Workshop for Academia and Research Community on the Activities and Findings of the Intergovernmental Panel on Climate Change

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INTERGOVERNMENTAL PANEL ON climate change

hosted by the African Climate Policy Centre (ACPC) of the United Nations Economic Commission for Africa (UNECA)

29 April 2017
United Nations Conference Centre
Addis Ababa, Ethiopia

CLIMATE CHANGE 2014

Mitigation of Climate Change

Main findings of the Working Group III Fifth Assessment Report - IPCC

Working Group III contribution to the IPCC Fifth Assessment Report

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Coordinating Lead Author, IPCC Working Group III

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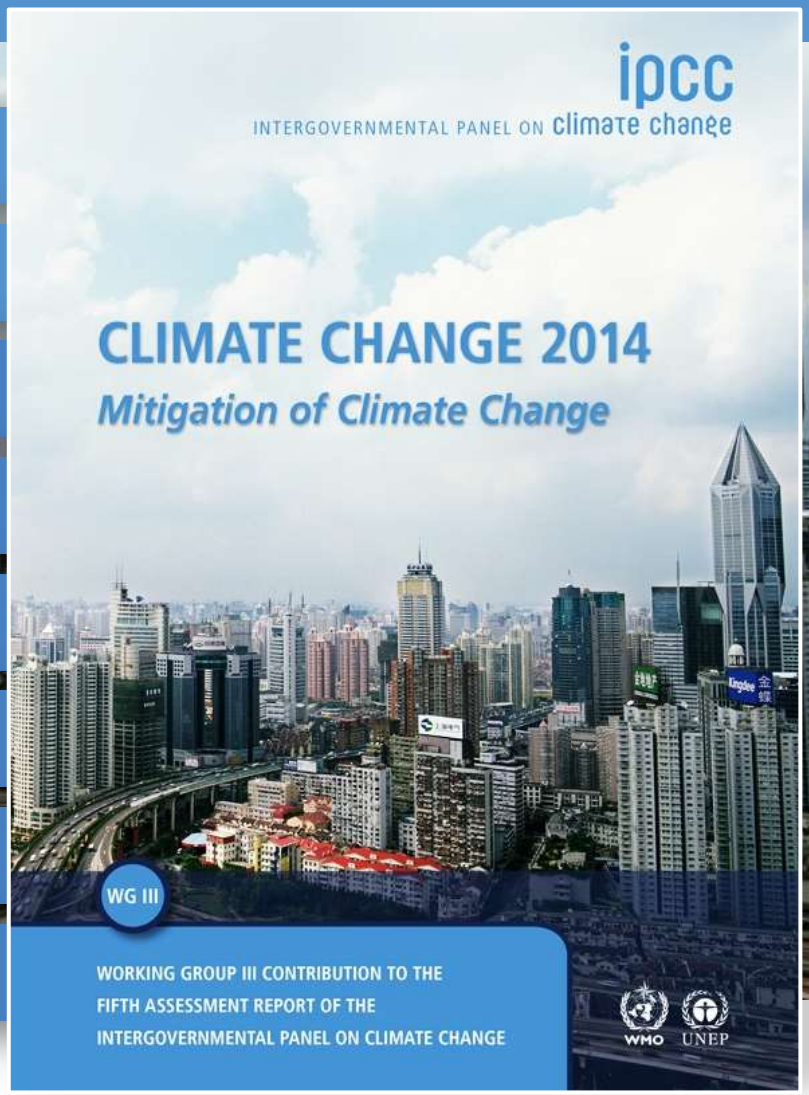
IPCC reports are the result of extensive work of many scientists from around the world

- 1 Summary for Policymakers
- 1 Technical Summary
- 16 Chapters
- 235 Authors
- 800+ Reviewers
- Close to 1500 pages
- Close to 10,000 references
- More than 38,000 comments



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Looking into the past to understand the present and anticipate the future
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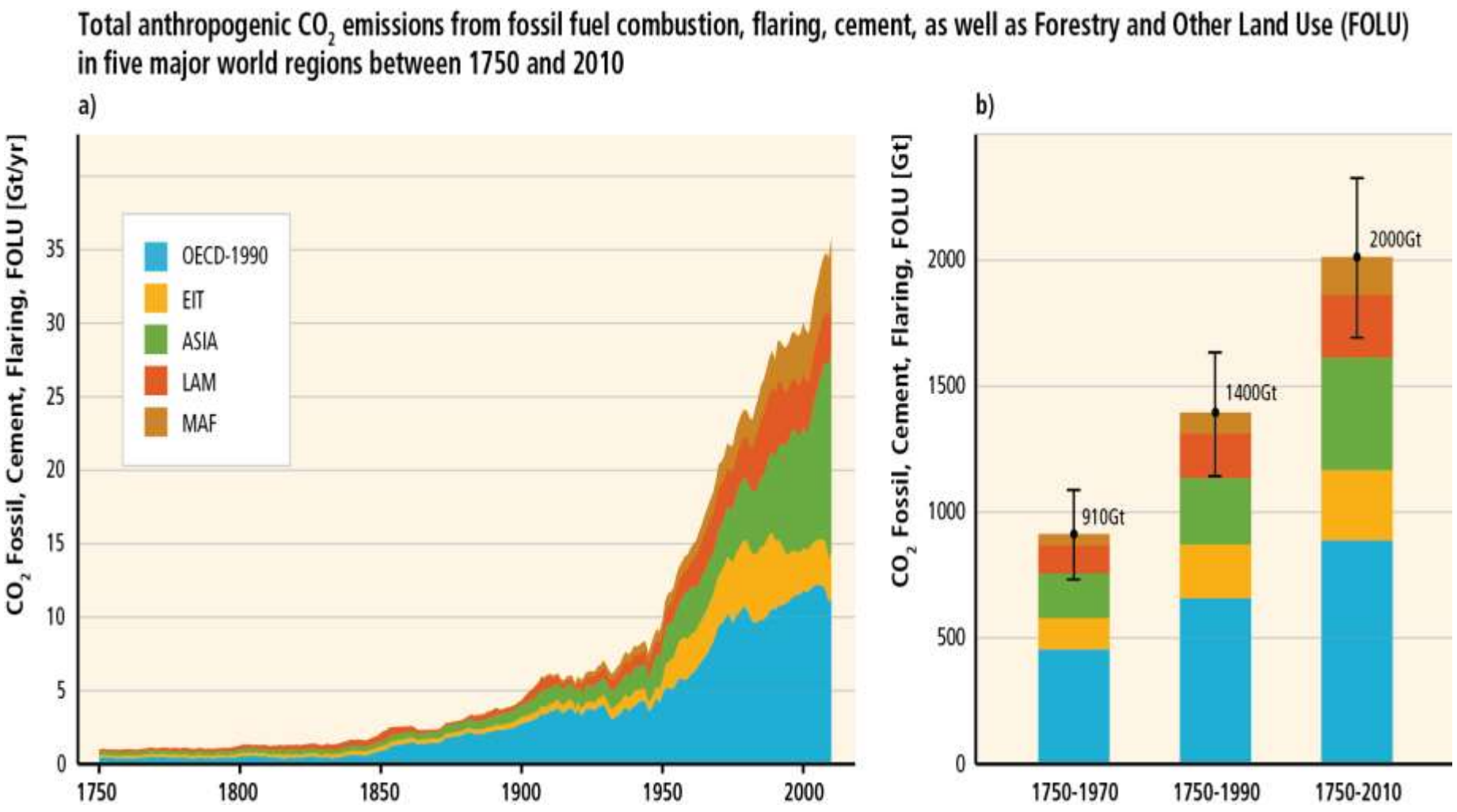
GHG emissions: Trends in stocks and flows

- The period 1970-2010 was taken as reference period
  - smallest common denominator for which we have data for all gases; extension for CO_2 until 2012
- Long-term historic data: 1751-2010 for CO_2.
  - Short-lived forcers not included due to limited residence time in the atmosphere
- Several datasets were used and comparison among them were done
  - Database for Global Atmospheric Research (EDGAR)
  - IEA data for fossil CO_2
  - Carbon Dioxide Information Analysis Center (CDIAC)

Multiple perspectives

- GHG stocks and flows were analyzed from multiple perspectives:
  - Cumulative CO2 emissions
  - GHG emissions (per region, per gas, per sector)
  - GHG emissions per capita
  - GHG emissions per GDP
  - Production (territorial) based GHG emissions
  - Consumption based GHG emissions

