ipcc
INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014

Mitigation of Climate Change

Key Insights from the AR5

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Tokyo

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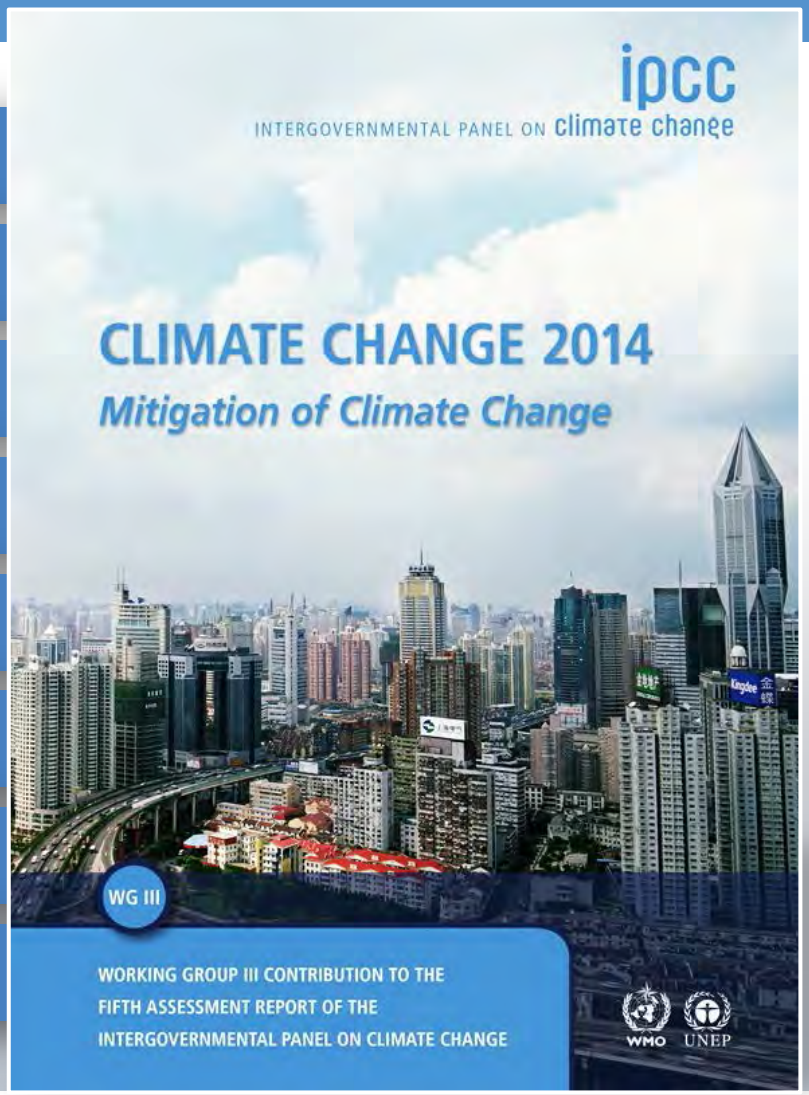
Working Group III contribution to the
IPCC Fifth Assessment Report

WMO UNEP

Exploring the solution space

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

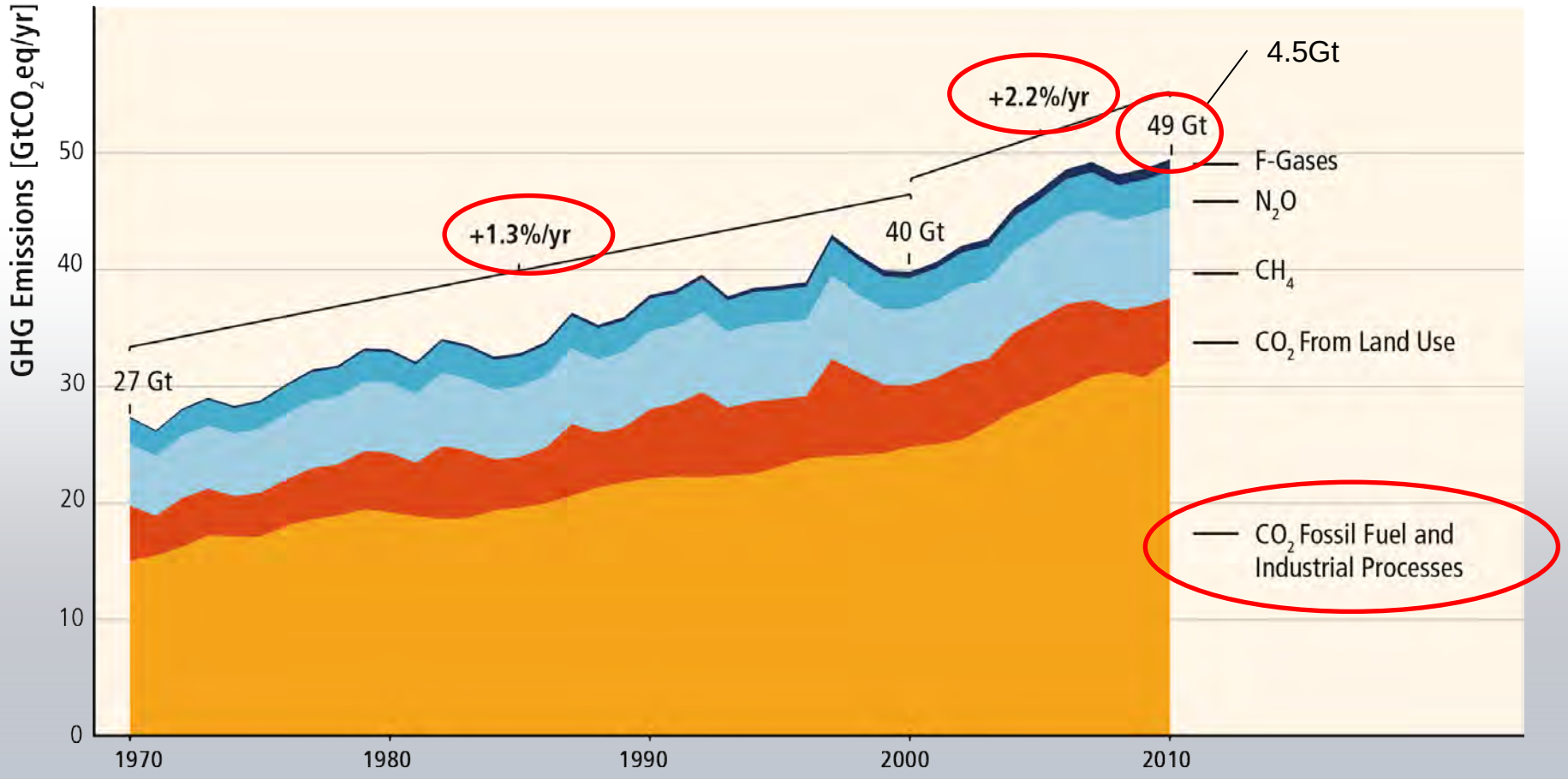
- 1 Summary for Policymakers
- 1 Technical Summary
- 16 Chapters
- 235 Authors
- 900 Reviewers
- More than 2000 pages
- Close to 10,000 references
- More than 38,000 comments



