Global Climate Change Mitigation: Burden sharing

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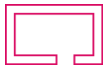
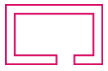


Introduction: burden sharing

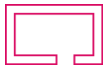
- Per capita emissions
- GDP intensity
- Developed countries should take a lead

- This paper compares the additional investments necessary to achieve 2DS compared to the no climate policy scenario by grouping countries into three categories:
  - high income, middle income and low-income countries



16 Region TIAM-UCL Global Model: Overview

- TMES Integrated Assessment Model (TIAM)
  - Based on TIMES model generator
- Dynamic partial equilibrium model approach with objective function maximising Societal welfare costs (consumer surplus + producer surplus)
  - Annualised capital costs, O&M costs, fuel costs, taxes/subsidies, salvage values, demand changes
- Technologically detailed bottom-up whole energy system model:
  - Covers from resources to conversion to end-use devices to energy service demand
- Flexible time horizon through to 2100
- Multi-emissions, plus reduced-form climate module



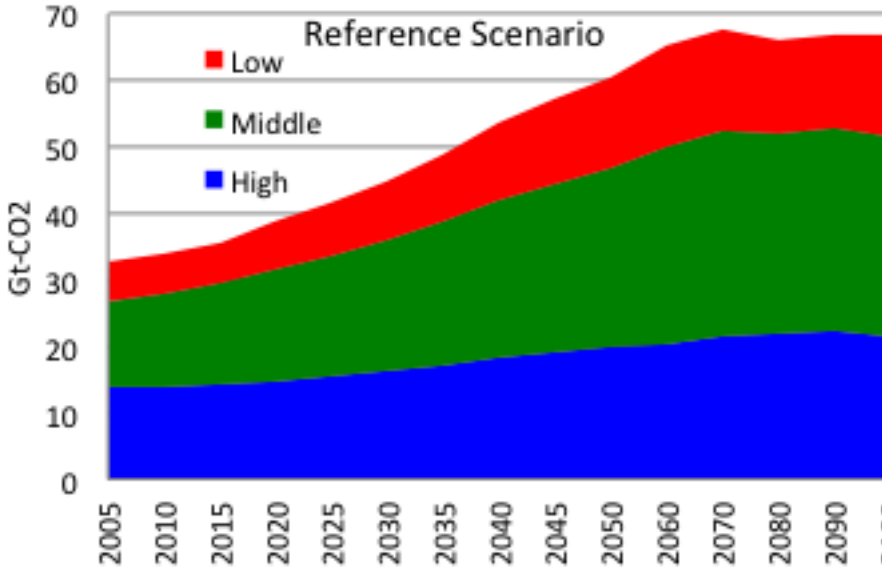
Scenarios

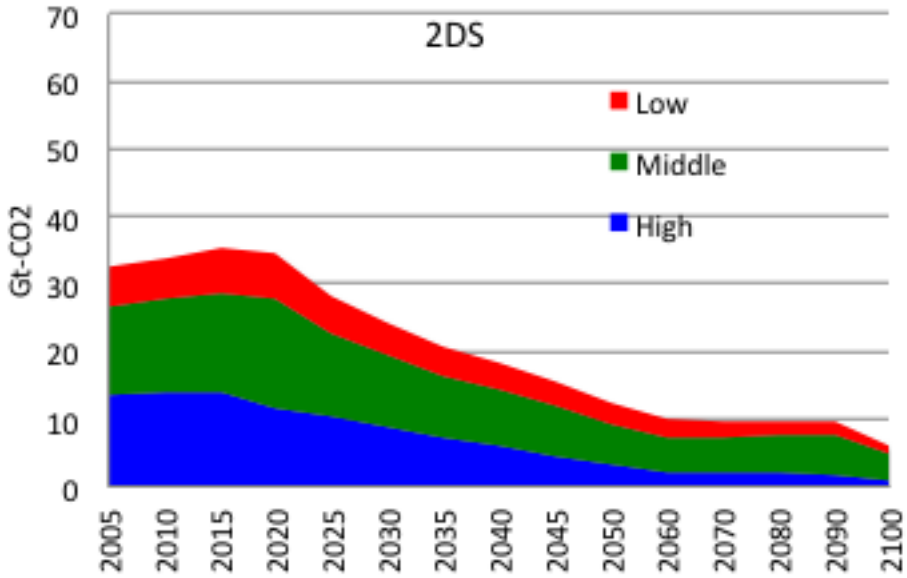
- **Reference Scenario (Ref)** with no climate policy
- **2DS:** 60% chance of a 2° C (2DS) rise
- **2DS-No bio-CCS:** 60% chance of a 2° C (2DS) rise without Bio-CCS