Cumulative CO_2 emissions since 1750



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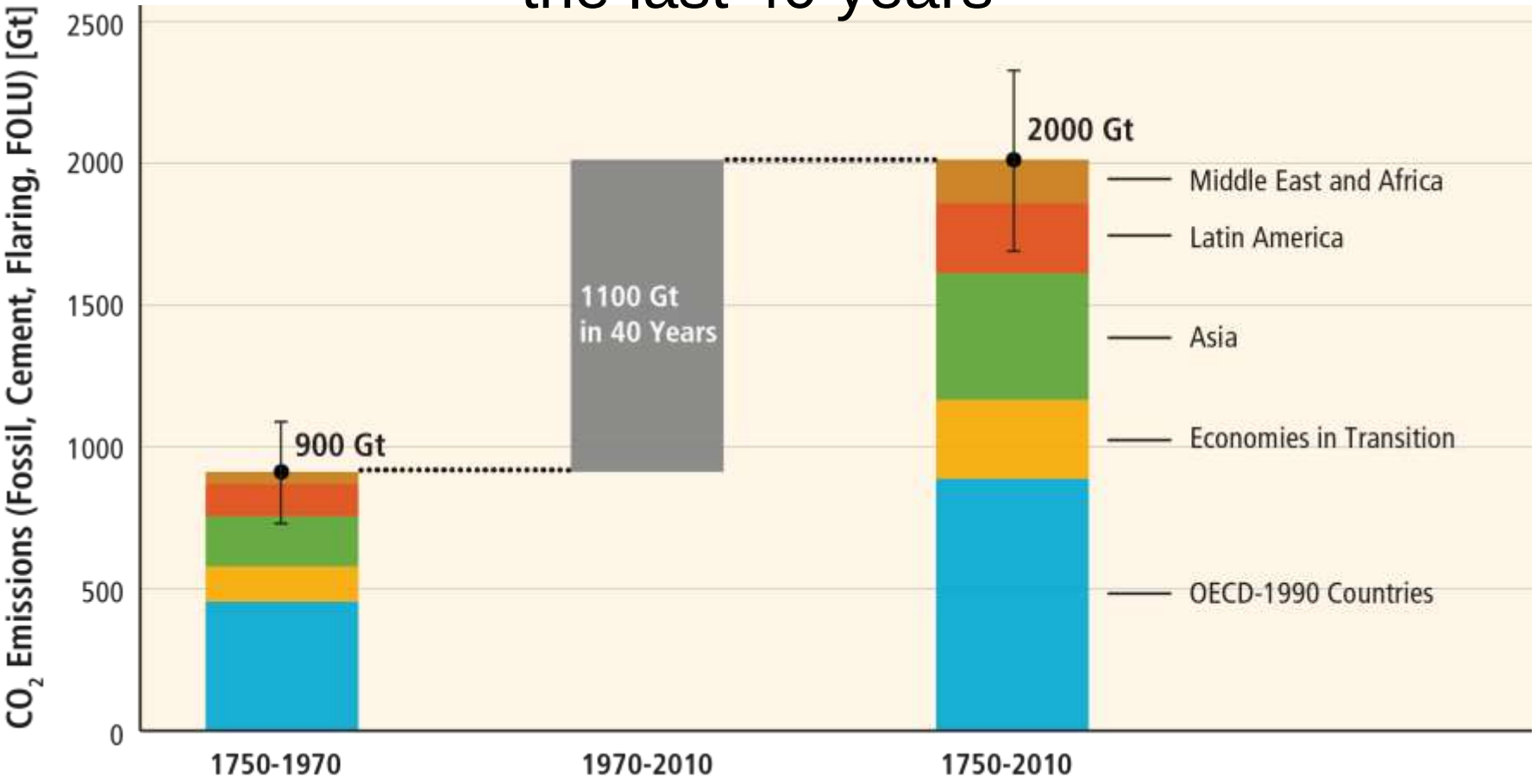
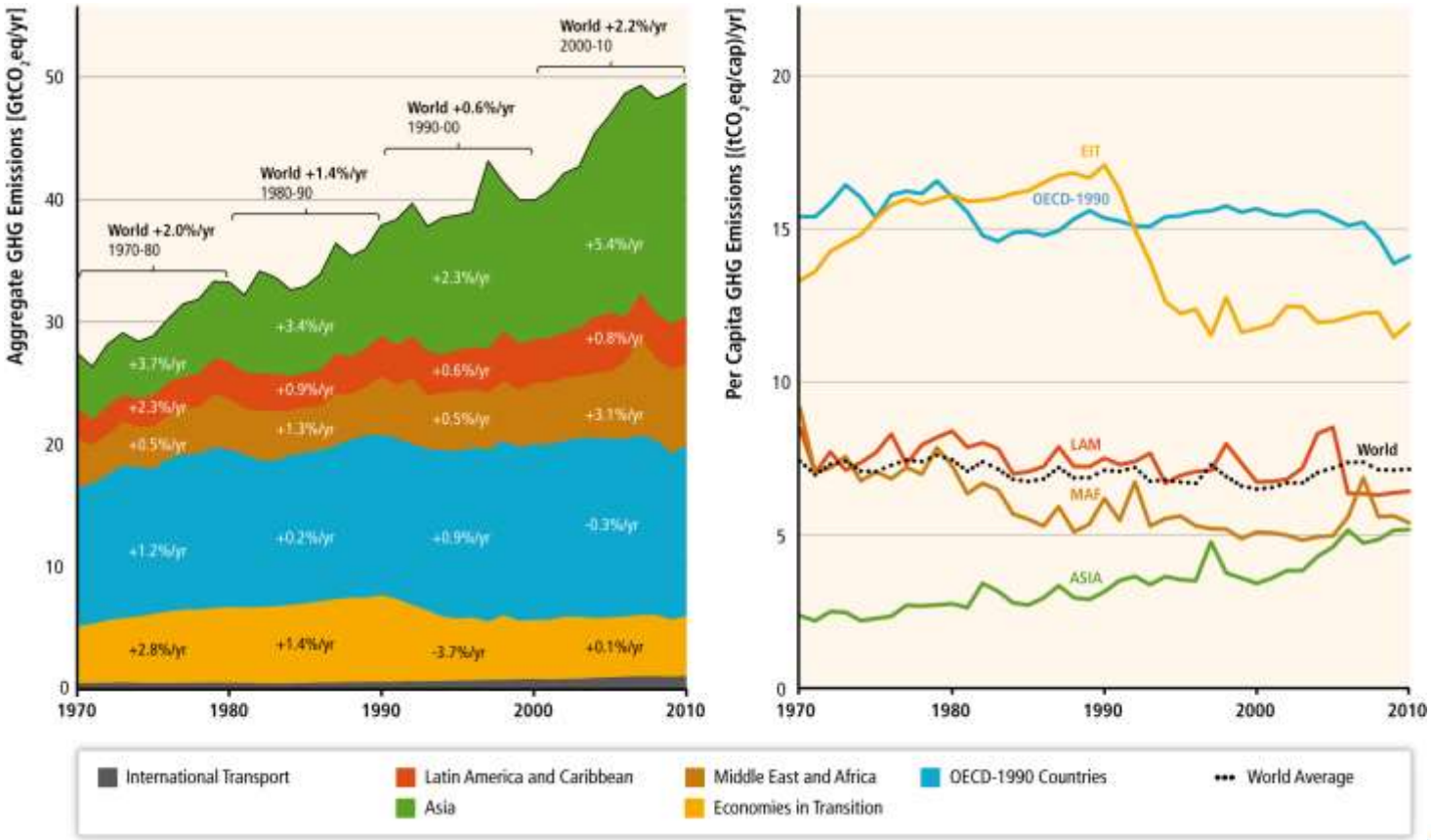
About half of the cumulative anthropogenic CO_2 emissions between 1750 and 2010 have occurred in the last 40 years



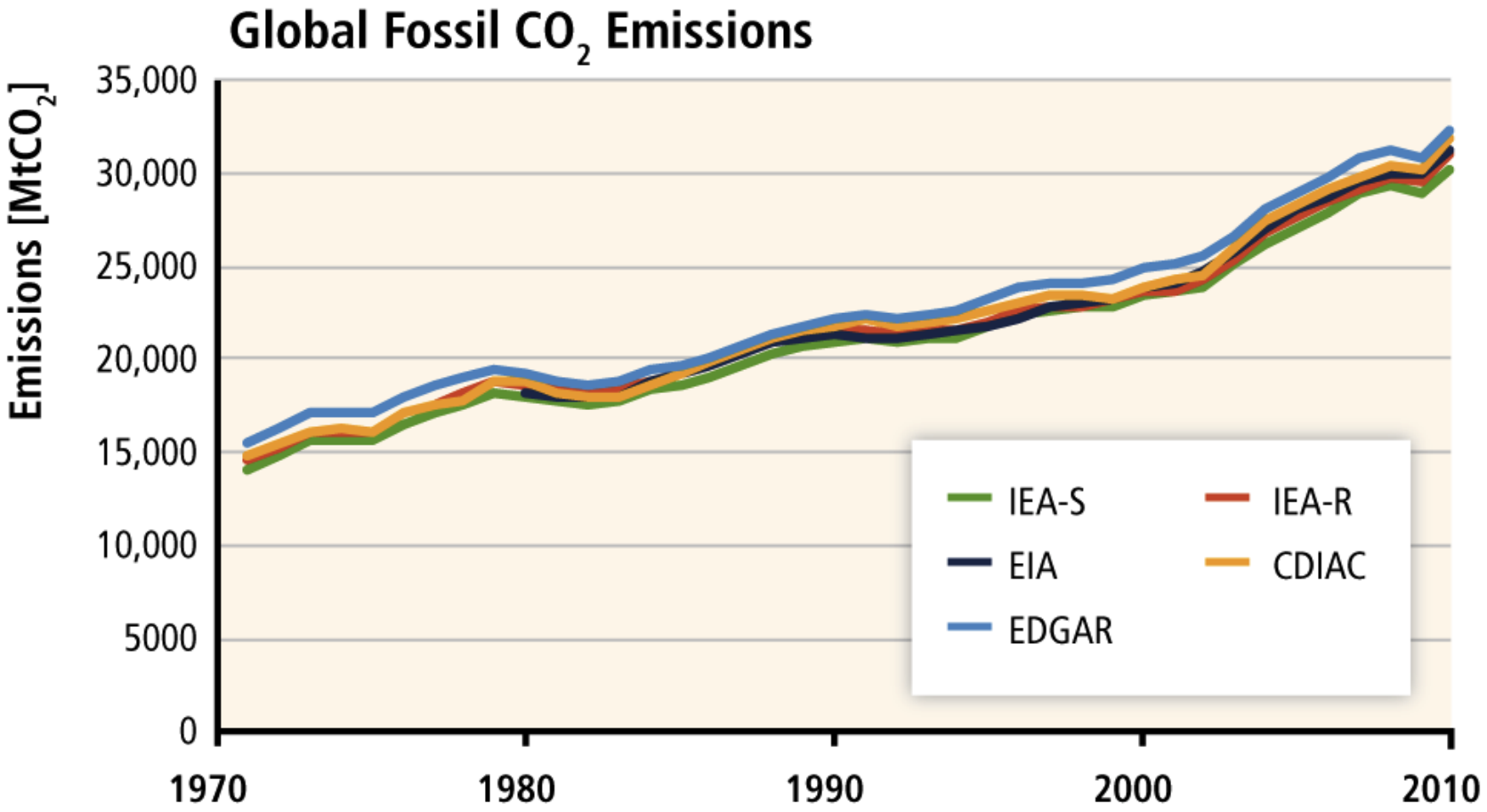
Based on Figure 5.3

Territorial GHG emissions per region and per capita over 1970-2010

including fossil, agriculture and land-use/land-use change sectors, aggregated using 100-year GWP