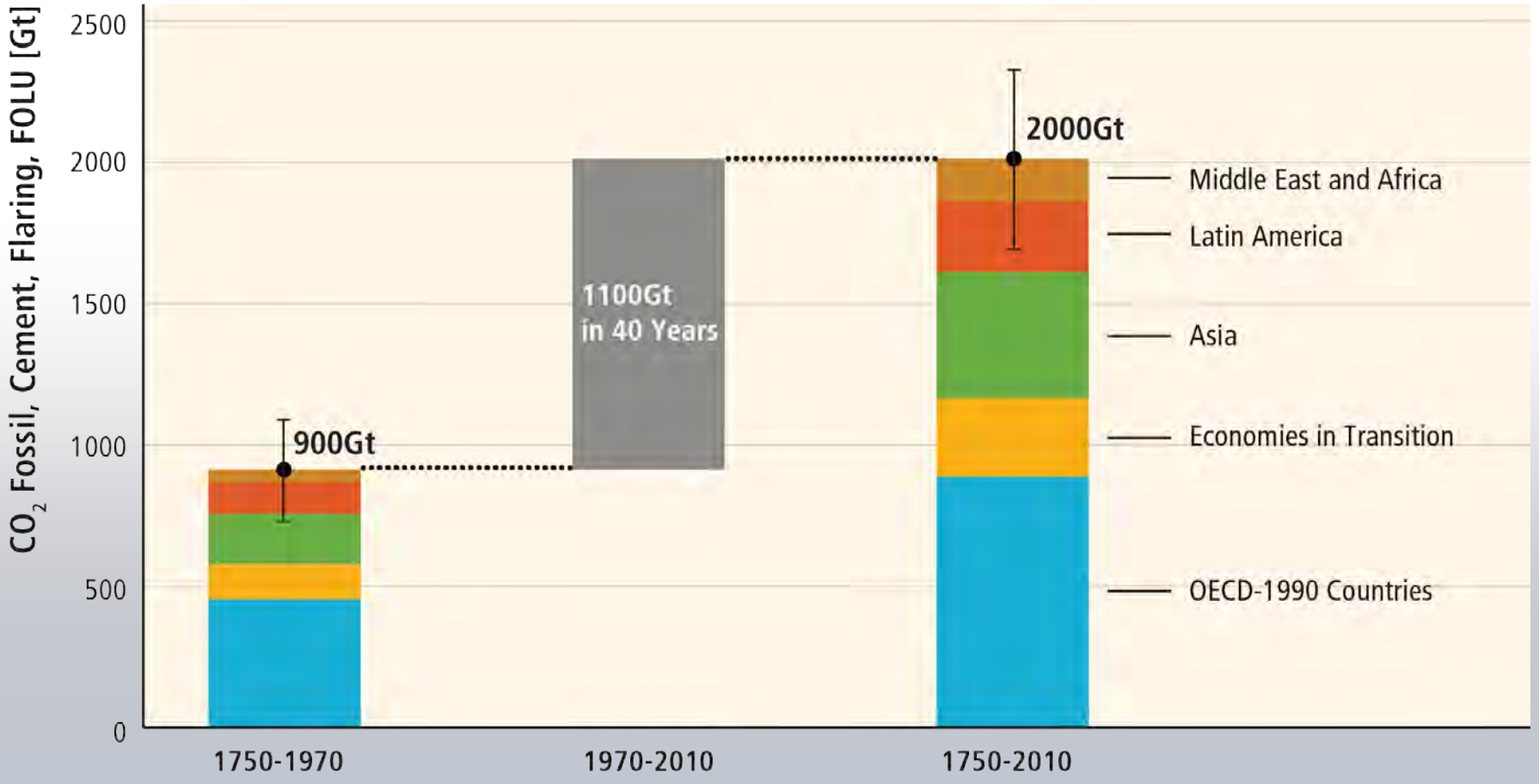

#1
What are the trends in stocks and flows of GHG emissions?

GHG emissions growth has accelerated despite reduction efforts.

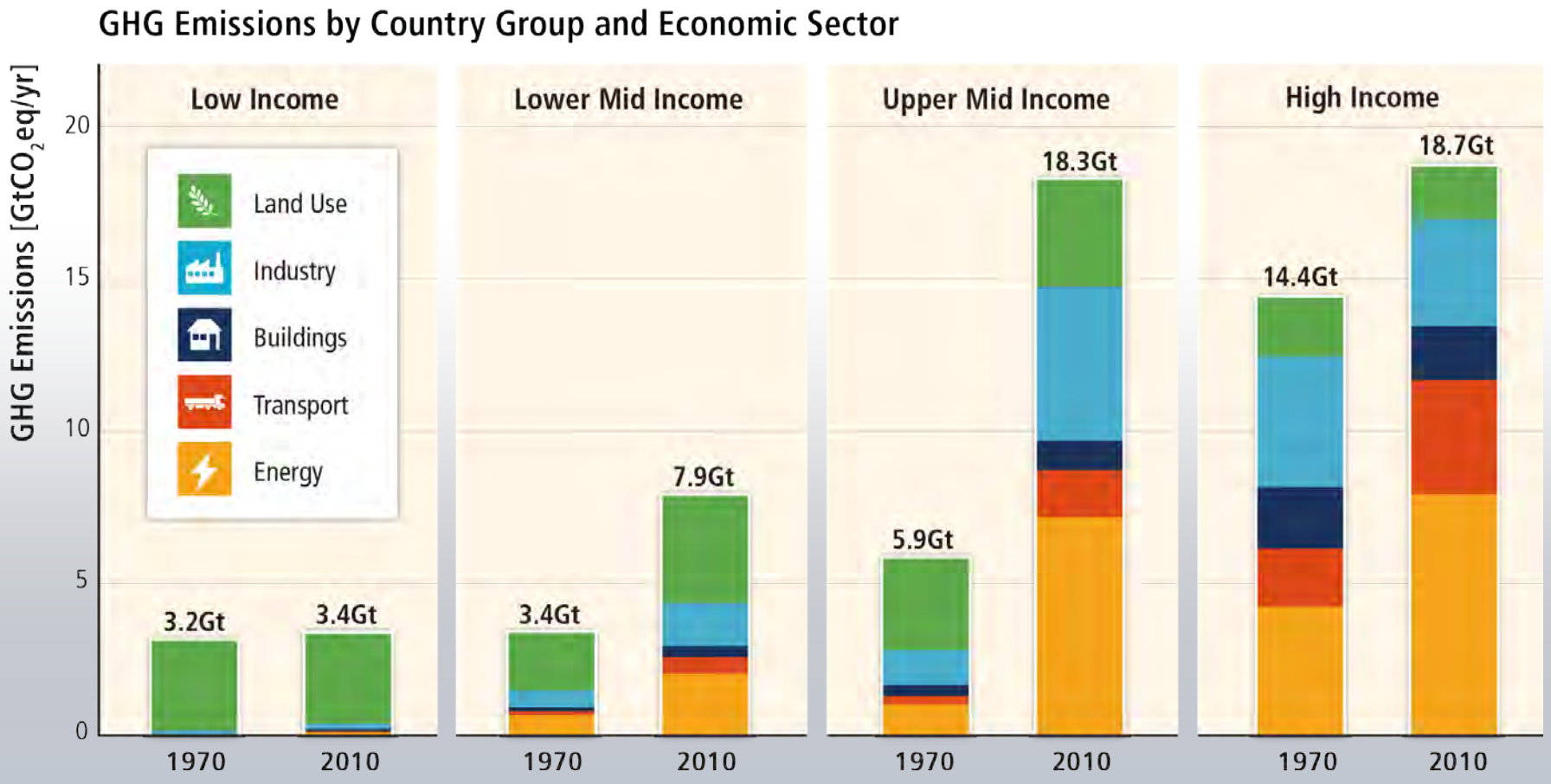
GHG emissions growth between 2000 and 2010 has been larger than in the previous three decades.



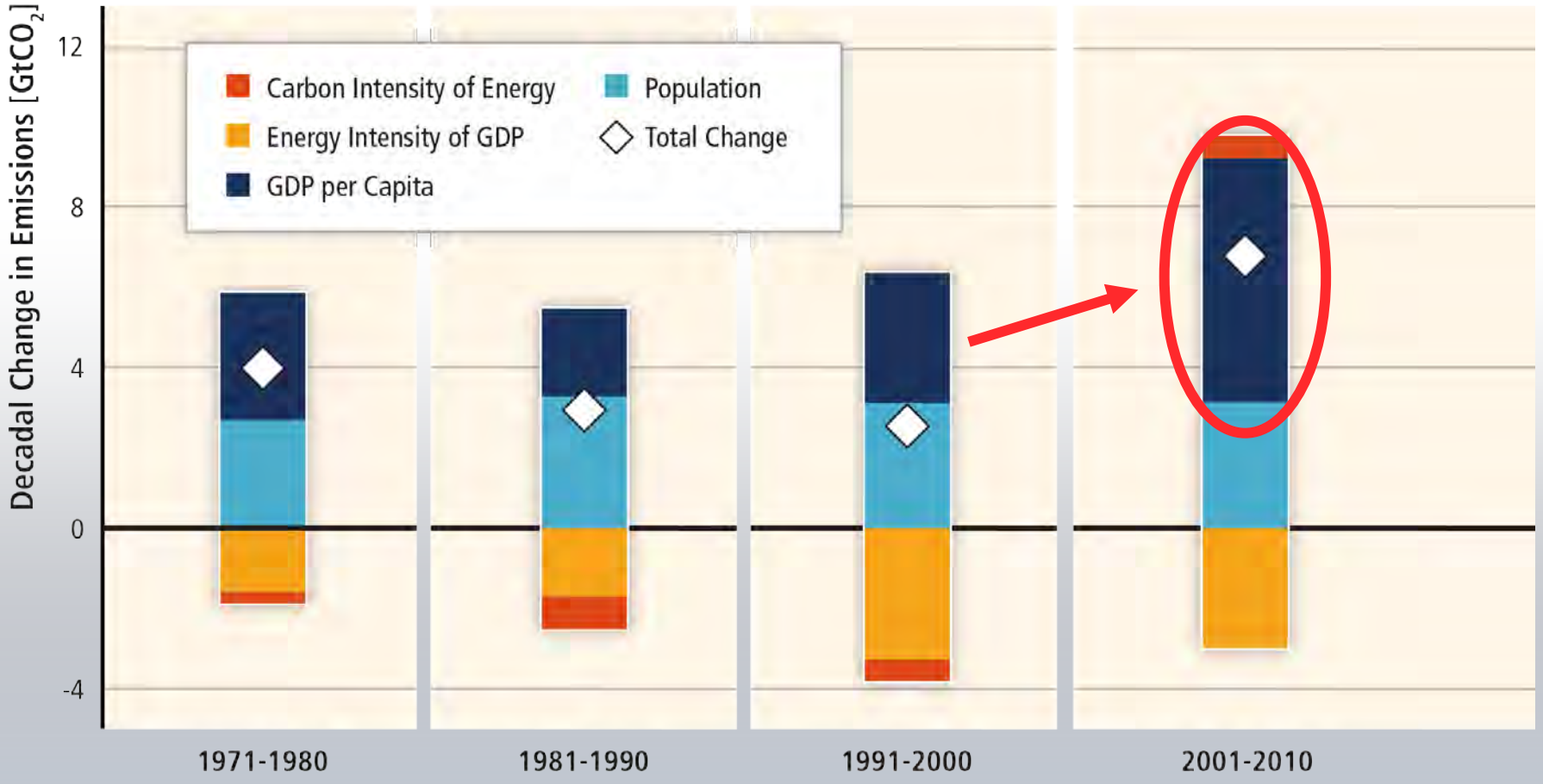
About half of the cumulative anthropogenic CO_2 emissions between 1750 and 2010 have occurred in the last 40 years.