TIAM-UCL regions, abbreviations and economic groups to which each have been assigned

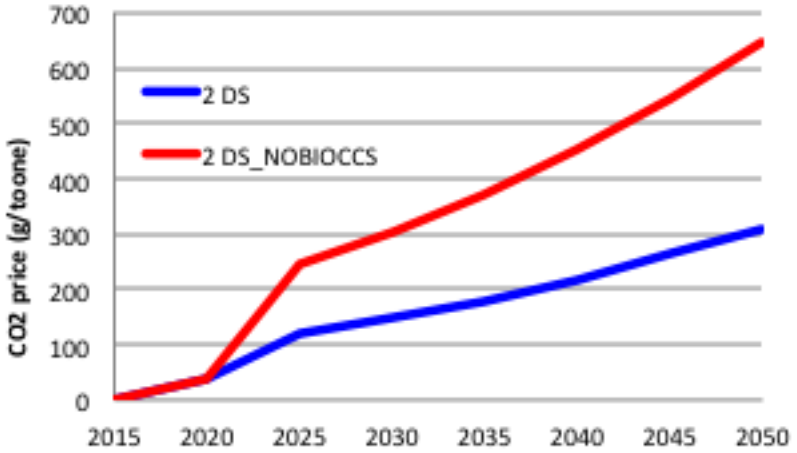
Region	Abbreviation	Assigned group
Africa	AFR	Low
Australia	AUS	High
Canada	CAN	High
Central and South America	CSA	Middle
China	CHI	Middle
Eastern Europe	EEU	High
Former Soviet Union	FSU	Middle
India	IND	Low
Japan	JAP	High
Middle East	MEA	Middle
Mexico	MEX	Middle
Other Developing Asia	ODA	Low
South Korea	SKO	High
United Kingdom	UK	High
United States	USA	High
Western Europe	WEU	High