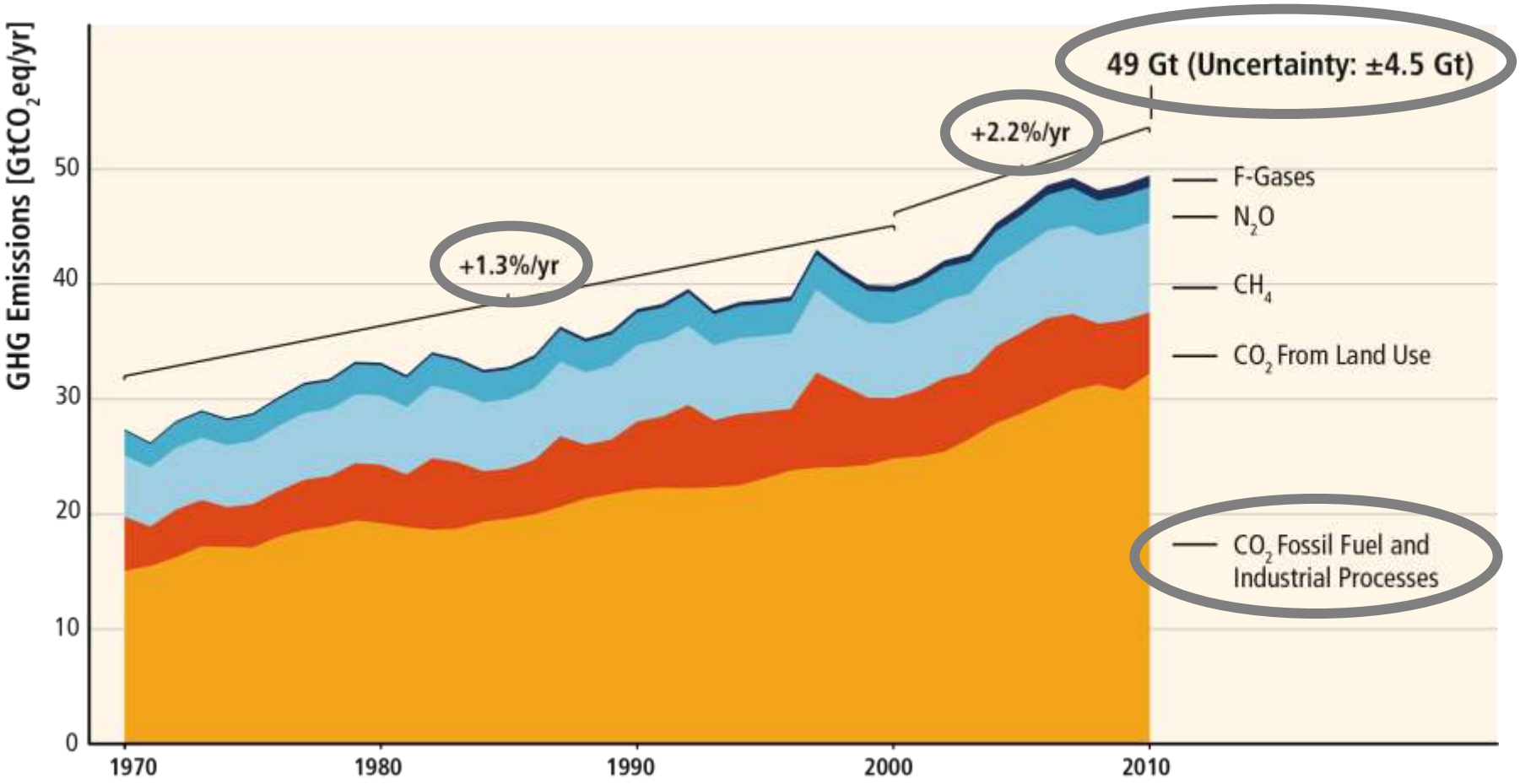


Robustness across databases



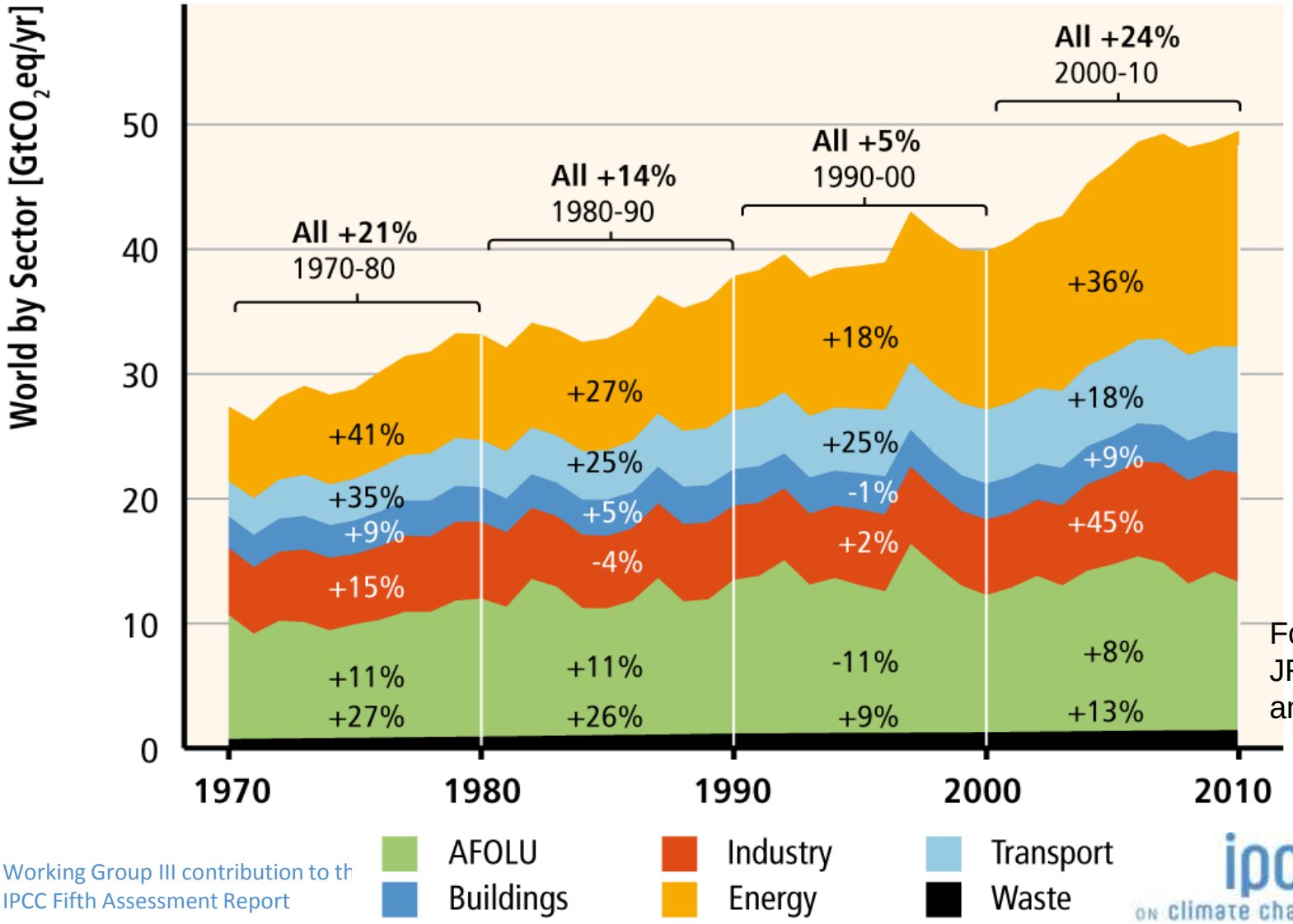
On a global basis, different estimates of CO_2, harmonized to cover the same sources, have relatively small differences.

GHG emissions growth between 2000 and 2010 has been larger than in the previous three decades



Based on Figure SPM.1

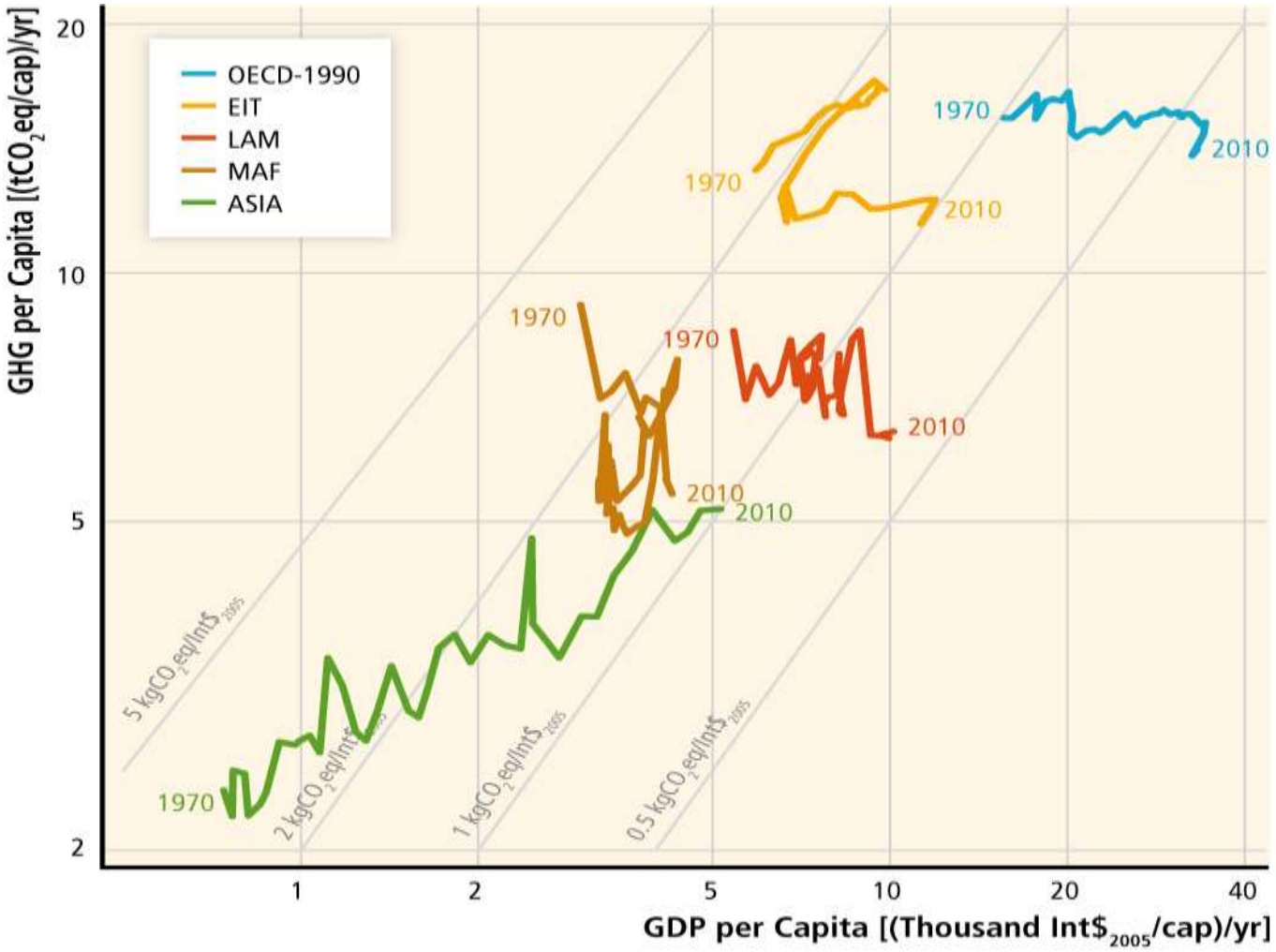
GHG emissions by sectors



For AFOLU JRC/PBL (2012) and IEA (2012)

