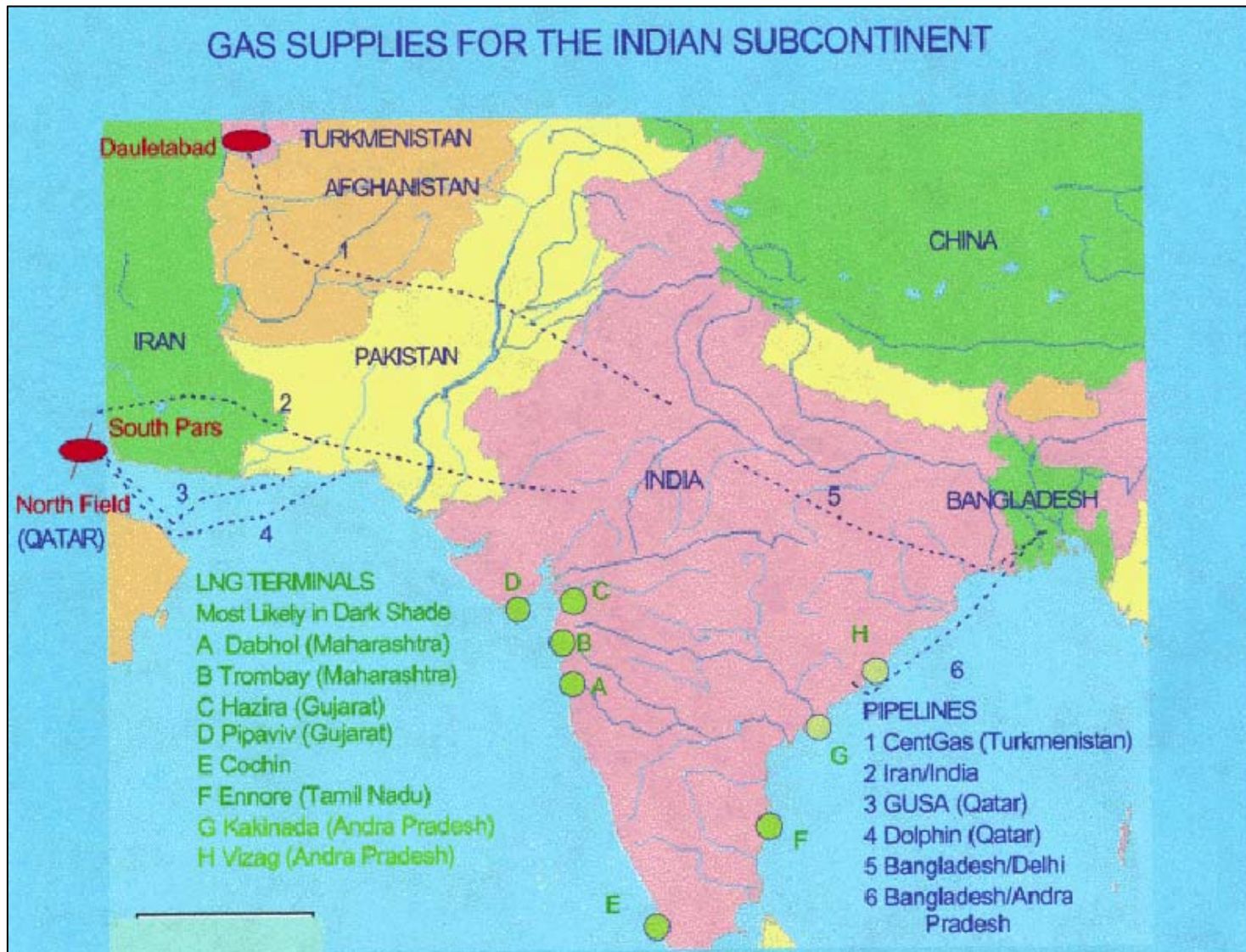
Energy Changes: 550 ppmv Case