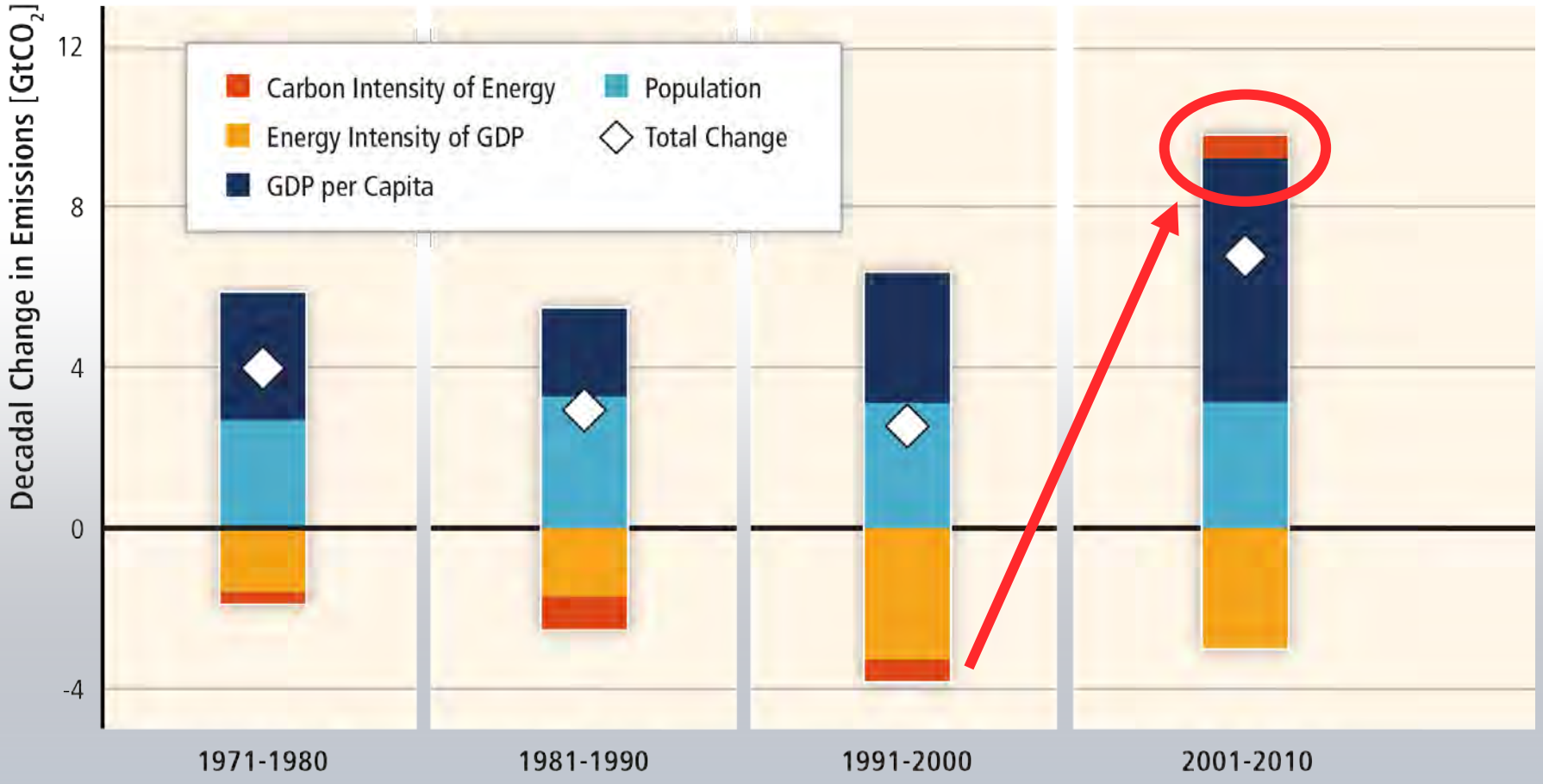
Regional patterns of GHG emissions are shifting along with changes in the world economy.

