

## Third meeting of the structured expert dialogue on the 2013-2015 review (SED 3)

Bonn, Germany  
6 – 8 June 2014

# CLIMATE CHANGE 2014

## *Mitigation of Climate Change*

### Trends in stocks and flows of GHGs and their drivers

# Trends in stocks and flows

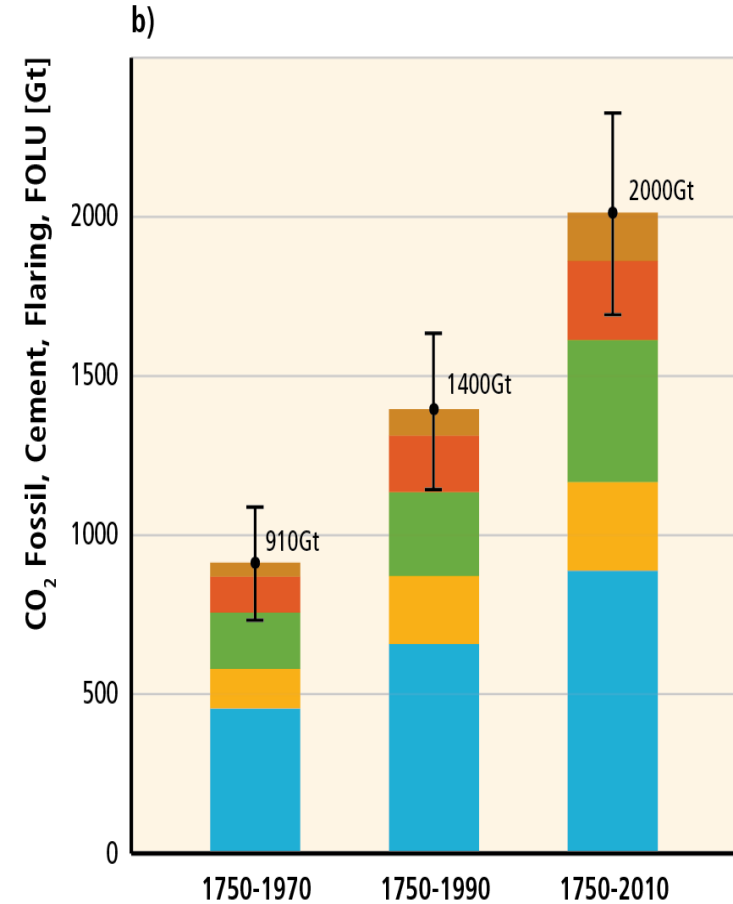
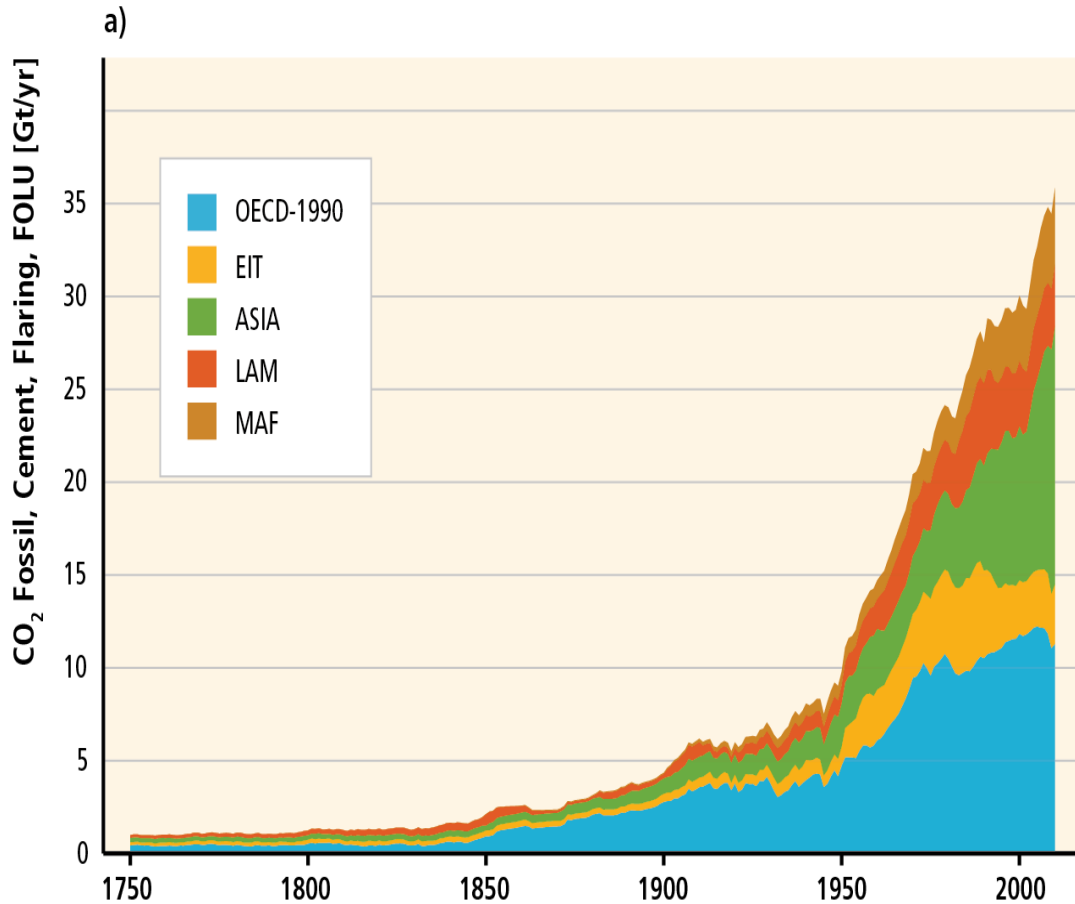
- The period 1970-2010 was taken as reference period
  - smallest common denominator for which we have data for all gases; extension for CO<sub>2</sub> until 2012
- Long-term historic data: 1751-2010 for CO<sub>2</sub>.
  - Short-lived forcers not included due to limited residence time in the atmosphere
- Several datasets were used and comparison among them were done
  - Database for Global Atmospheric Research (EDGAR)
  - IEA data for fossil CO<sub>2</sub>
  - Carbon Dioxide Information Analysis Center (CDIAC)