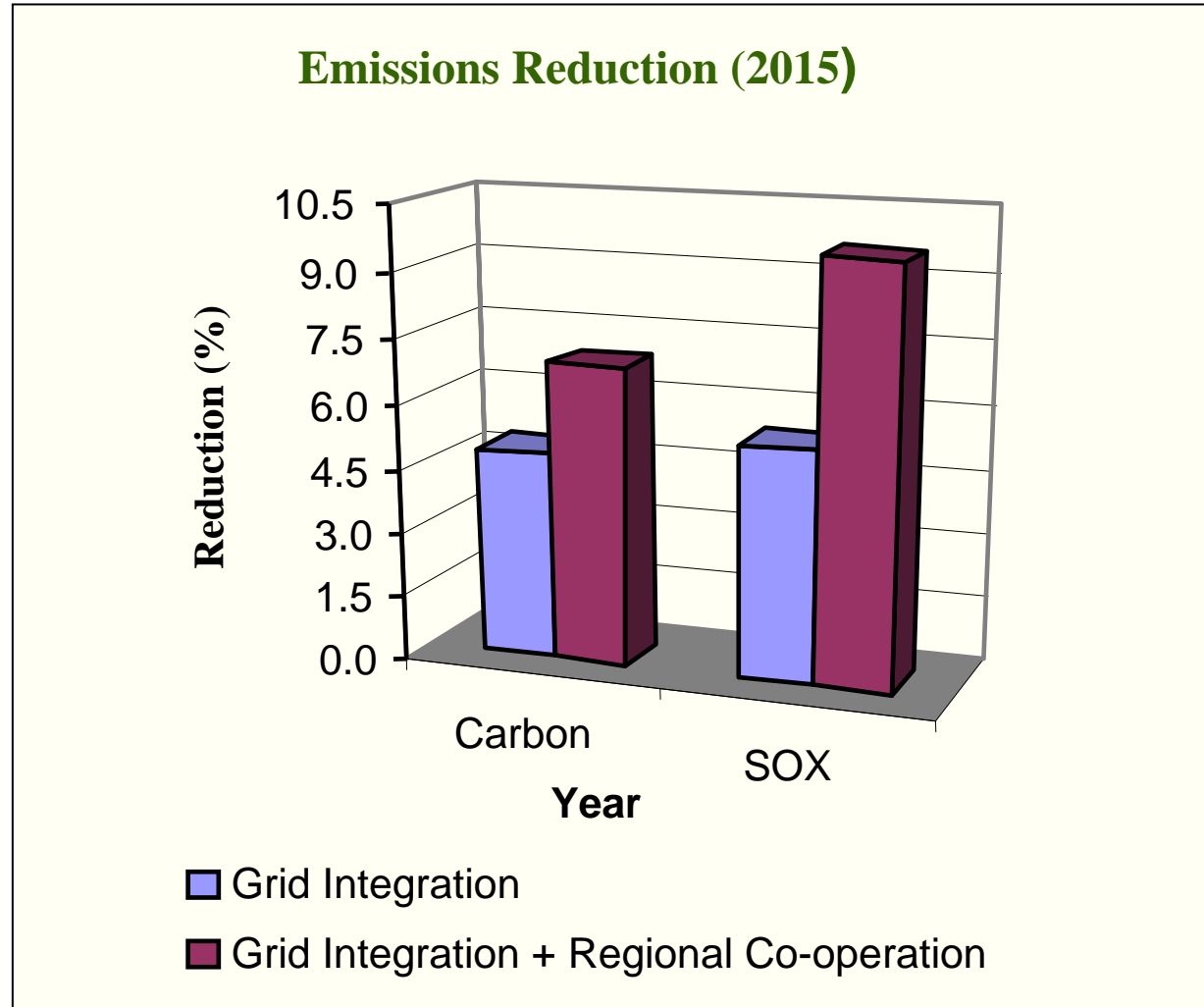
Technological Change in India to Stabilize CO₂ at 550 ppmv