CO_2 Emissions and mitigation costs

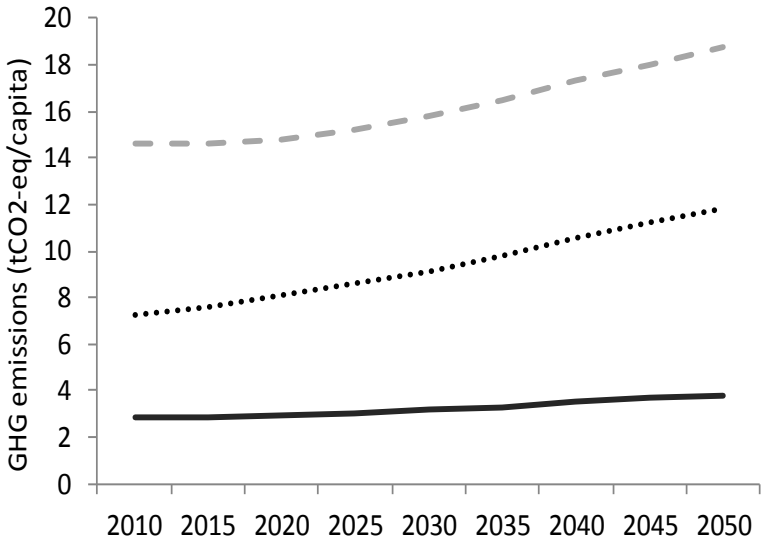


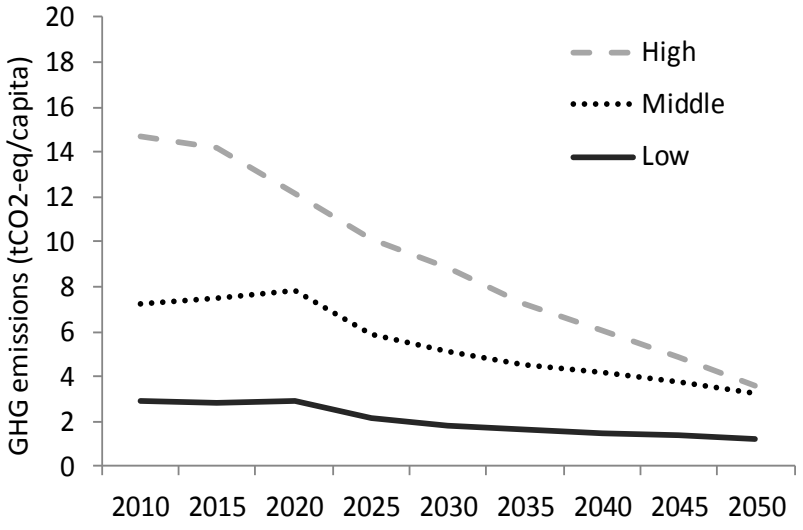


- All regions have to work hard to meet the long-term global climate change mitigation target.



Per Capita Emissions

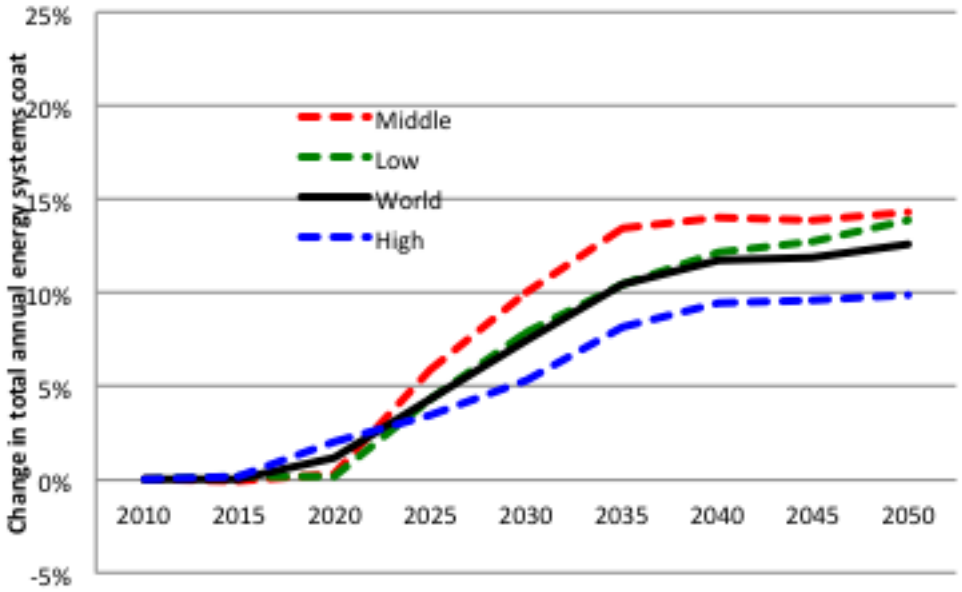




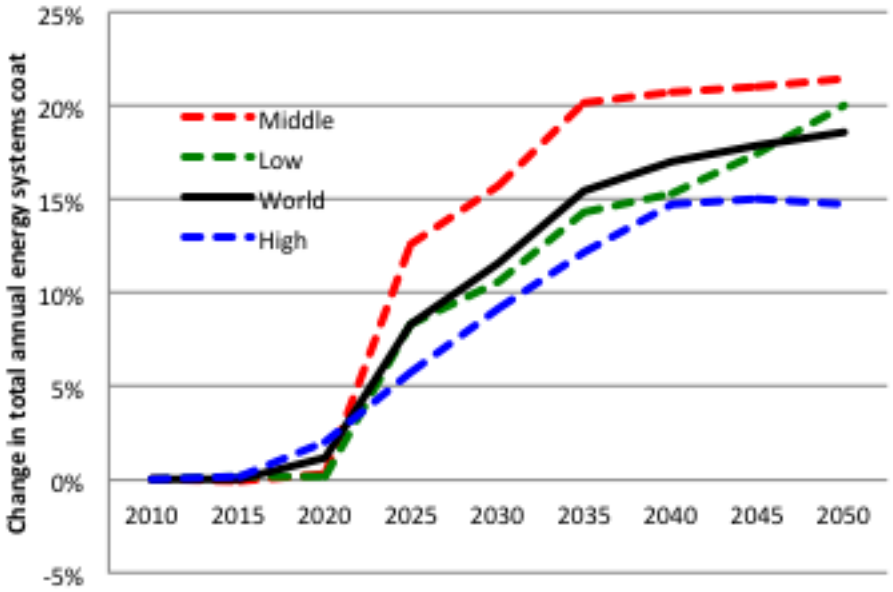
- Per capita emissions increase in all countries in Ref
- Per capita emissions converge in long-term under 2DS