# Multiple perspectives

- GHG stocks and flows were analyzed from multiple perspectives:
  - Cumulative CO<sub>2</sub> 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

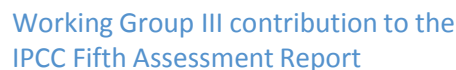
# Cumulative CO<sub>2</sub> emissions since 1750

Total anthropogenic CO<sub>2</sub> emissions from fossil fuel combustion, flaring, cement, as well as Forestry and Other Land Use (FOLU) in five major world regions between 1750 and 2010

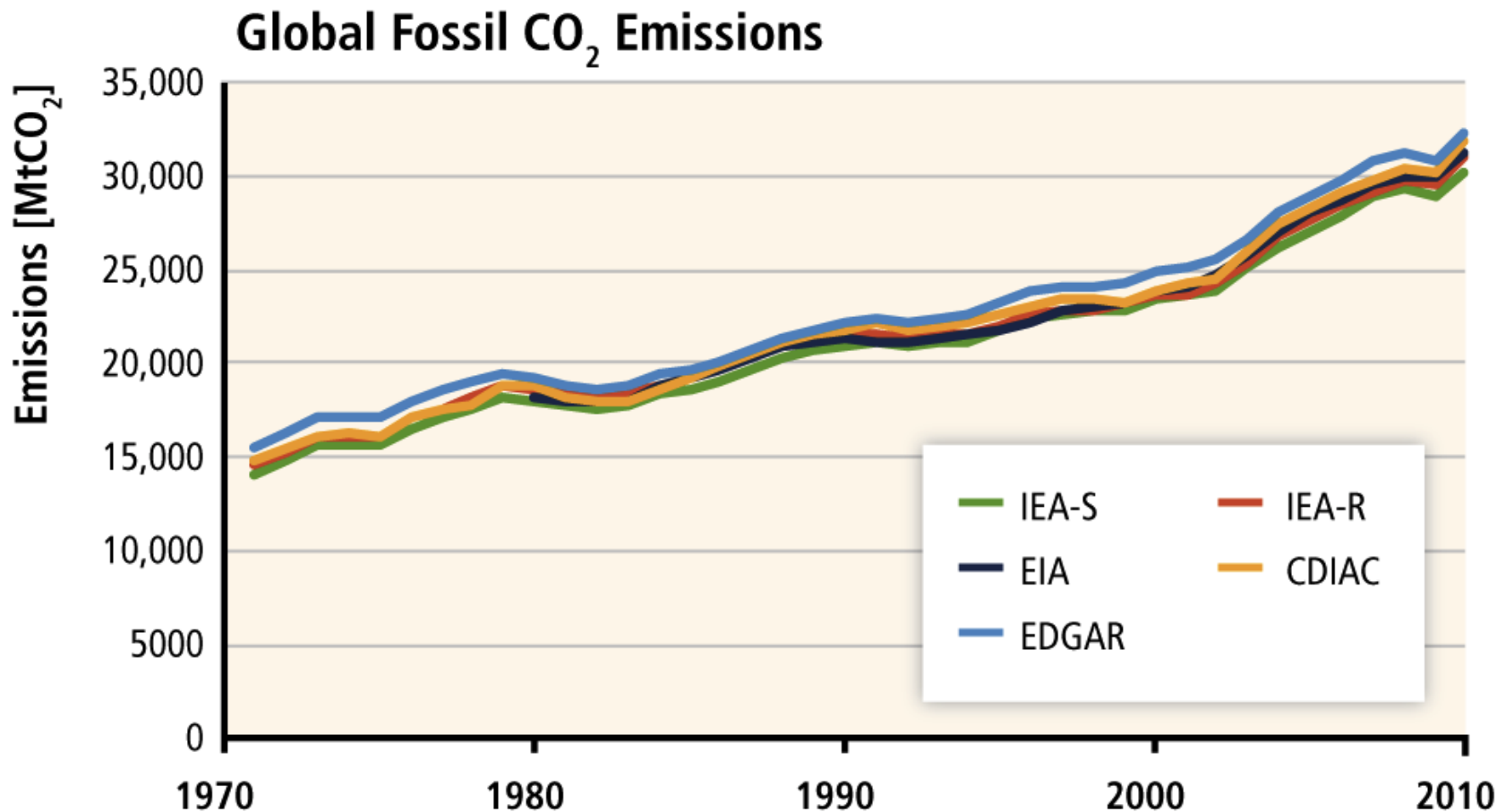




including fossil, agriculture and land-use/land-use change sectors, aggregated  
using 100-year GWP