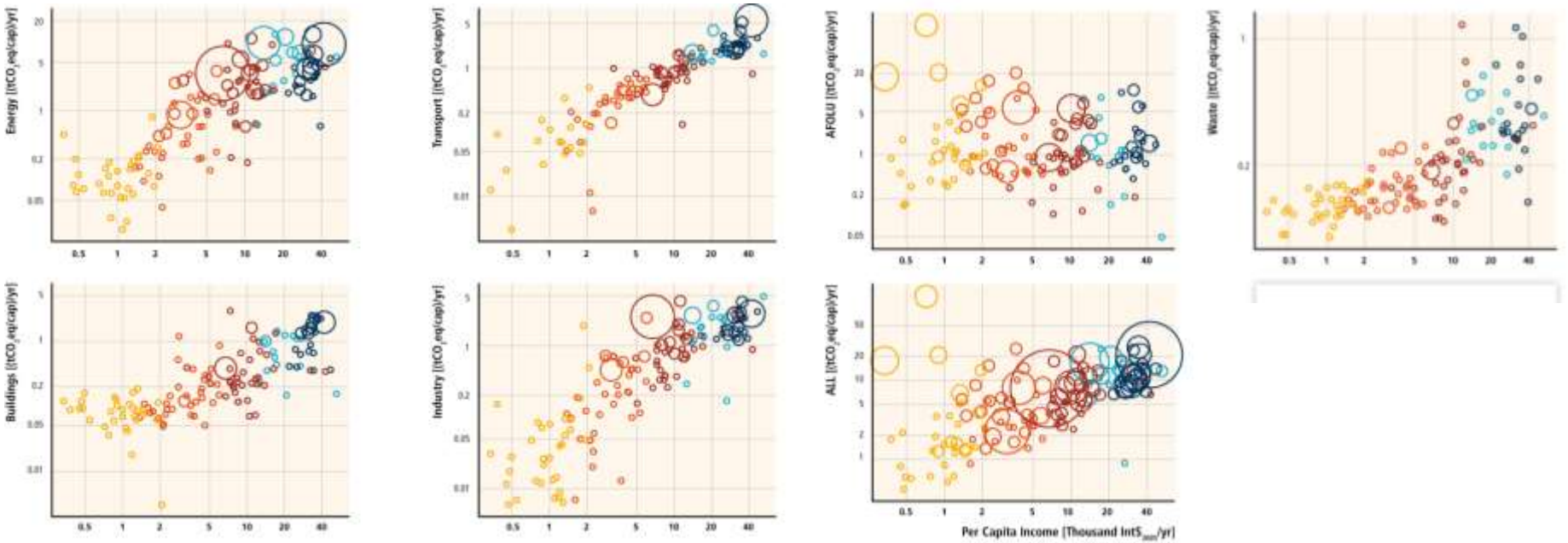
GHG per capita vs. GDP per capita

(over time by region)



GHG per capita vs GDP per capita

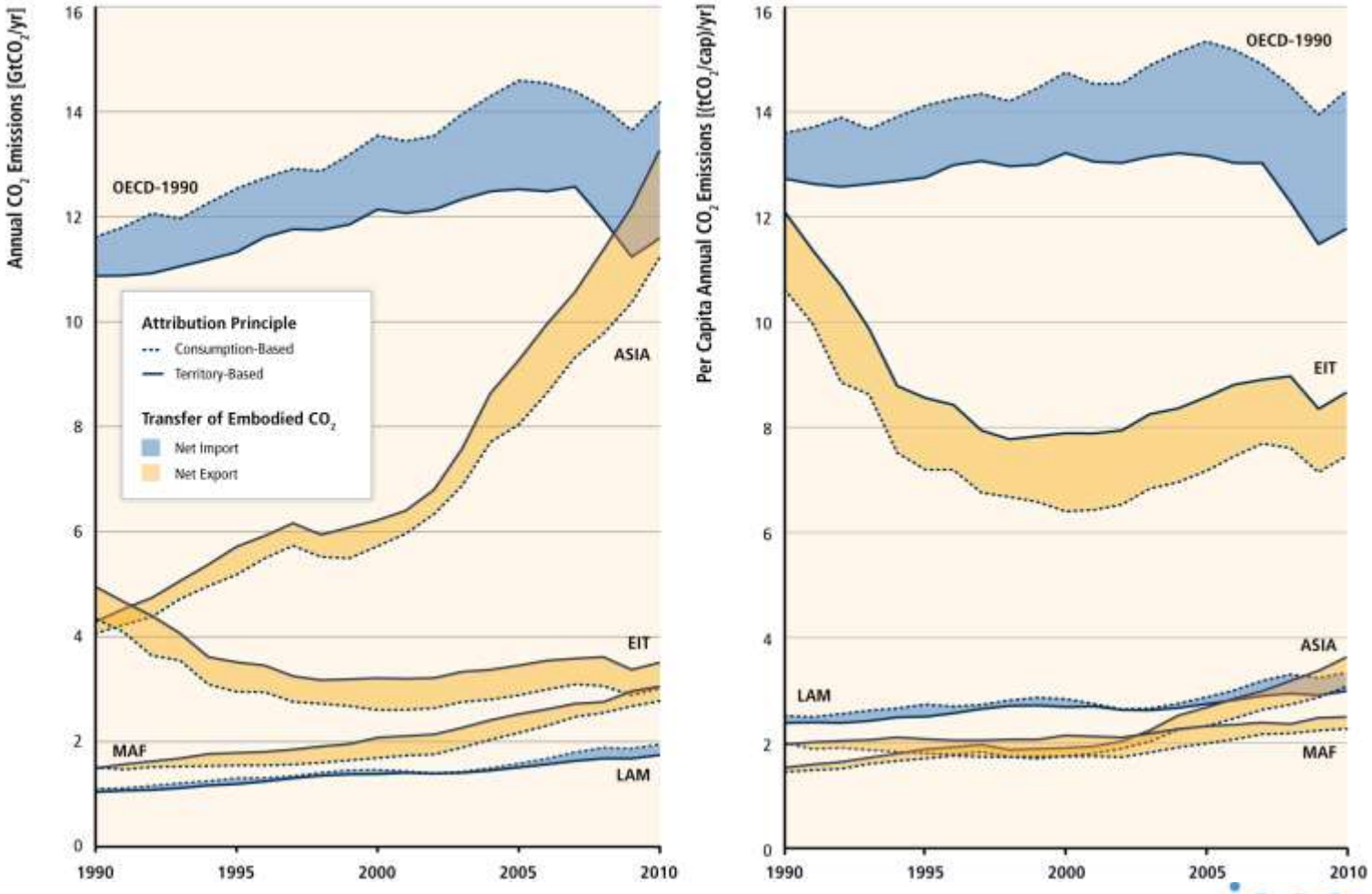
(for 2010 by country GDP per capita)



Production (Territorial) vs Consumption related CO2 emissions

"A growing share of CO_2 emissions from fossil fuel combustion and industrial processes in low and middle income countries has been released in the production of goods and services exported to high income countries."