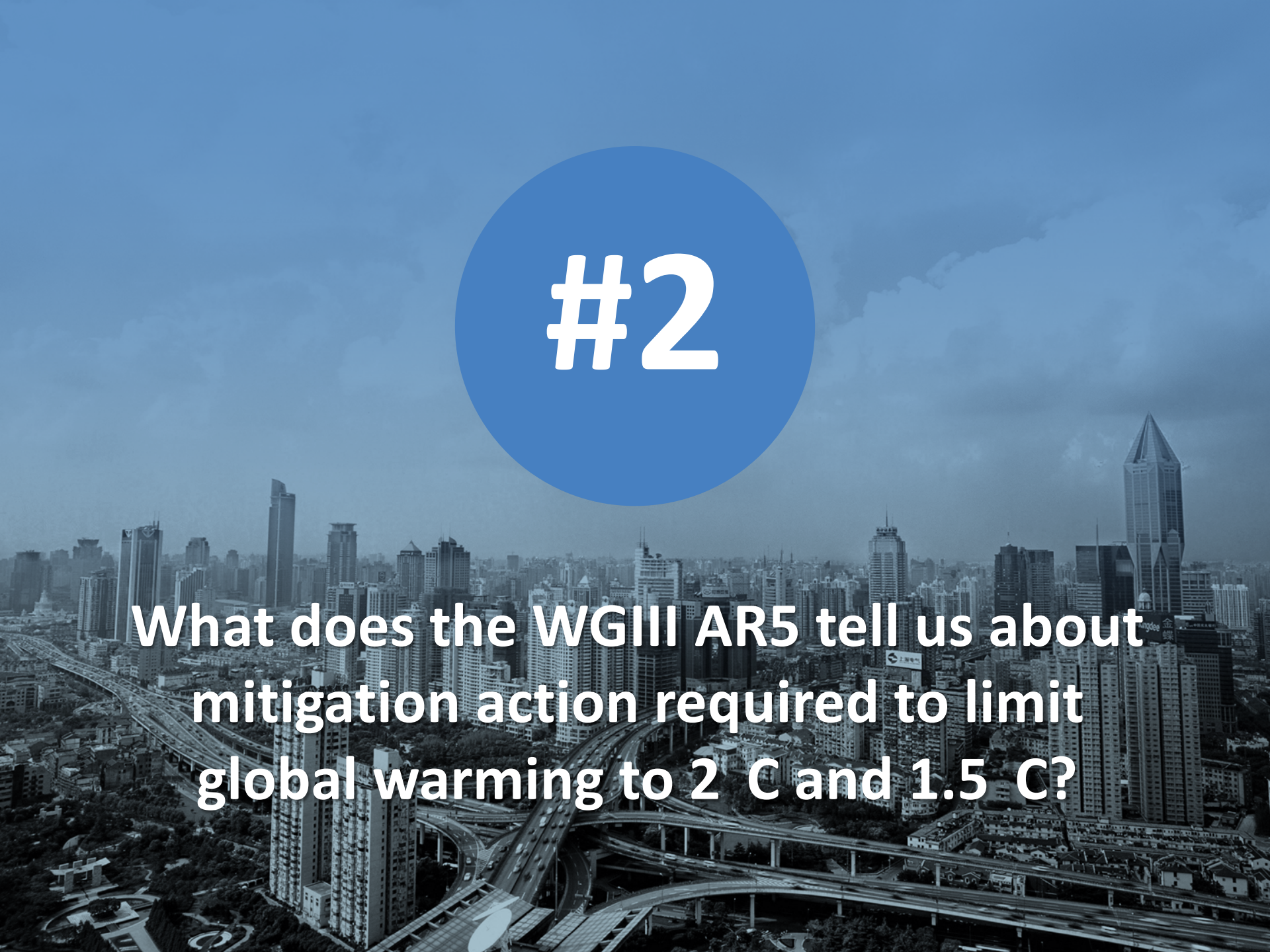


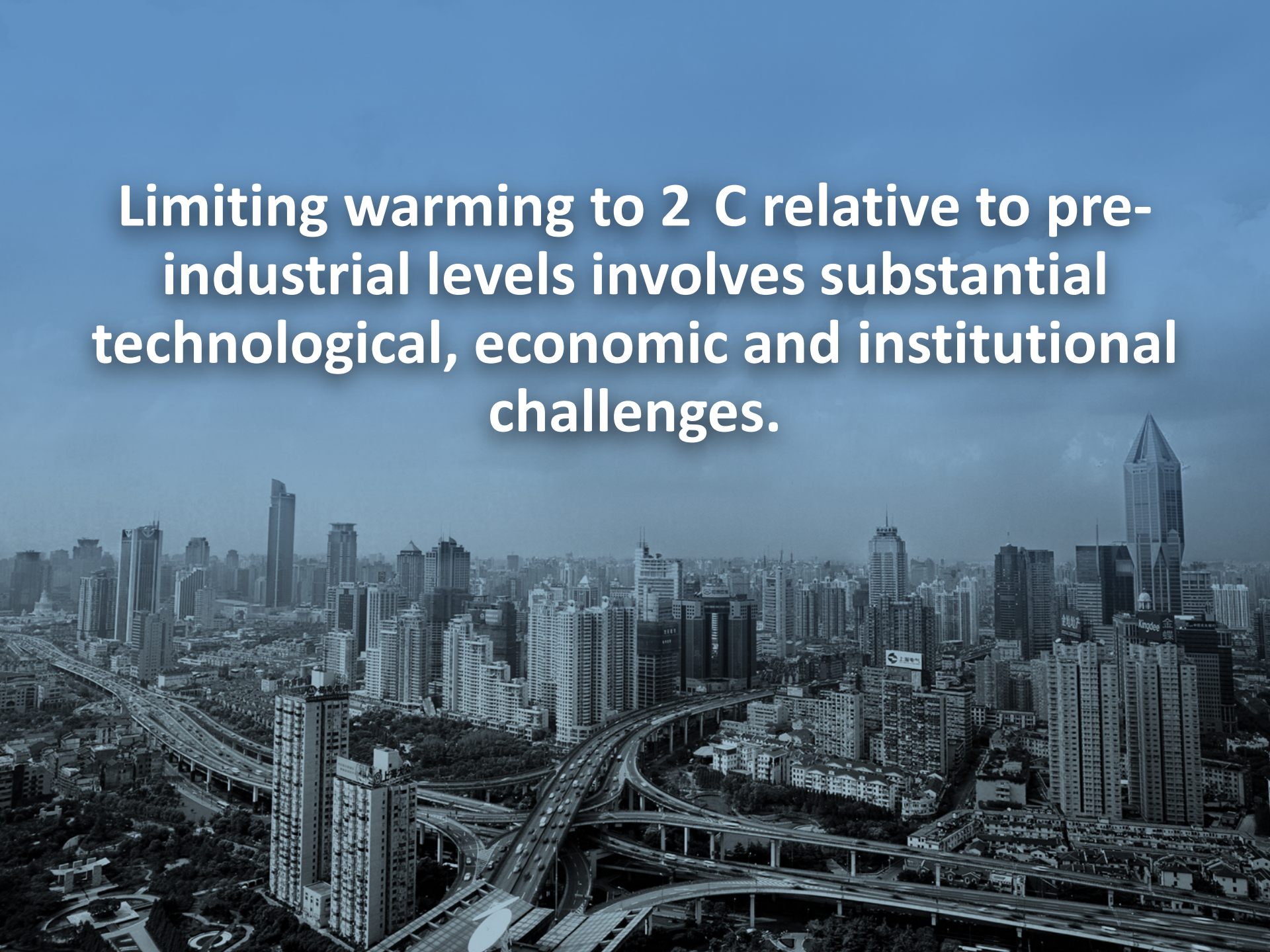
Most of the recent GHG emissions growth has been driven by growth in economic activity.



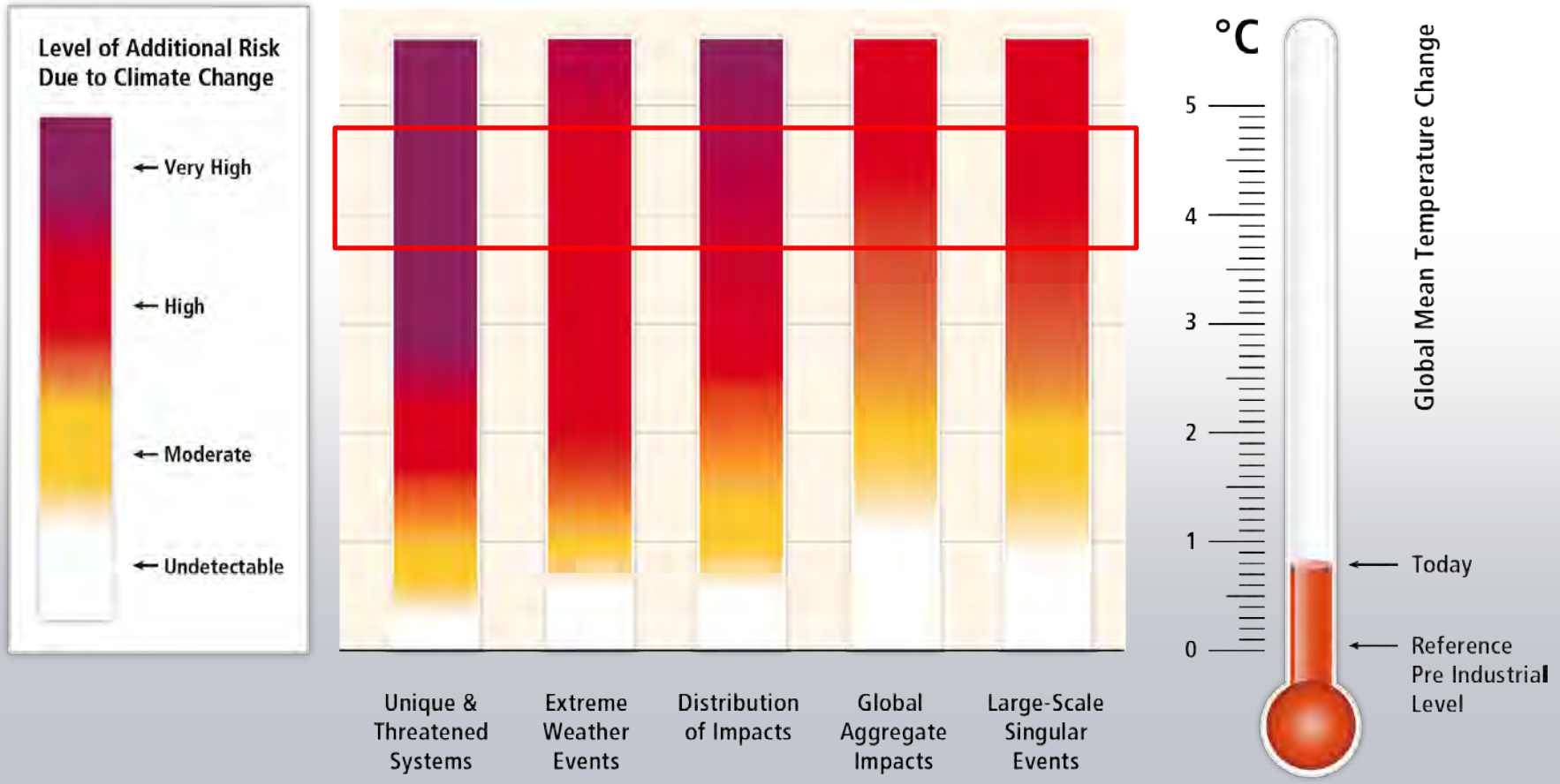
The long-standing trend of gradual decarbonization of energy has reversed recently.