Regional Energy Market Development

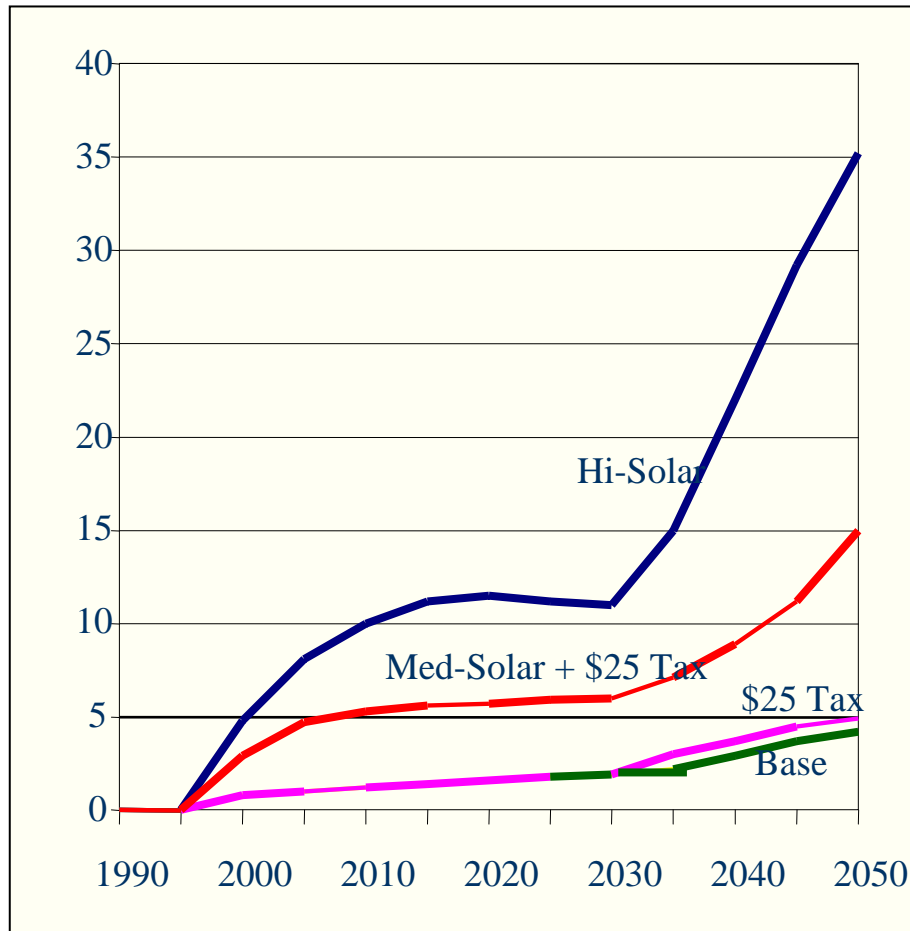


Impact of Regional Energy Market Developments in South-Asia

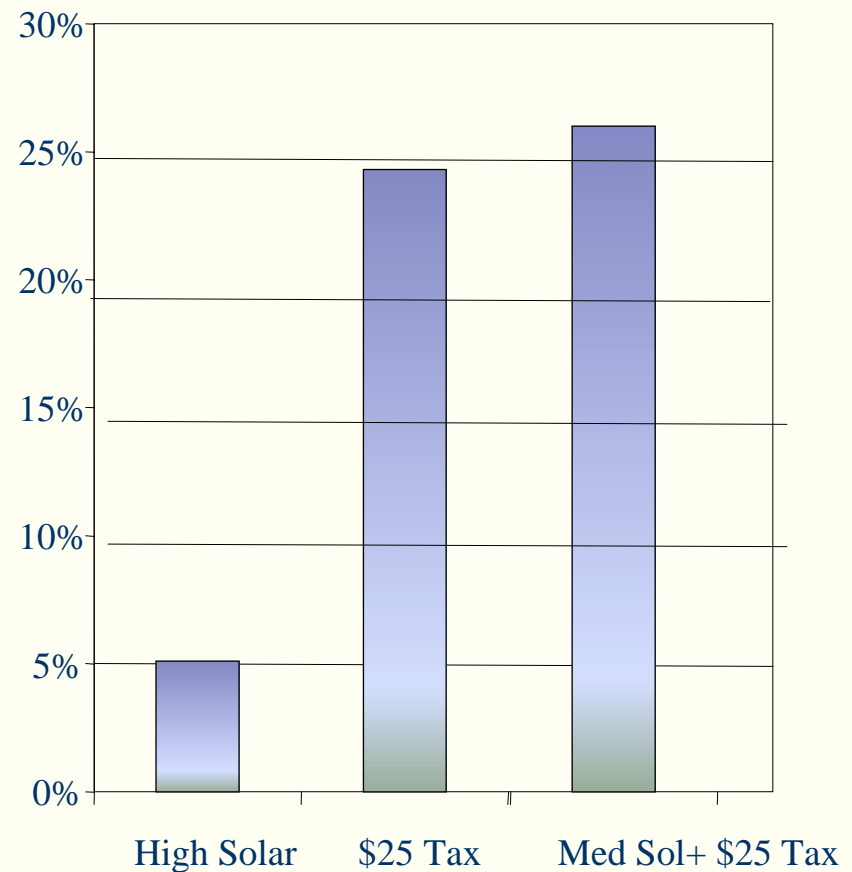


Advanced Technology: Competitive *Paradox*

Solar PV Penetration



Carbon Mitigation



Conclusions

- There is no “silver bullet” for mitigation or adaptation
- Local and global emissions mitigation policies are disjointed
- Regional cooperation can reduce the climate mitigation and impacts costs significantly
- Strong mitigation regime, e.g. 550 ppmv, can alter the regional energy system significantly
- Global cost-effectiveness requires substantial mitigation (and adaptation) in developing countries
- Supply-push of few clean technologies is inadequate for mitigation
- Climate Change impacts is complicated due to “winners and losers” rather than absolute impacts burden
- Integrated policy assessment is vital for linking climate change and sustainable development