Production (Territorial) vs Consumption related CO2 emissions

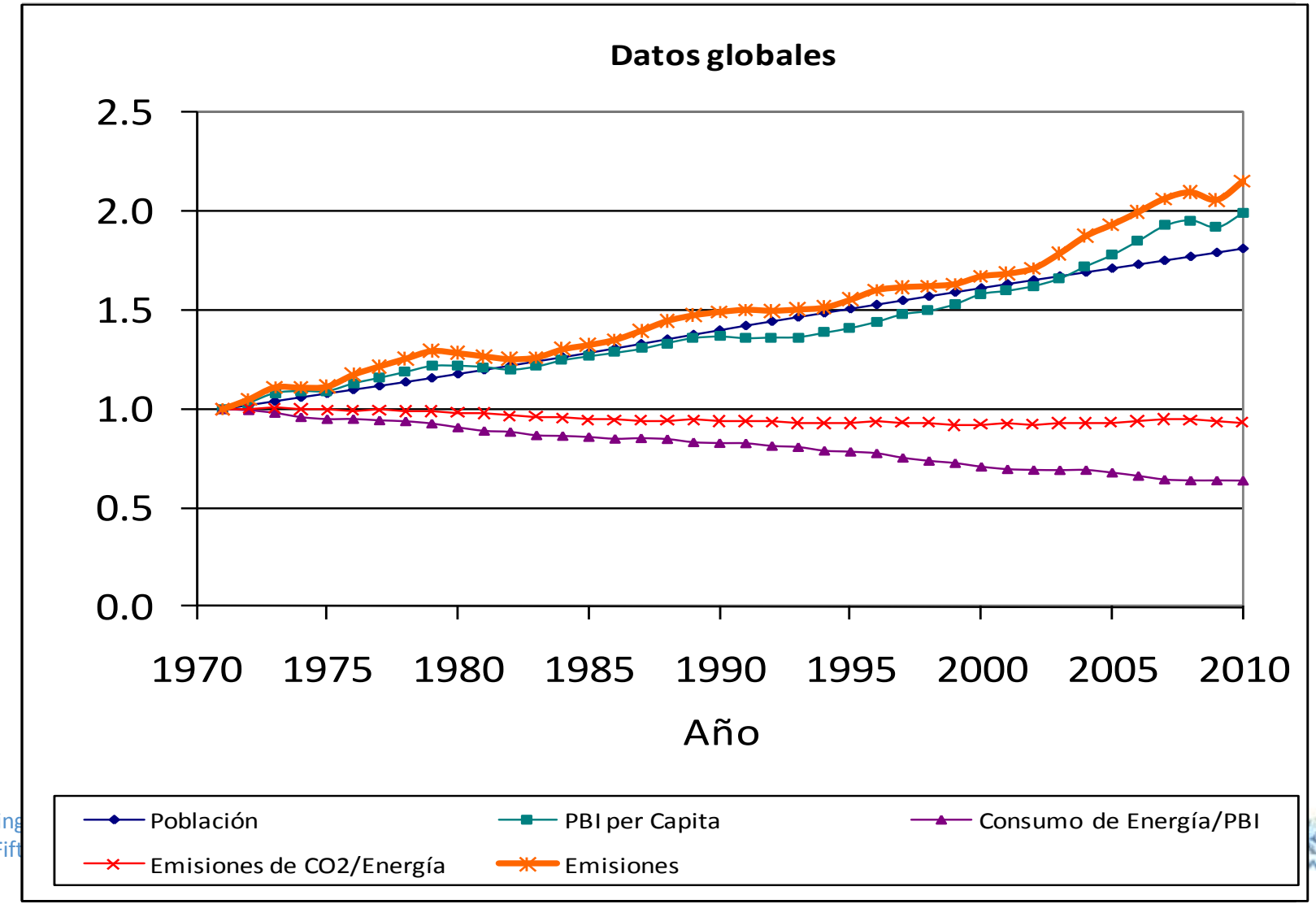


Drivers of emissions

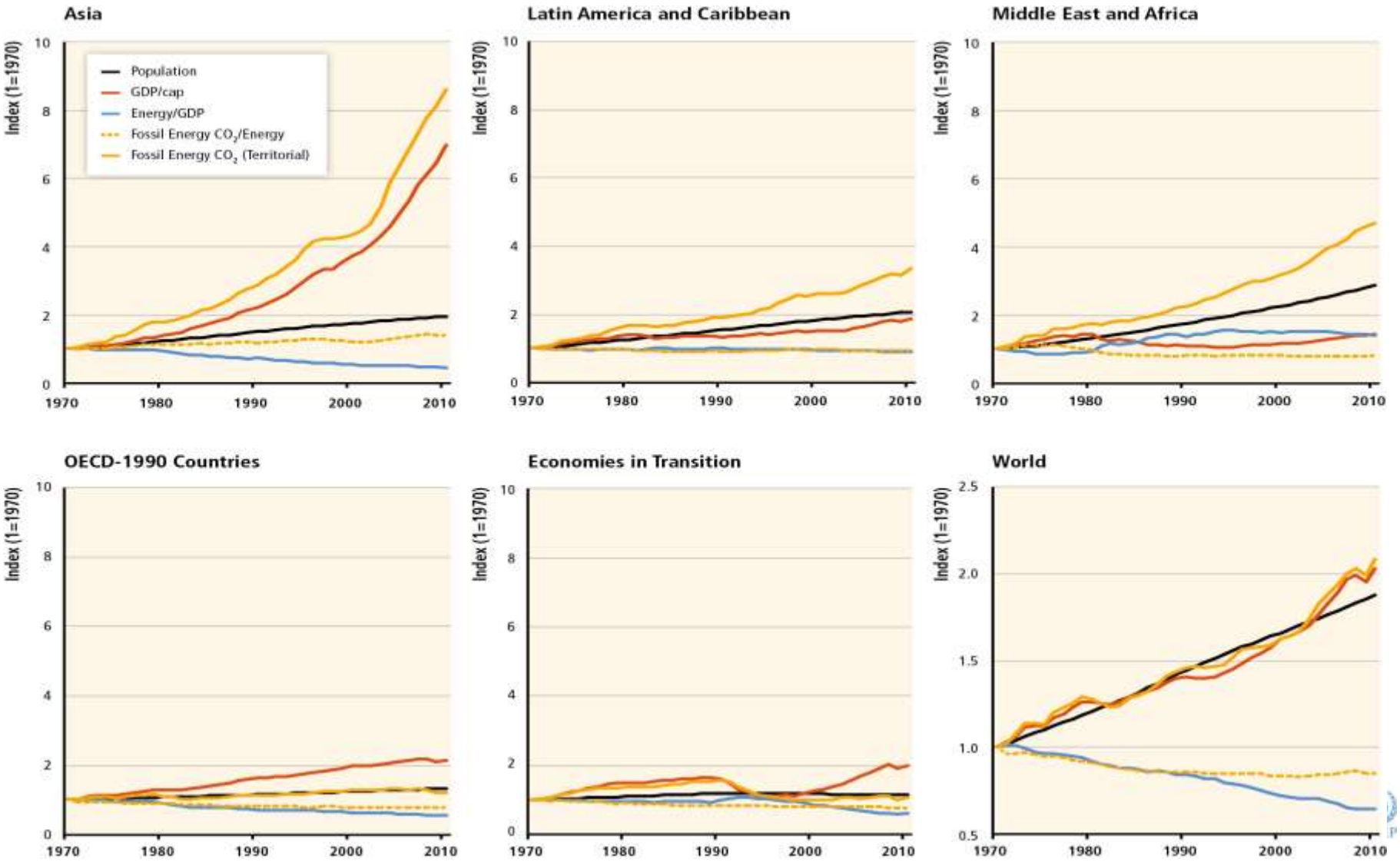
- Immediate drivers, or factors in the decomposition, of total GHG emissions were considered

- For instance, for energy related emissions, immediate drivers are:
  - population,
  - gross domestic product (GDP) per capita,
  - energy intensity of production, and
  - GHG-emissions (carbon) intensity of energy

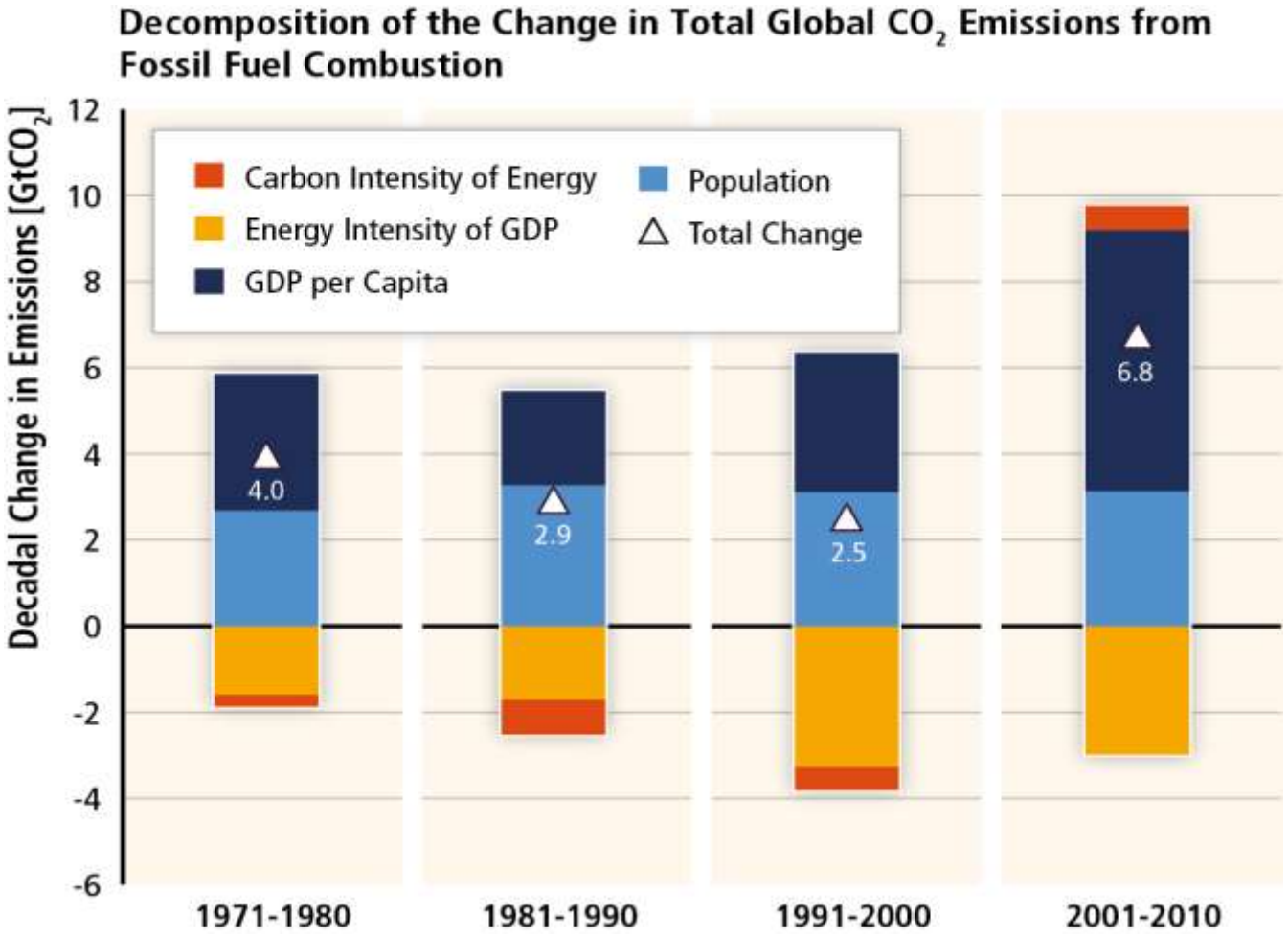
Immediate drivers of fossil fuel CO_2 emissions