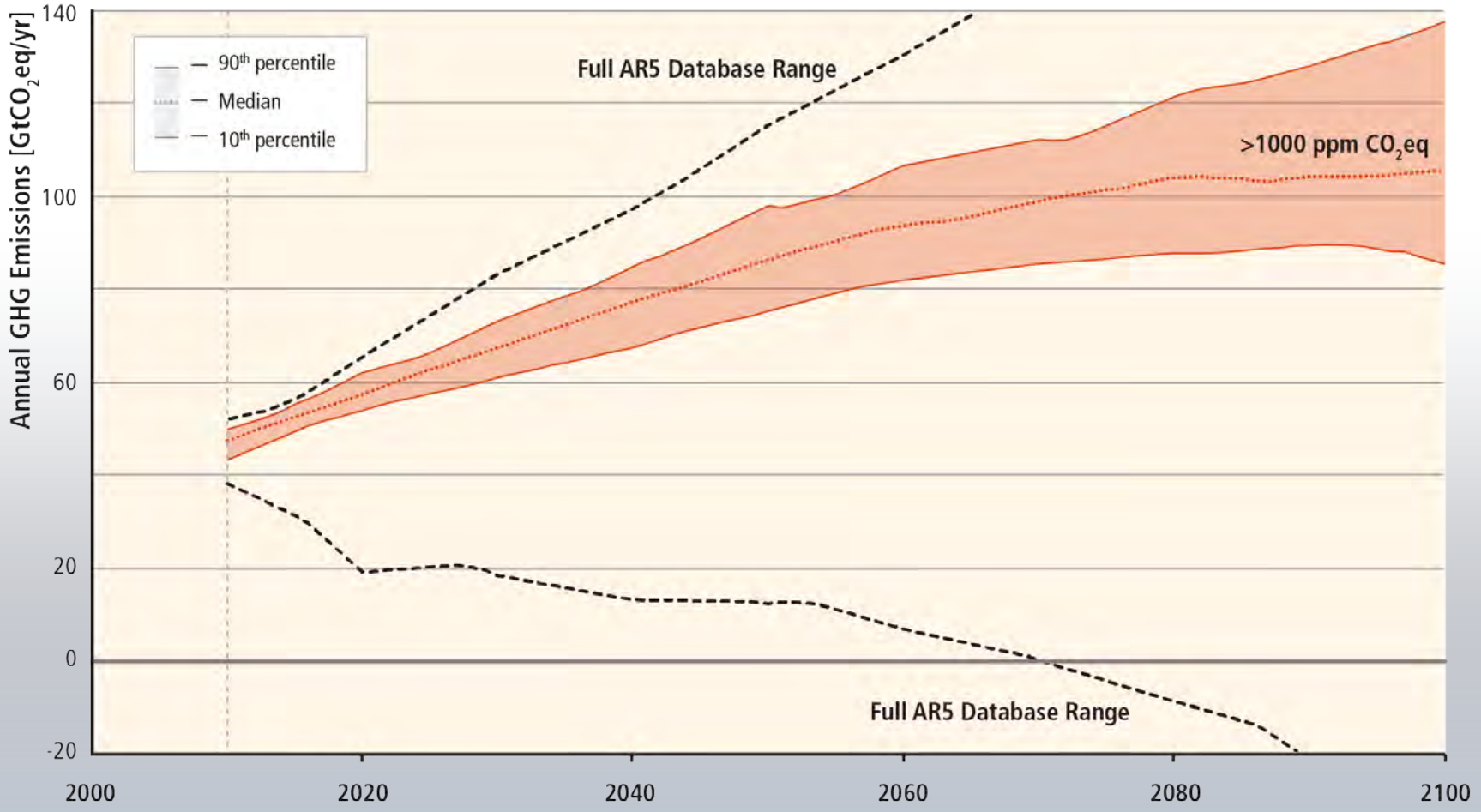

#2
What does the WGIII AR5 tell us about mitigation action required to limit global warming to 2 C and 1.5 C?


Limiting warming to 2 C relative to pre-industrial levels involves substantial technological, economic and institutional challenges.

Without additional mitigation, global mean surface temperature is projected to increase by 3.7 to 4.8°C (2.5 - 7.8°C) until 2100.



Stabilization of atmospheric GHG concentrations requires moving away from the baseline, regardless of the mitigation goal.



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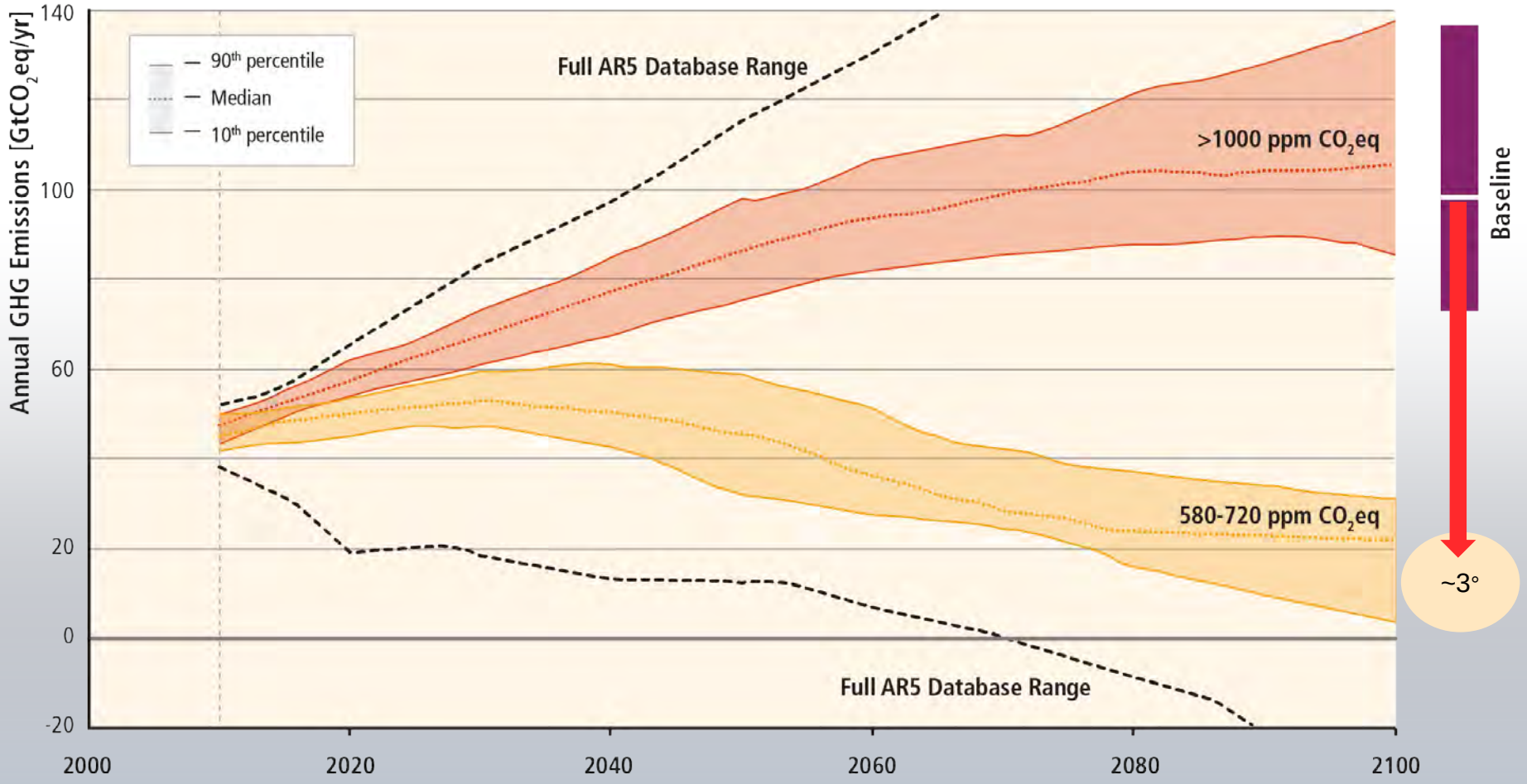