Change in total energy system cost under 2DS compared to Ref

2DS

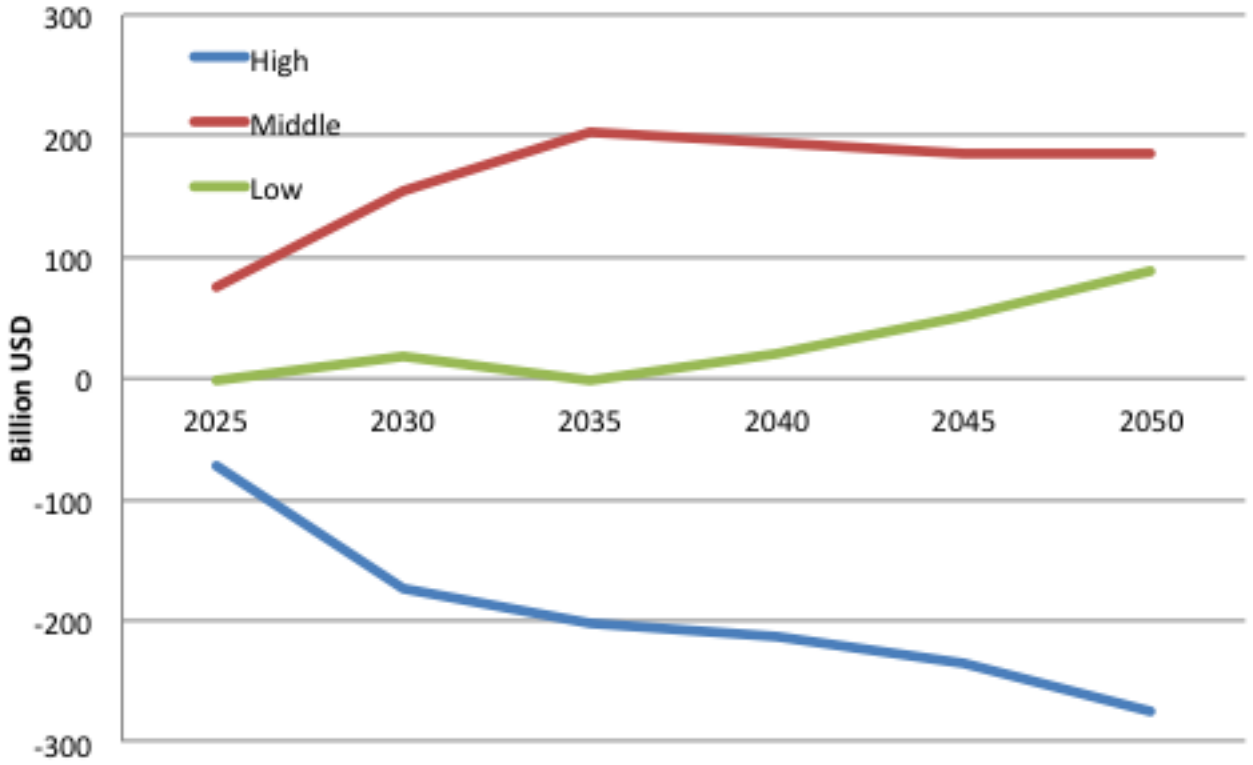


2DS-NoCCS



- Percentage change in investment necessary to meet global climate target is relatively high for low and middle income countries compared that for high income counties

Financial support necessary



Conclusions

- All regions share some of the burden of emissions reduction.
- Under the objective of least cost mitigation and sharing the burden based on additional investment necessary, high income countries may have to provide financial support (climate change investment fund) to middle and low income countries
- Annual climate change investment fund necessary increases from USD 75 billion in 2025 to USD 200 billion 2035.