Immediate drivers of fossil fuel CO_2 emissions by region

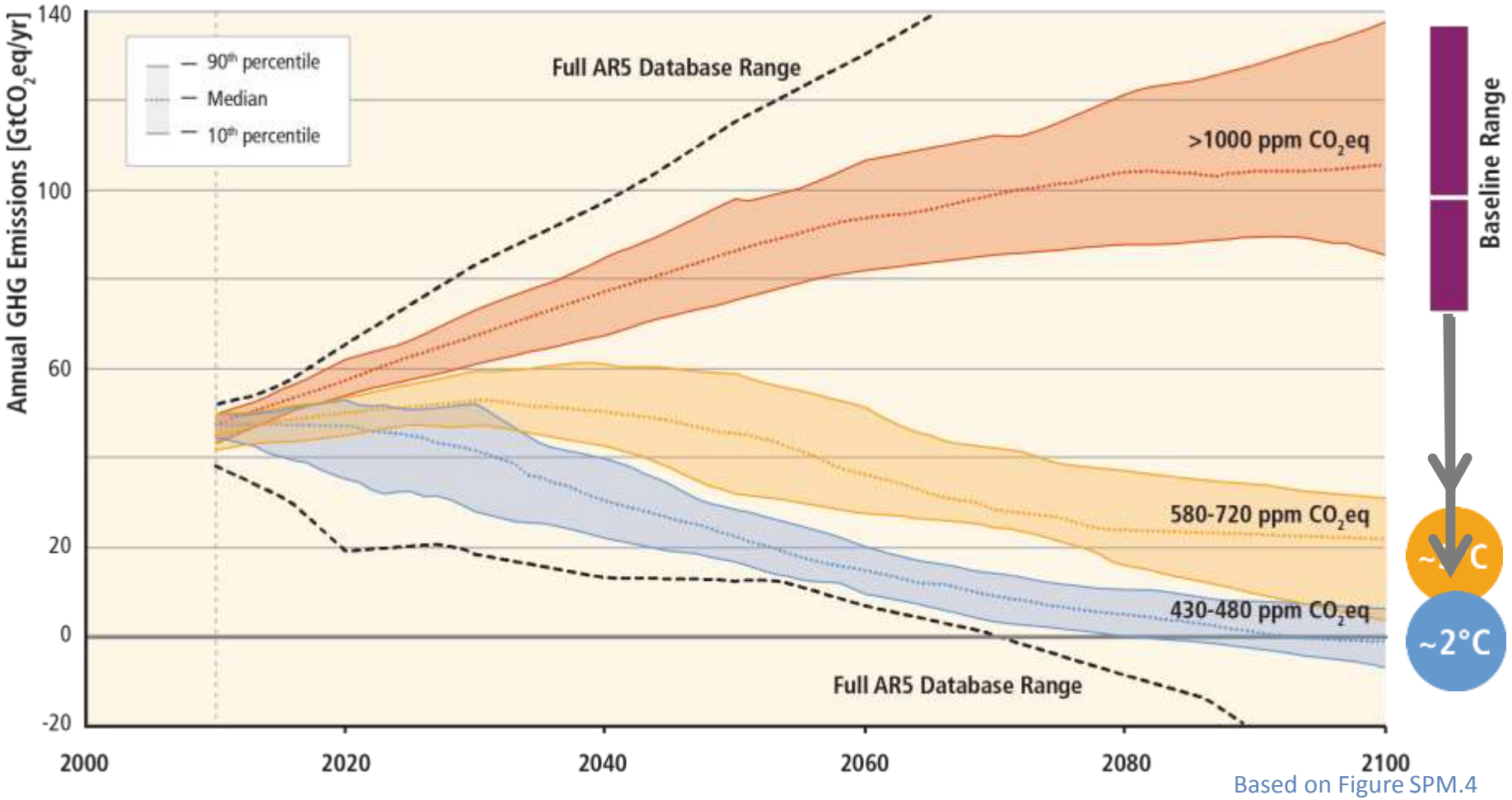


Drivers of energy-related CO_2 emissions



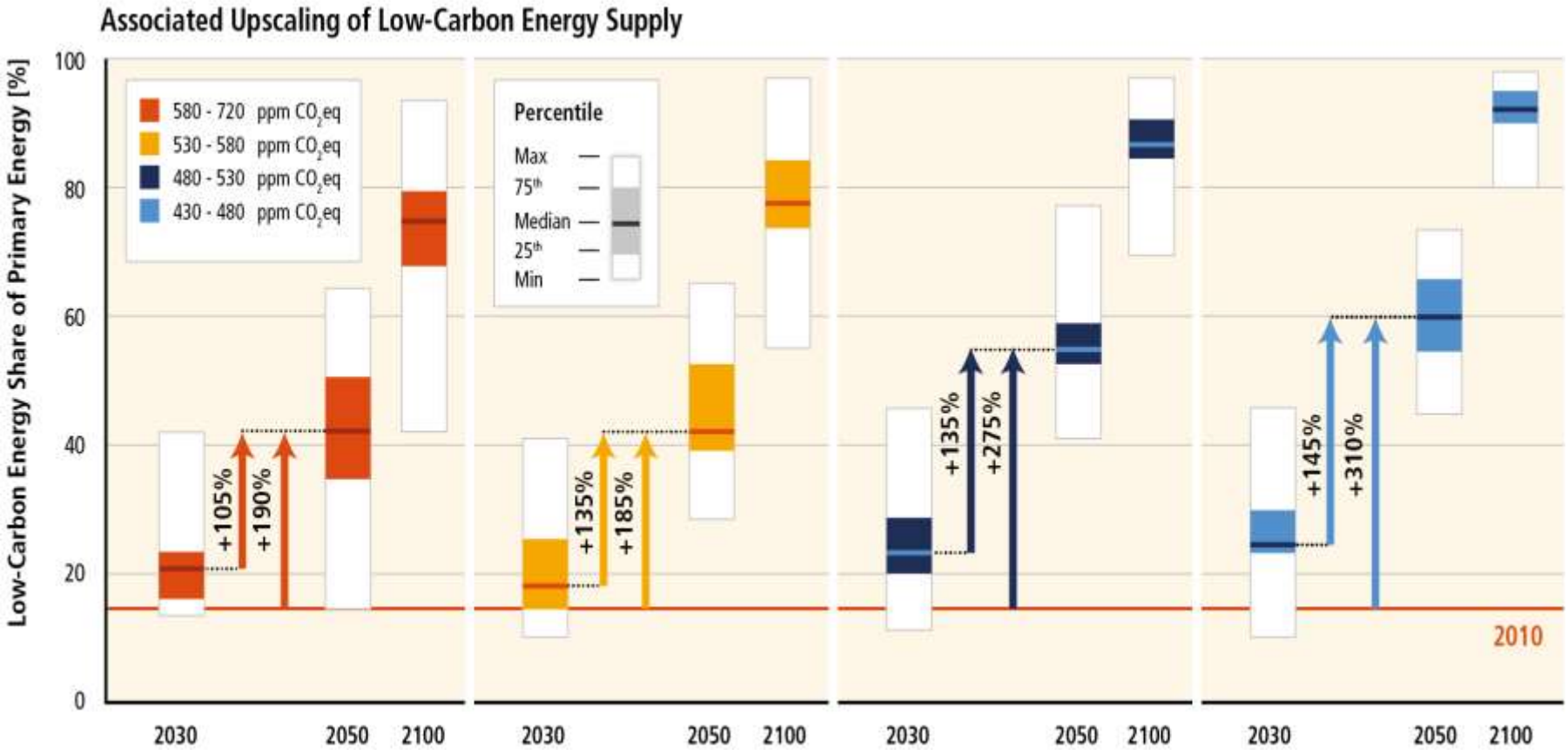
Limiting warming involves substantial technological, economic and institutional challenges

Lower ambition mitigation goals require similar reductions of GHG emissions.



Based on Figure SPM.4

Mitigation involves substantial upscaling of low-carbon energy



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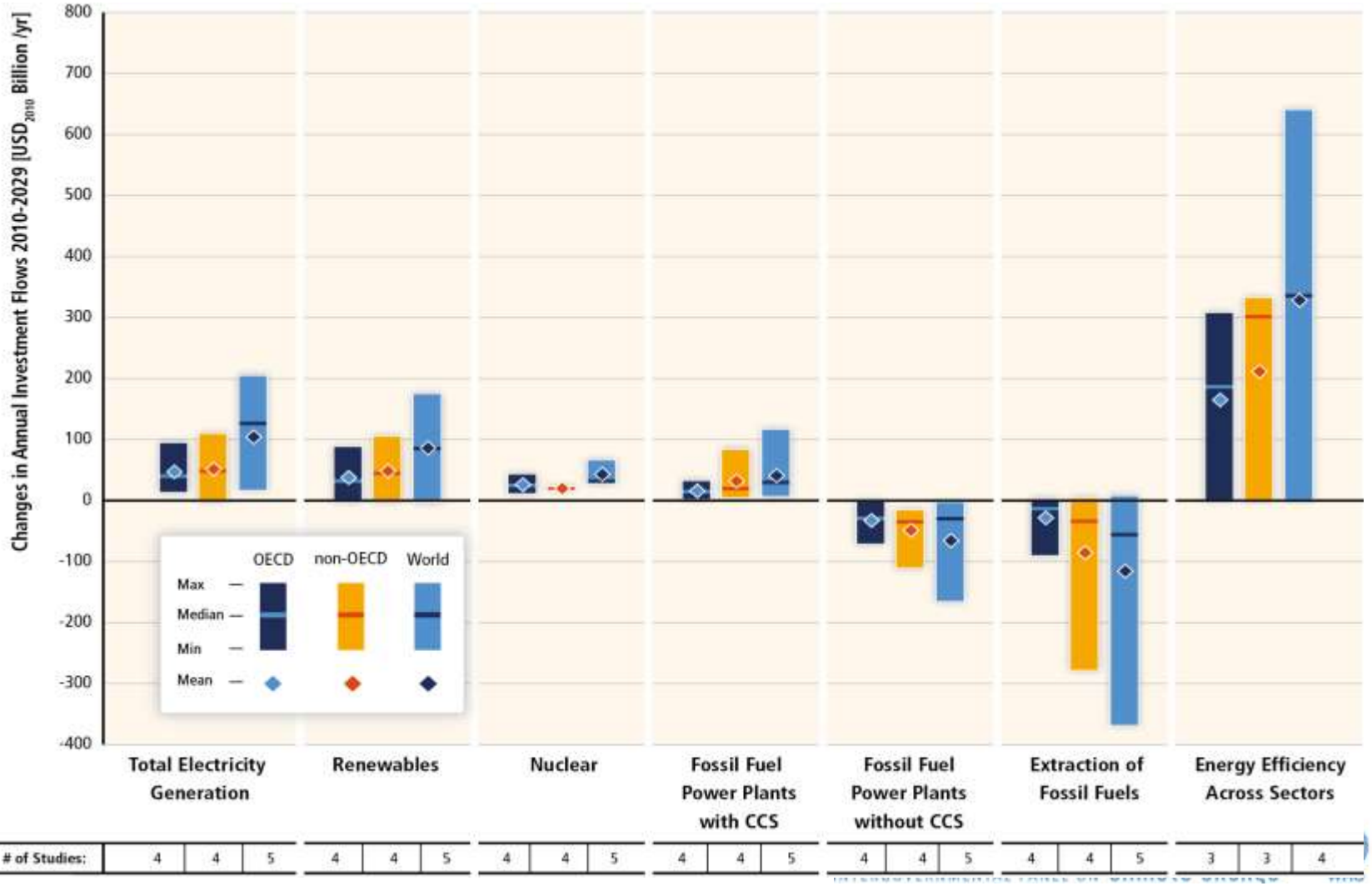
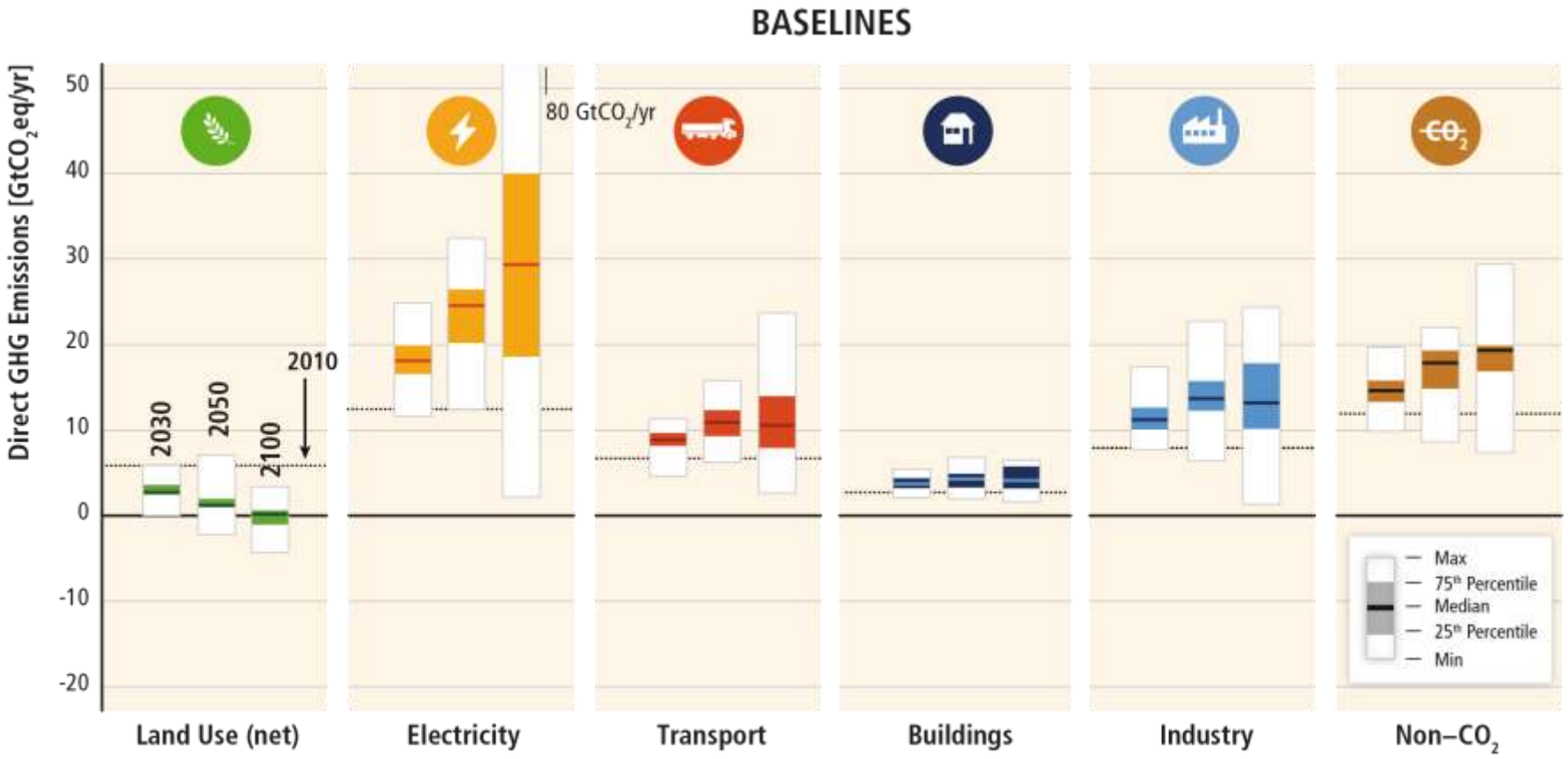
It also requires new investment patterns