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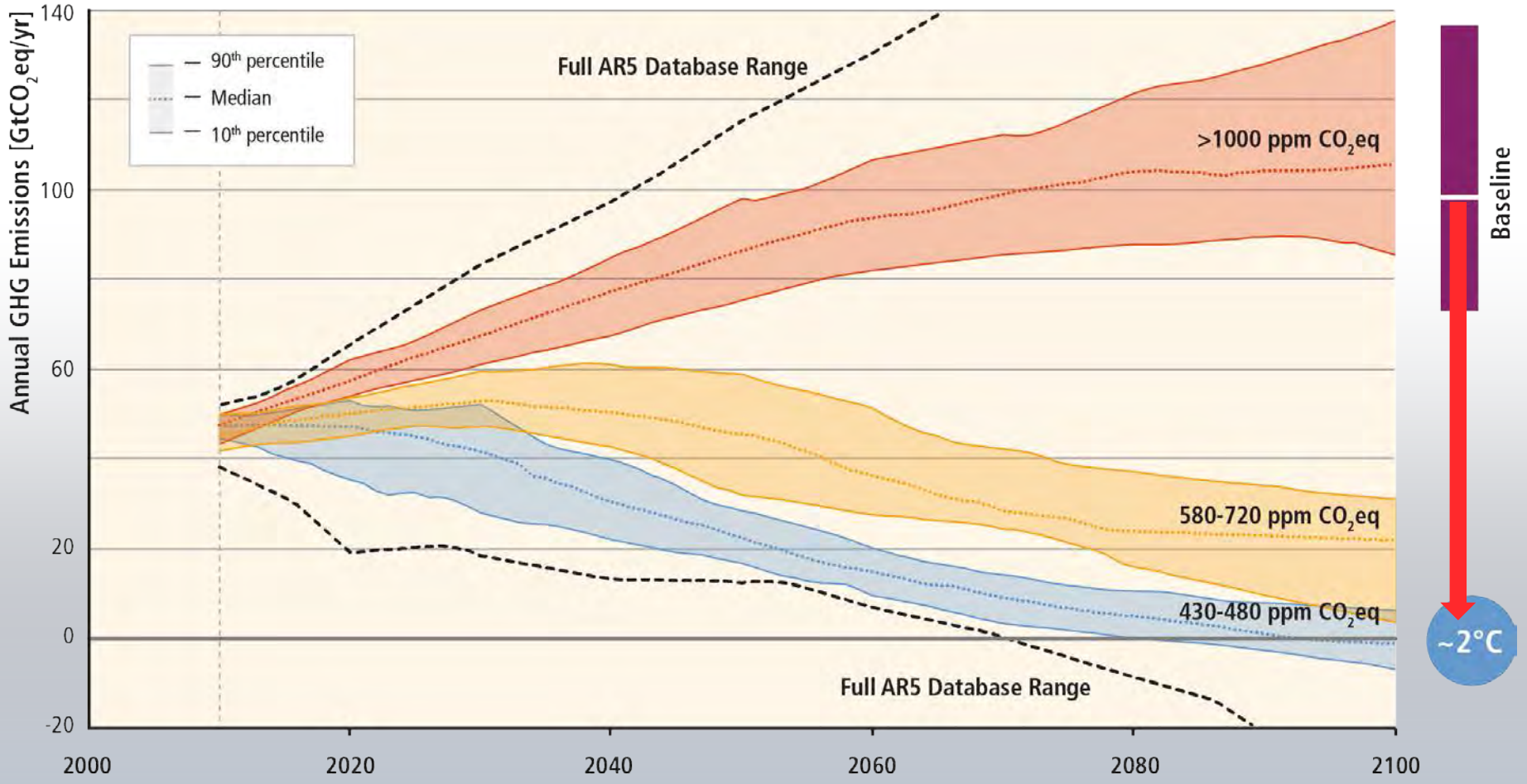
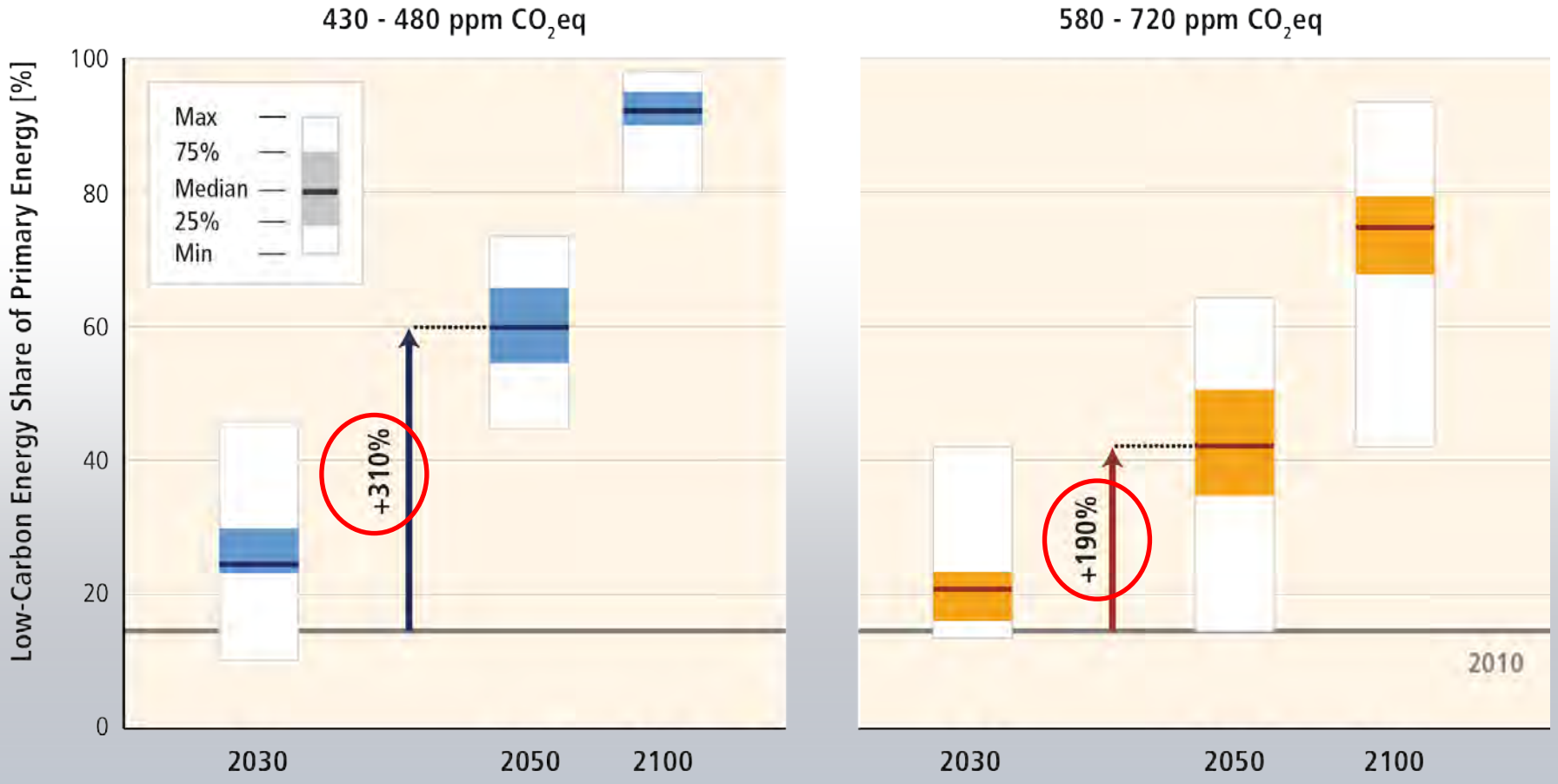
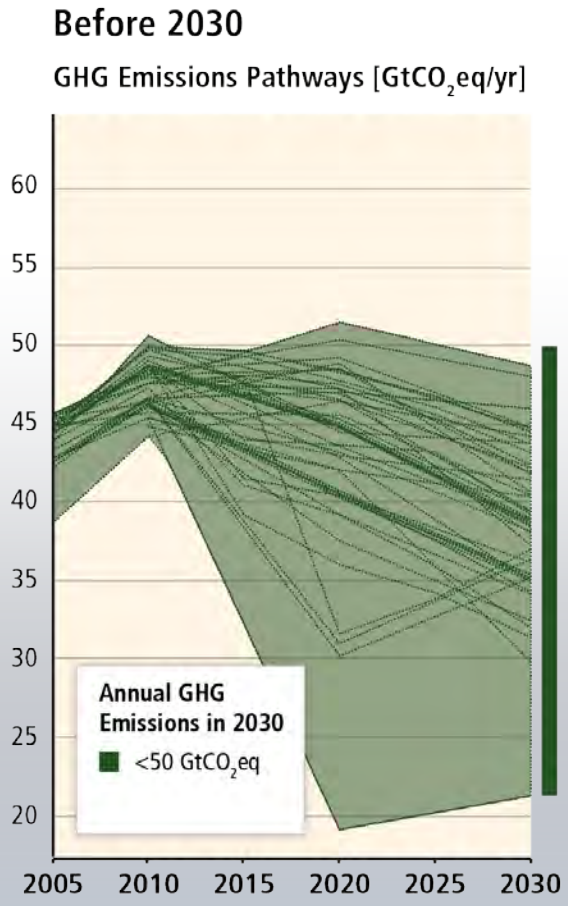


Mitigation involves substantial upscaling of low carbon energy.



Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.

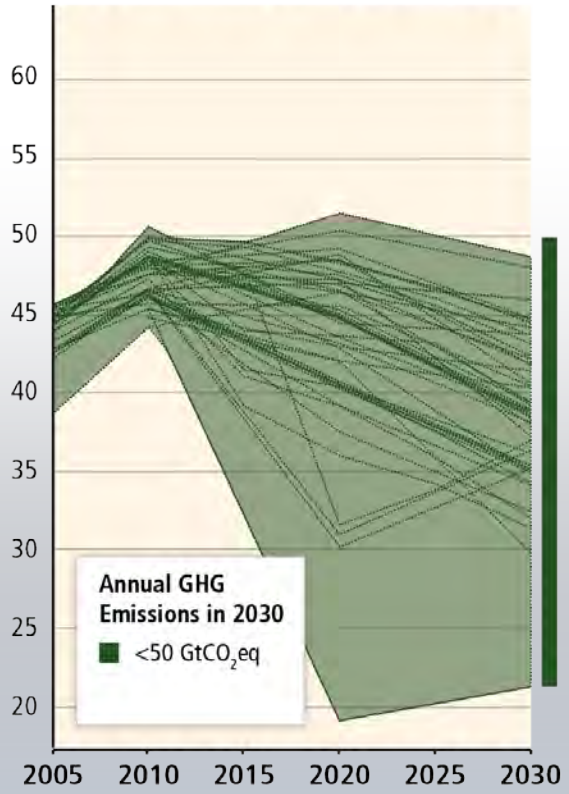


„immediate action“

Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.

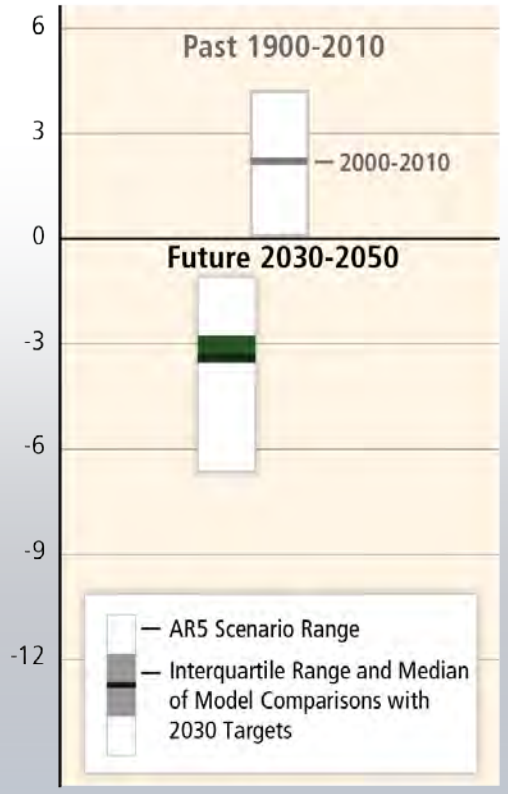
Before 2030

GHG Emissions Pathways [$GtCO_2eq/yr$]



After 2030

Rate of CO_2 Emission Change [%/yr]



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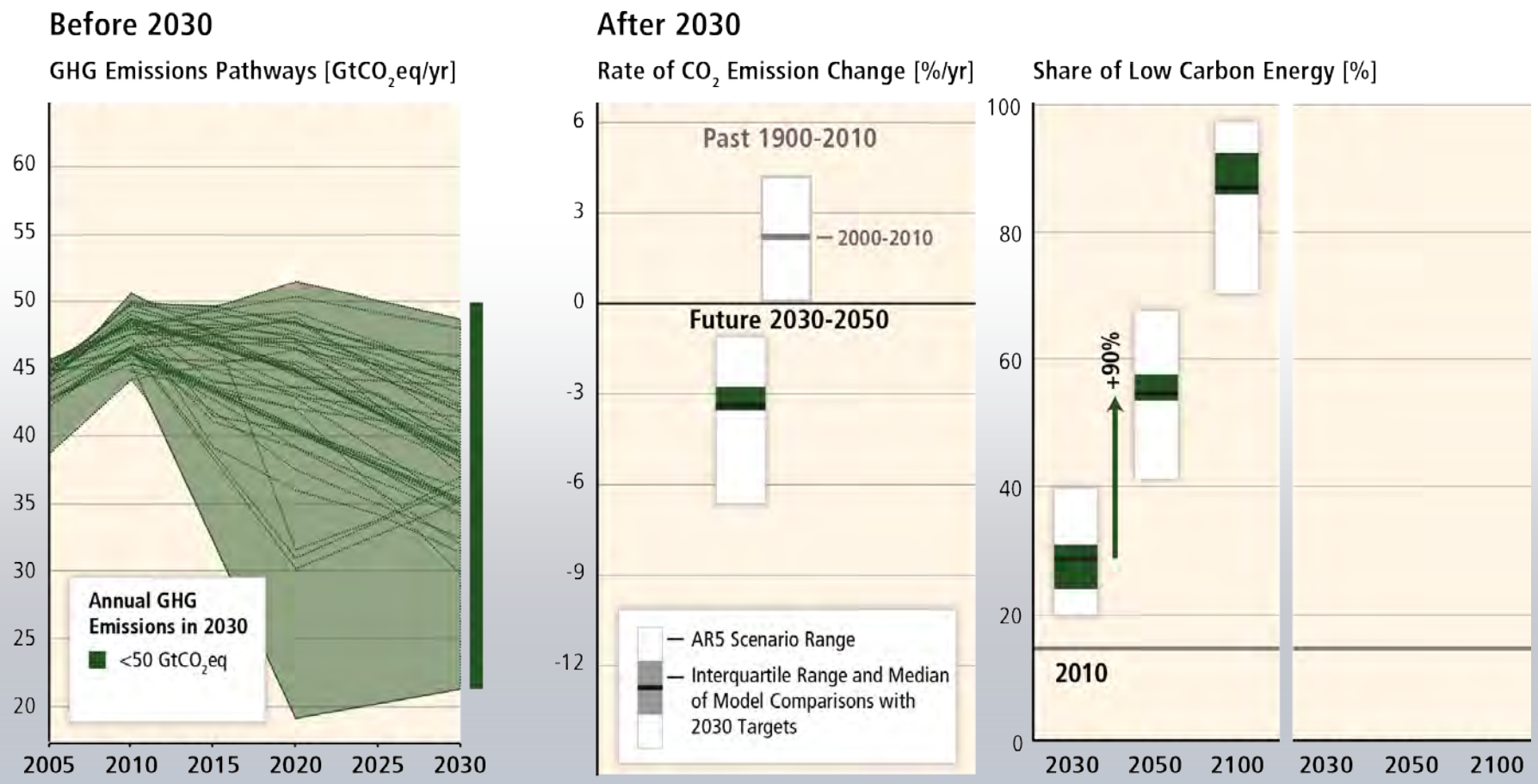

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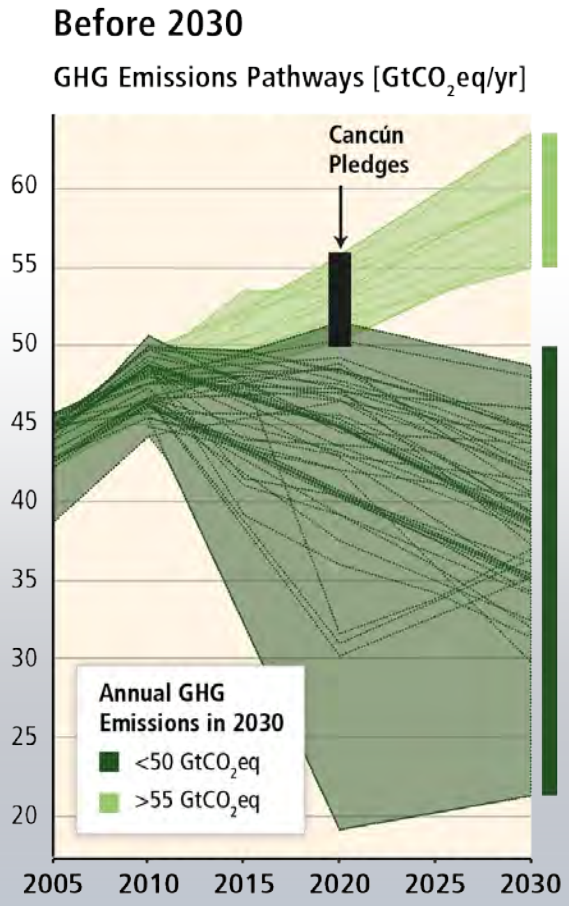