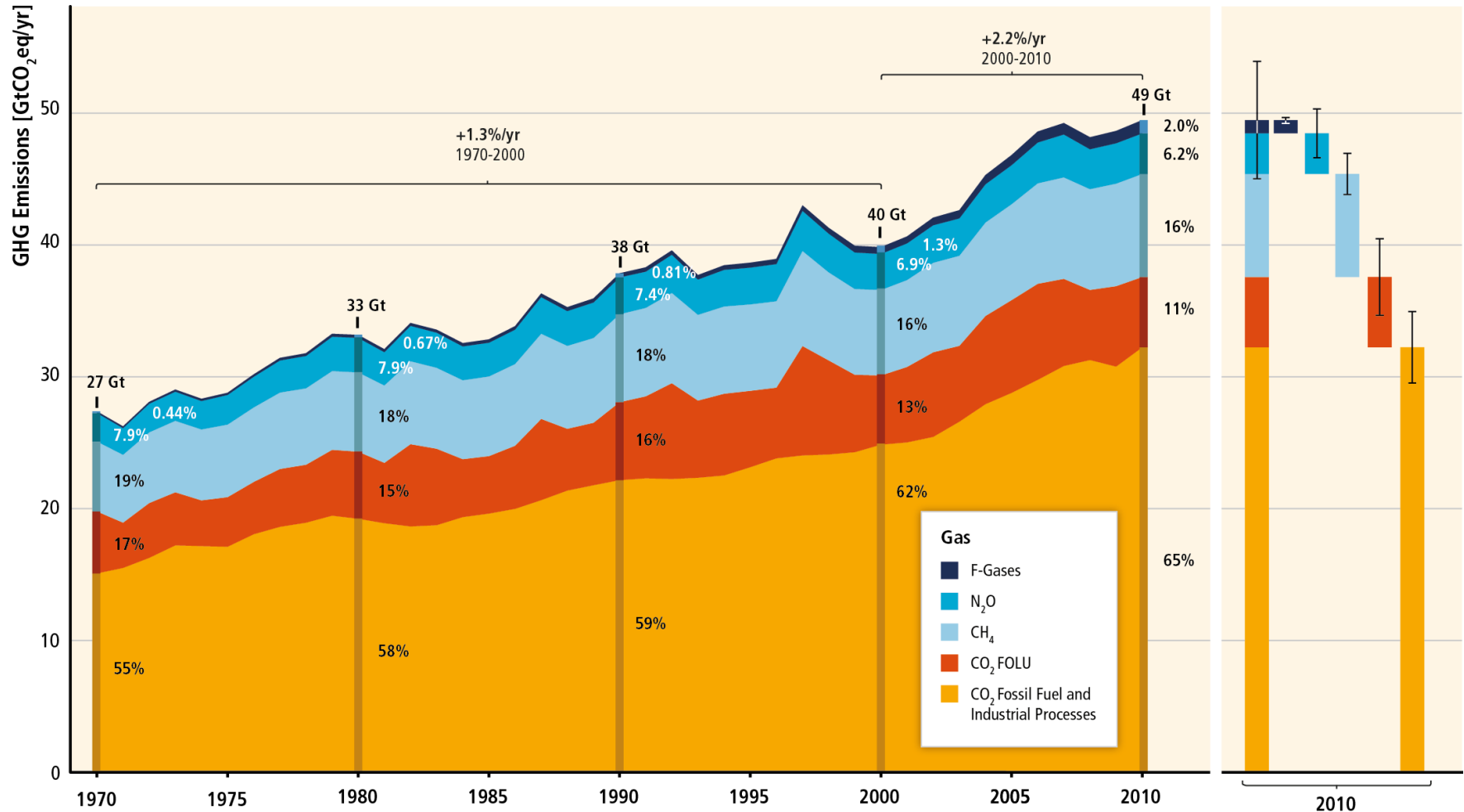
# Robustness across databases



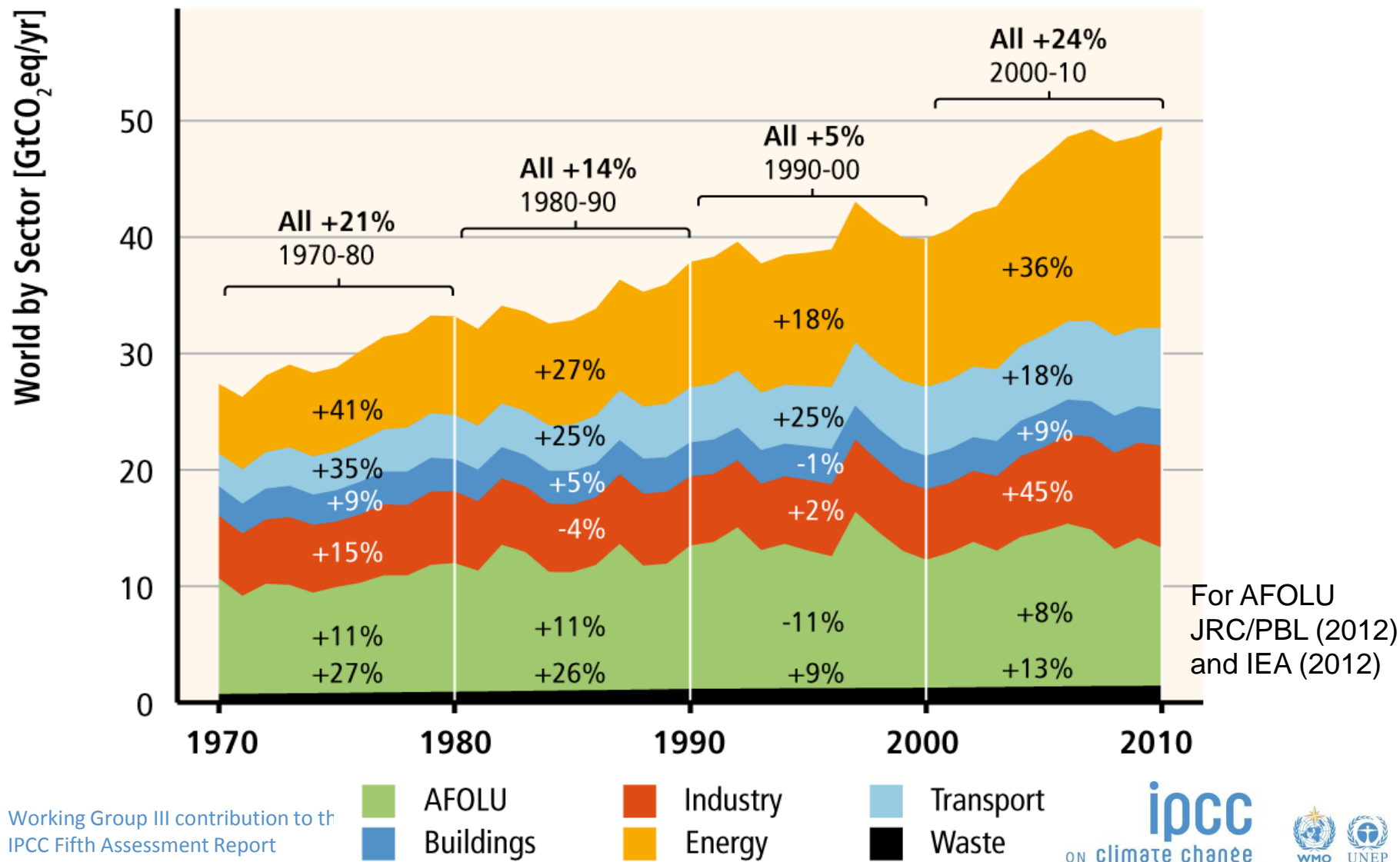
On a global basis, different estimates of CO<sub>2</sub>, harmonized to cover the same sources, have relatively small differences.