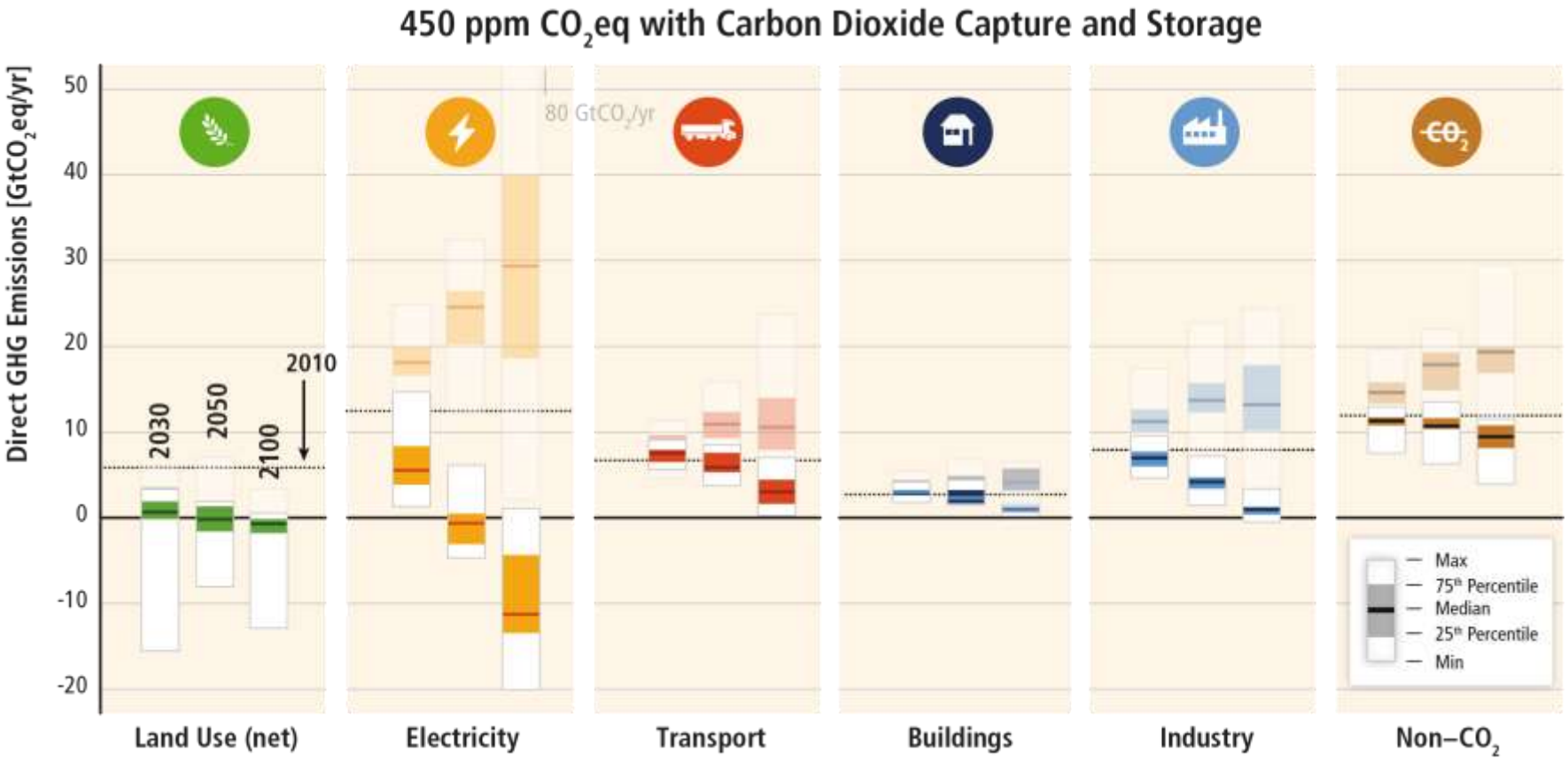


Baseline scenarios suggest rising GHG emissions in all sectors, except for CO_2 emissions from the land-use sector



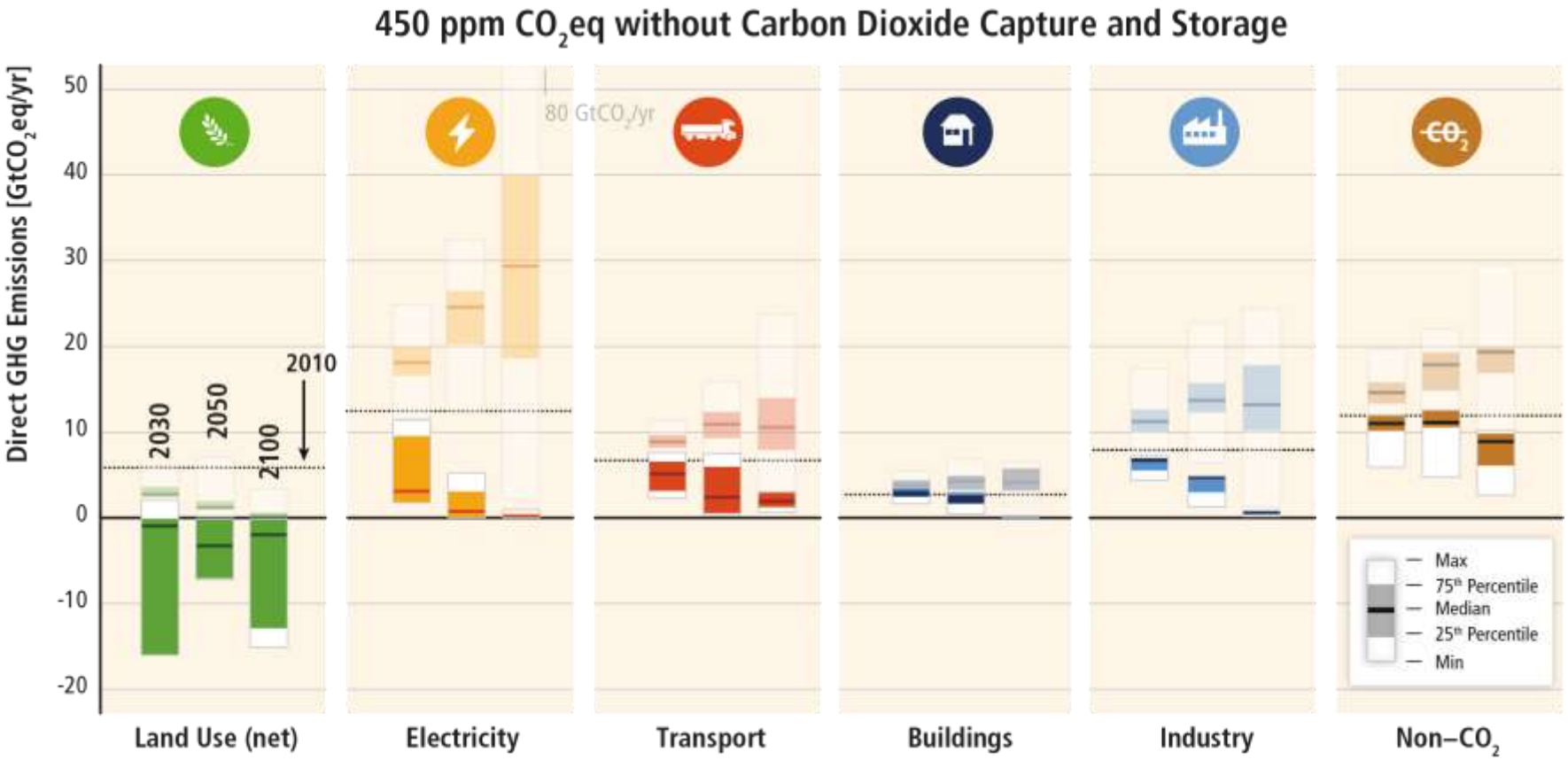
Based on Figure TS.15

Mitigation requires changes throughout the economy. Systemic approaches are expected to be most effective



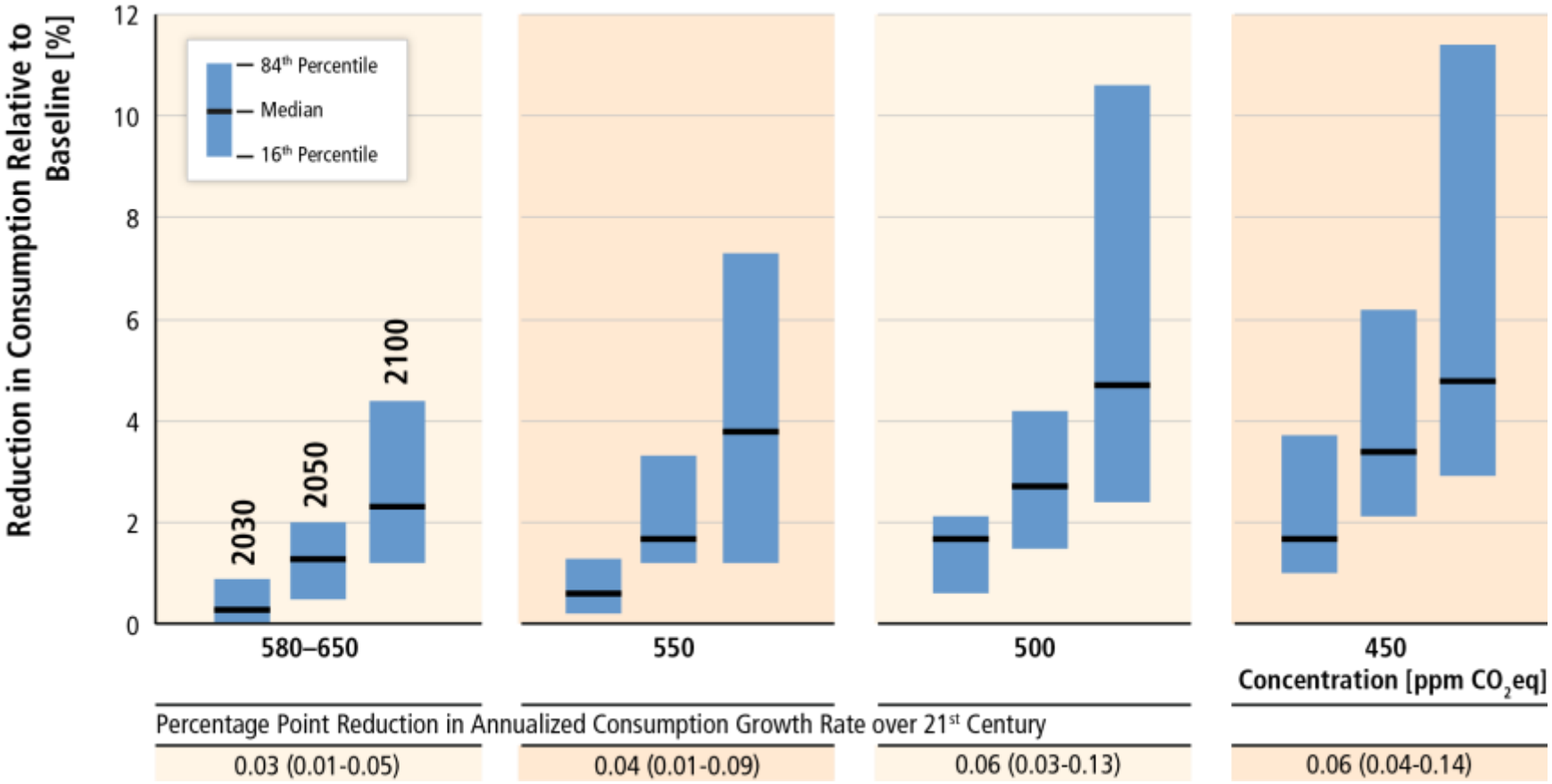
Based on Figure TS.17

Mitigation efforts in one sector determine efforts in others



Based on Figure TS.17

Global costs rise with the ambition of the mitigation goal



Based on Table SPM.2

Underlying drivers

- Underlying drivers were considered
  - defined as the processes, mechanisms, and characteristics of society that influence emissions through the factors

- For instance:
  - fossil fuels endowment and availability,
  - consumption patterns,
  - structural and technological changes, and
  - behavioural choices

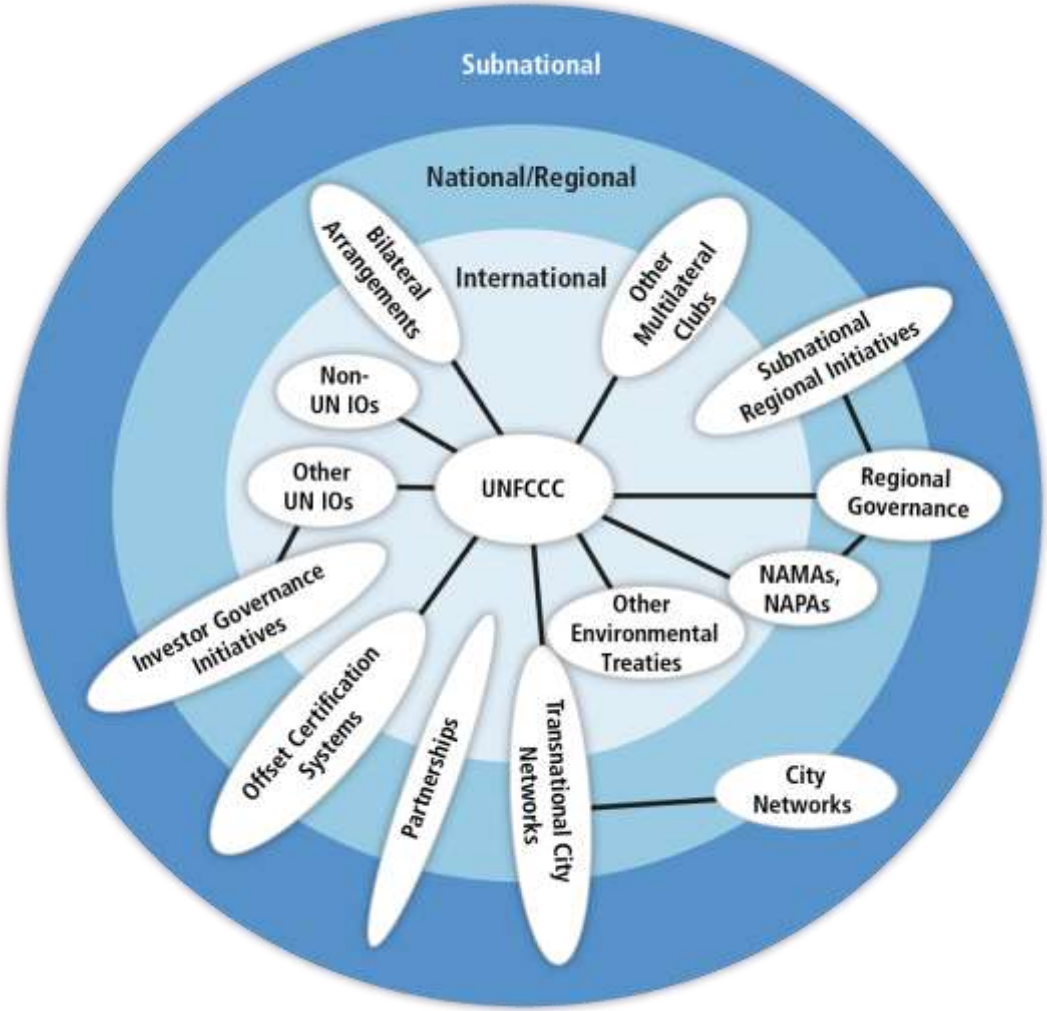
- Underlying drivers are subject to policies and measures that can be applied to, and act upon them

Underlying drivers

- The effect of immediate drivers on GHG emissions can be quantified through a straight decomposition analysis;

- the effect of underlying drivers on immediate drivers, however, is not straightforward and, therefore, difficult to quantify in terms of their ultimate effects on GHG emissions

Climate change mitigation requires international cooperation across scales



Based on Figure 13.1

WGIII's Key Findings

- **Total anthropogenic GHG emissions have continued to increase over 1970 to 2010 with larger absolute decadal increases toward the end of this period**, despite a growing number of climate change mitigation policies in place

- **CO_2 emissions from fossil fuel combustion and industrial processes contributed about 78% of the total GHG emission increase from 1970 to 2010**

- **Globally, economic and population growth continue to be the most important drivers of increases in CO_2 emissions from fossil fuel combustion.**
  - Between 2000 and 2010, both drivers outpaced emission reductions from improvements in energy intensity

- **Without additional efforts to reduce GHG emissions beyond those in place today, emissions growth is expected to persist driven by growth in global population and economic activities.**
  - Baseline scenarios, those without additional mitigation, result in global mean surface temperature increases in 2100 from 3.7 to 4.8°C (median values) compared to pre-industrial levels


Climate change is a global commons problem that requires international cooperation and coordination across scales
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