# GHG emissions by group of gases

Total Annual Anthropogenic GHG Emissions by Groups of Gases 1970-2010

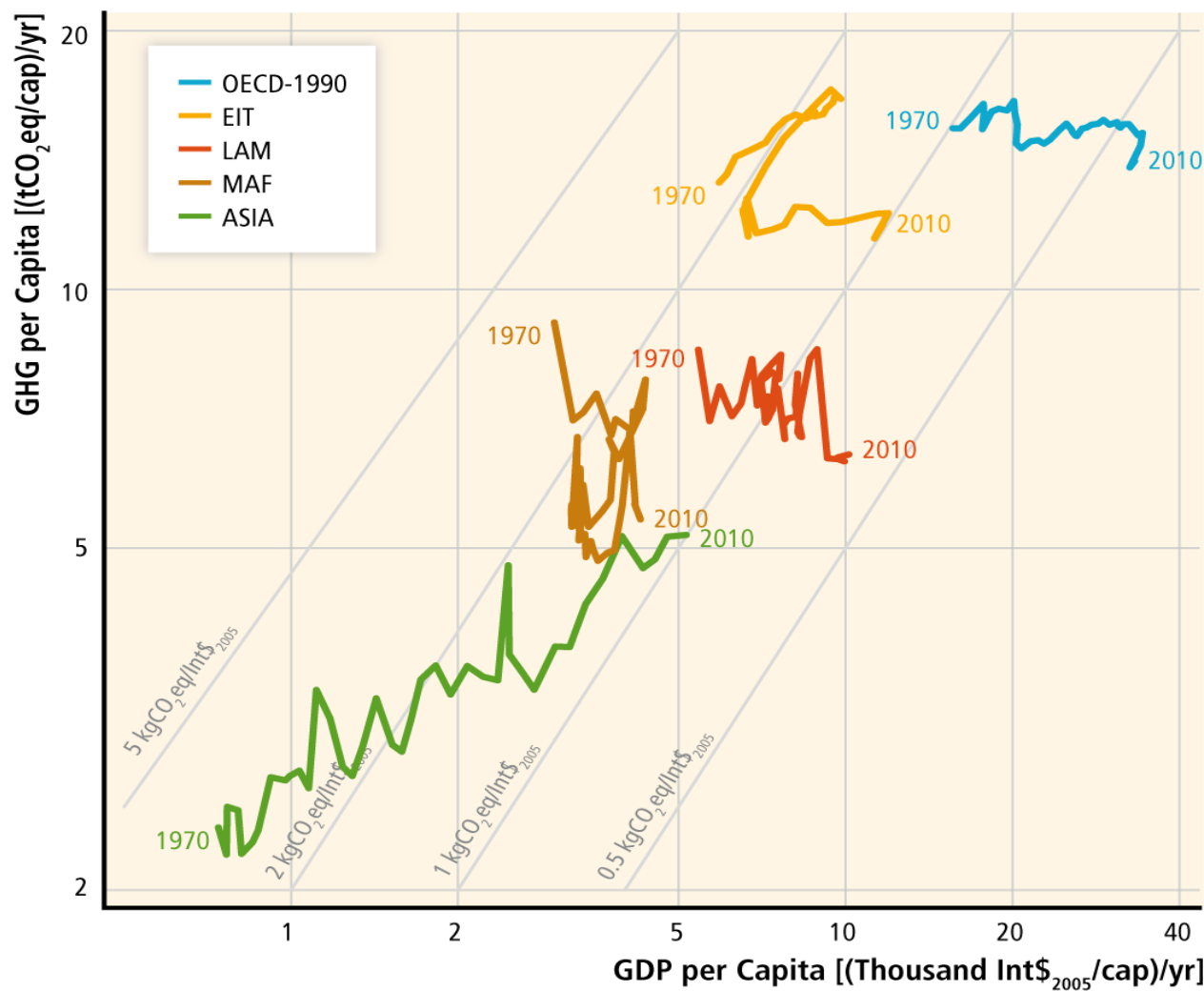


# GHG emissions by sectors





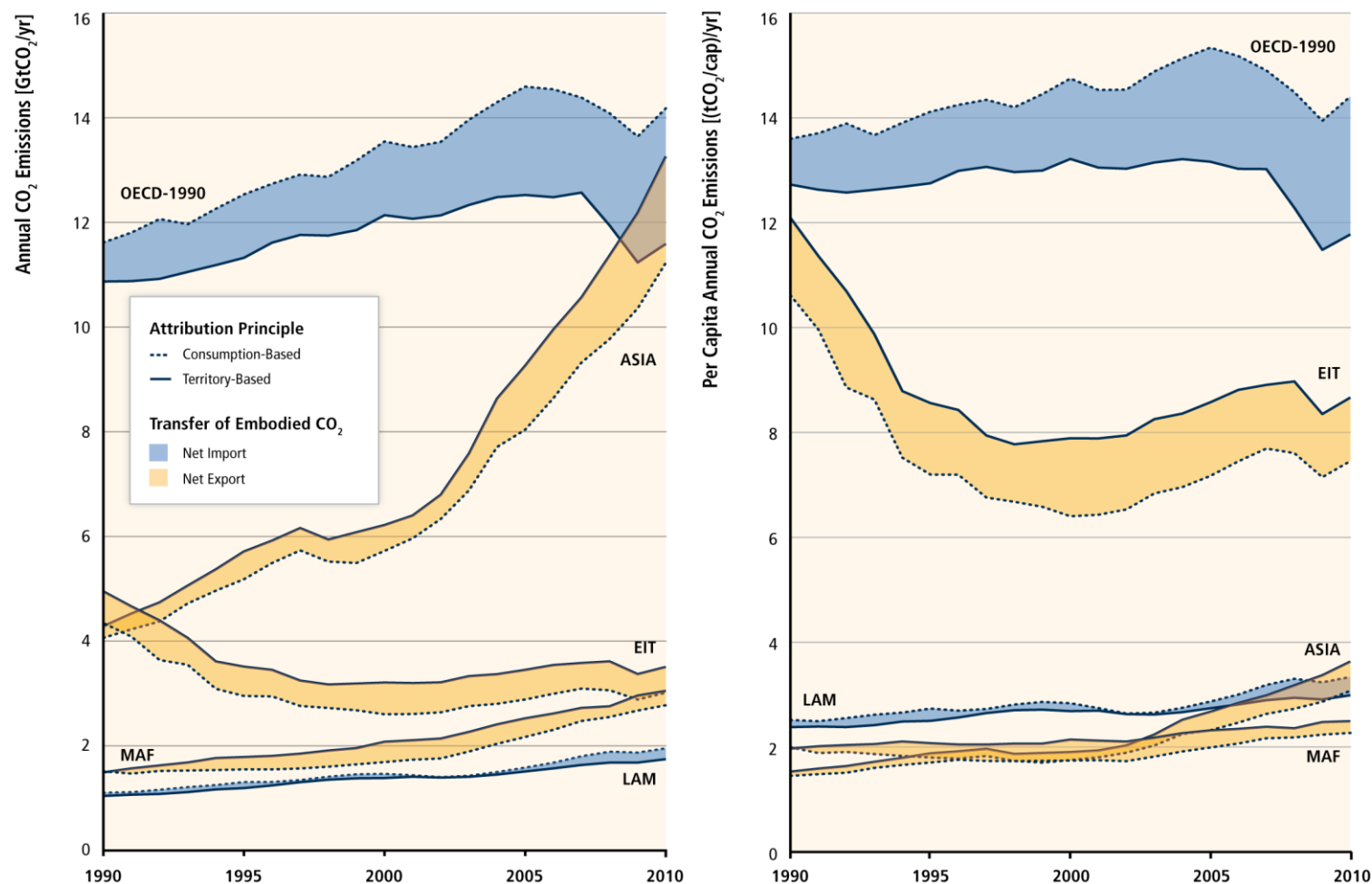
# GHG per capita vs. GDP per capita



# Production (Territorial) vs Consumption related CO<sub>2</sub> emissions

A growing share of CO<sub>2</sub> 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 CO<sub>2</sub> emissions

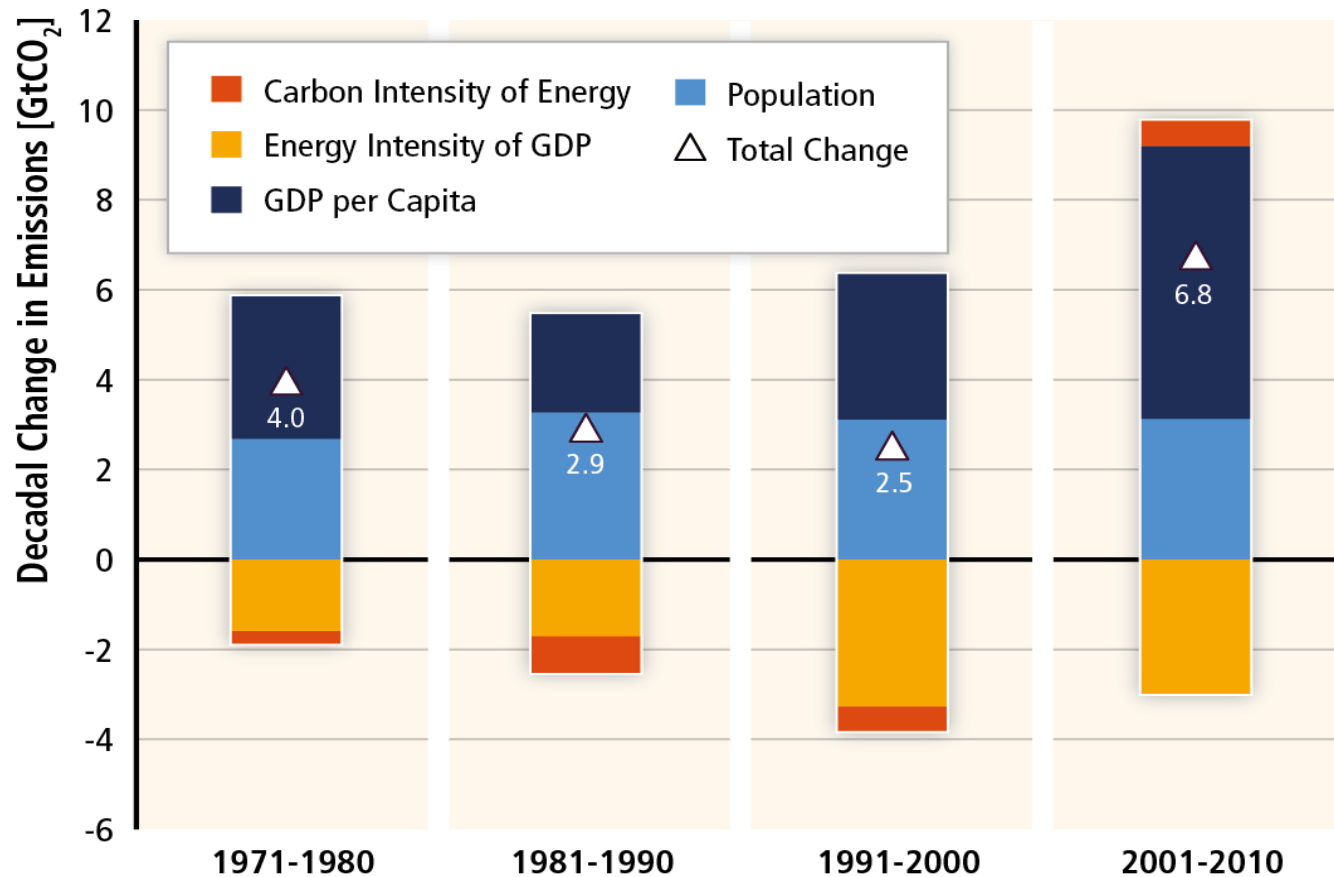


# Drivers of emissions

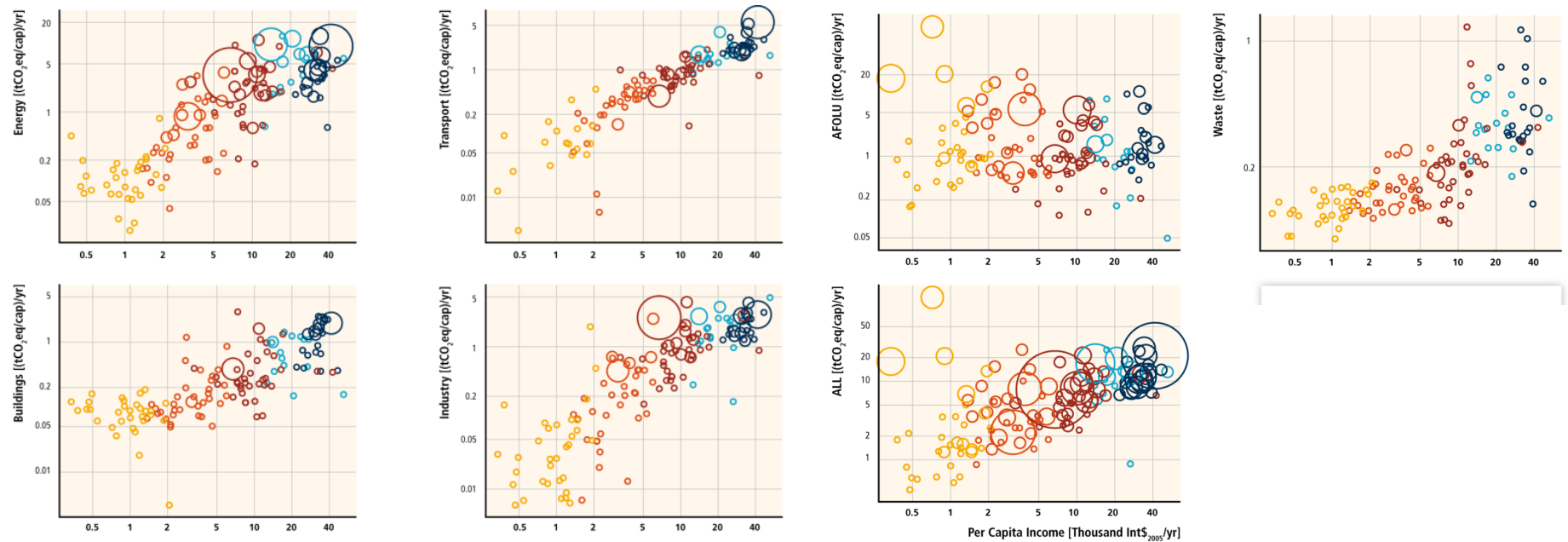
- Firstly, immediate drivers, or factors in the decomposition, of total GHG emissions were considered
- For instance, for energy related emissions, immediate drivers are:
  - population,
  - gross domestic product (GDP) per capita,
  - energy intensity of production, and
  - GHG-emissions (carbon) intensity of energy

# Drivers of energy-related CO<sub>2</sub> emissions

Decomposition of the Change in Total Global CO<sub>2</sub> Emissions from Fossil Fuel Combustion



# GHG per capita vs GDP per capita





# Underlying drivers

- Secondly, 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

# 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<sub>2</sub> 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<sub>2</sub> 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

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[www.mitigation2014.org](http://www.mitigation2014.org)