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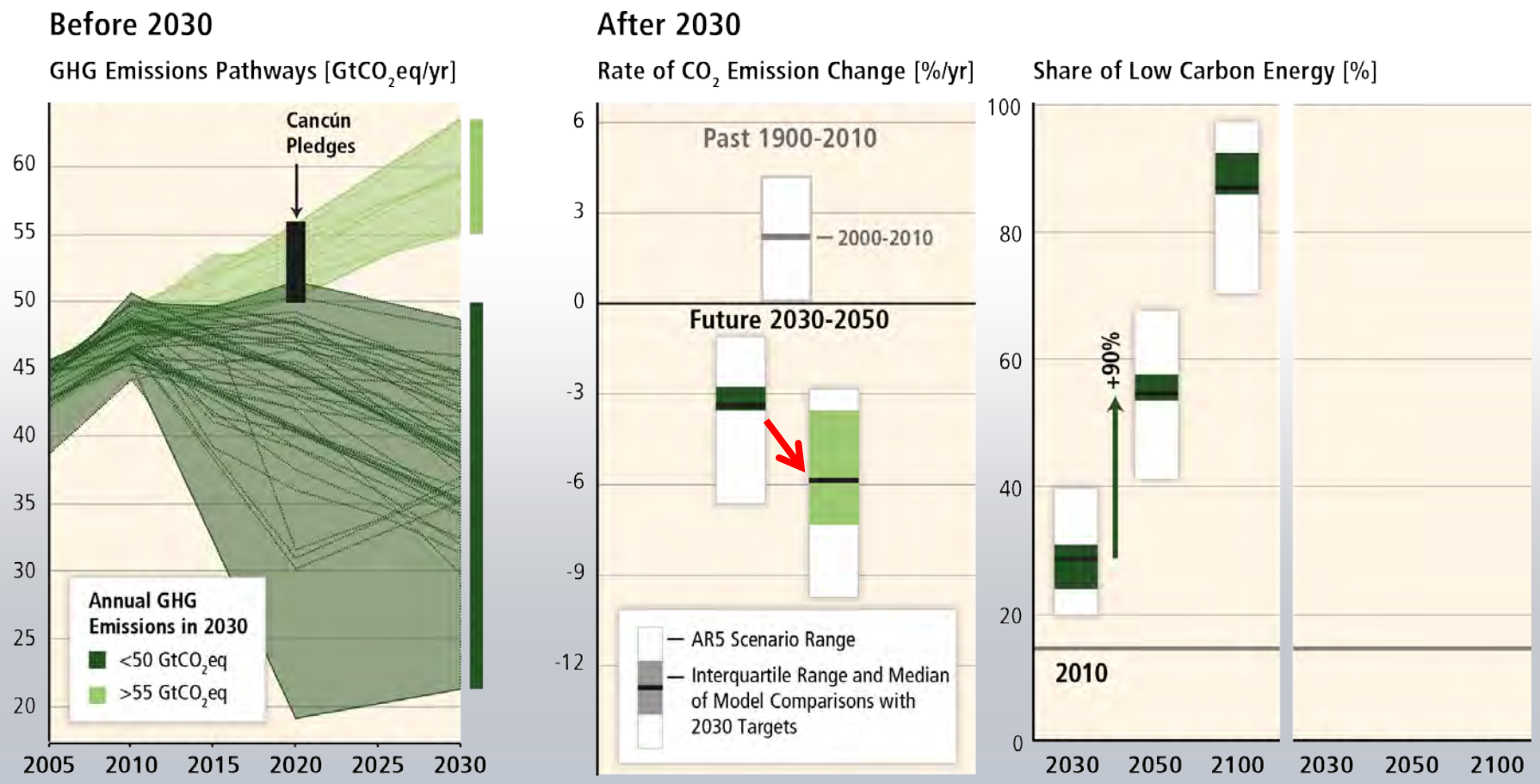

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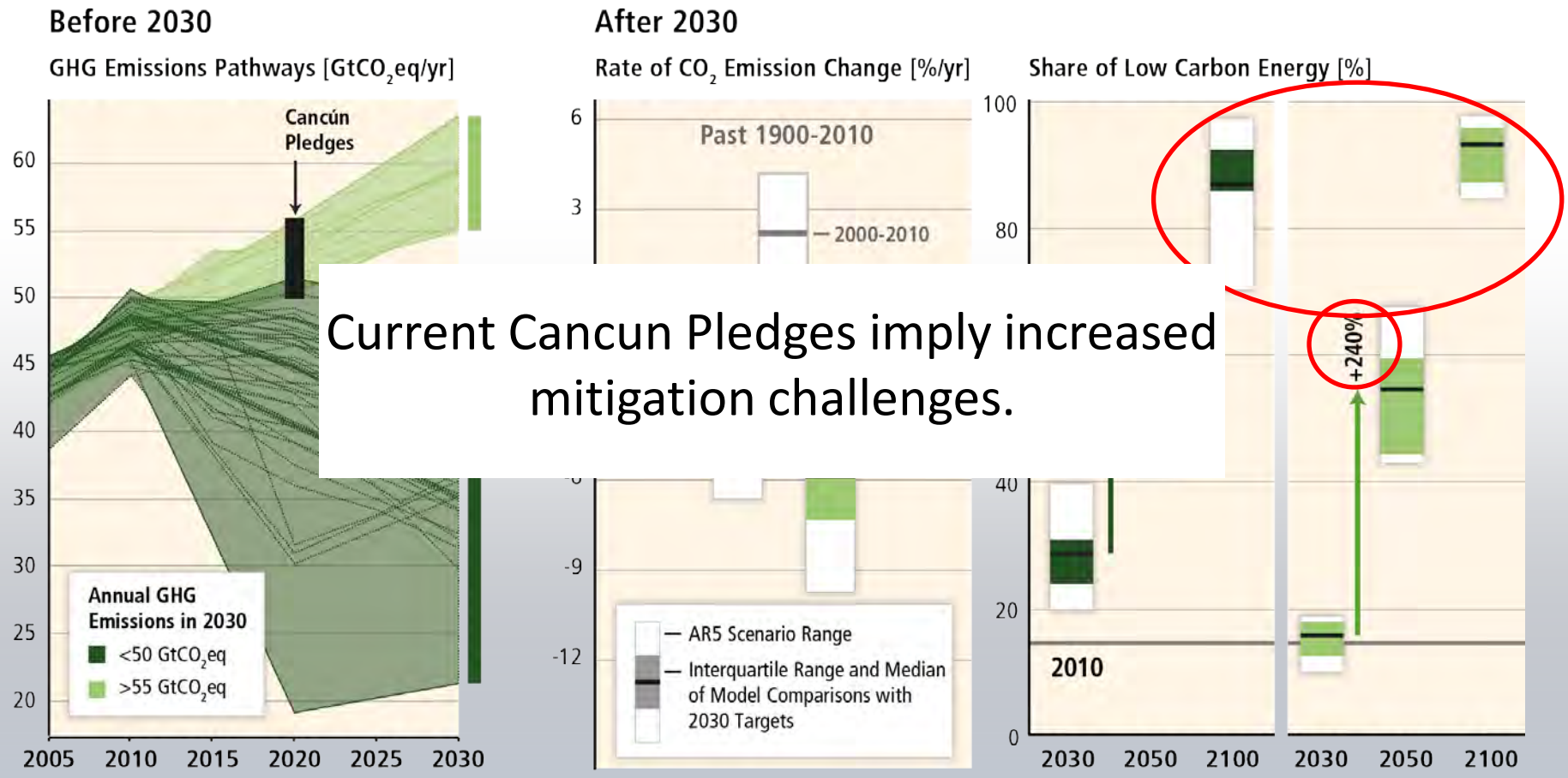


Current Cancun Pledges imply increased mitigation challenges.

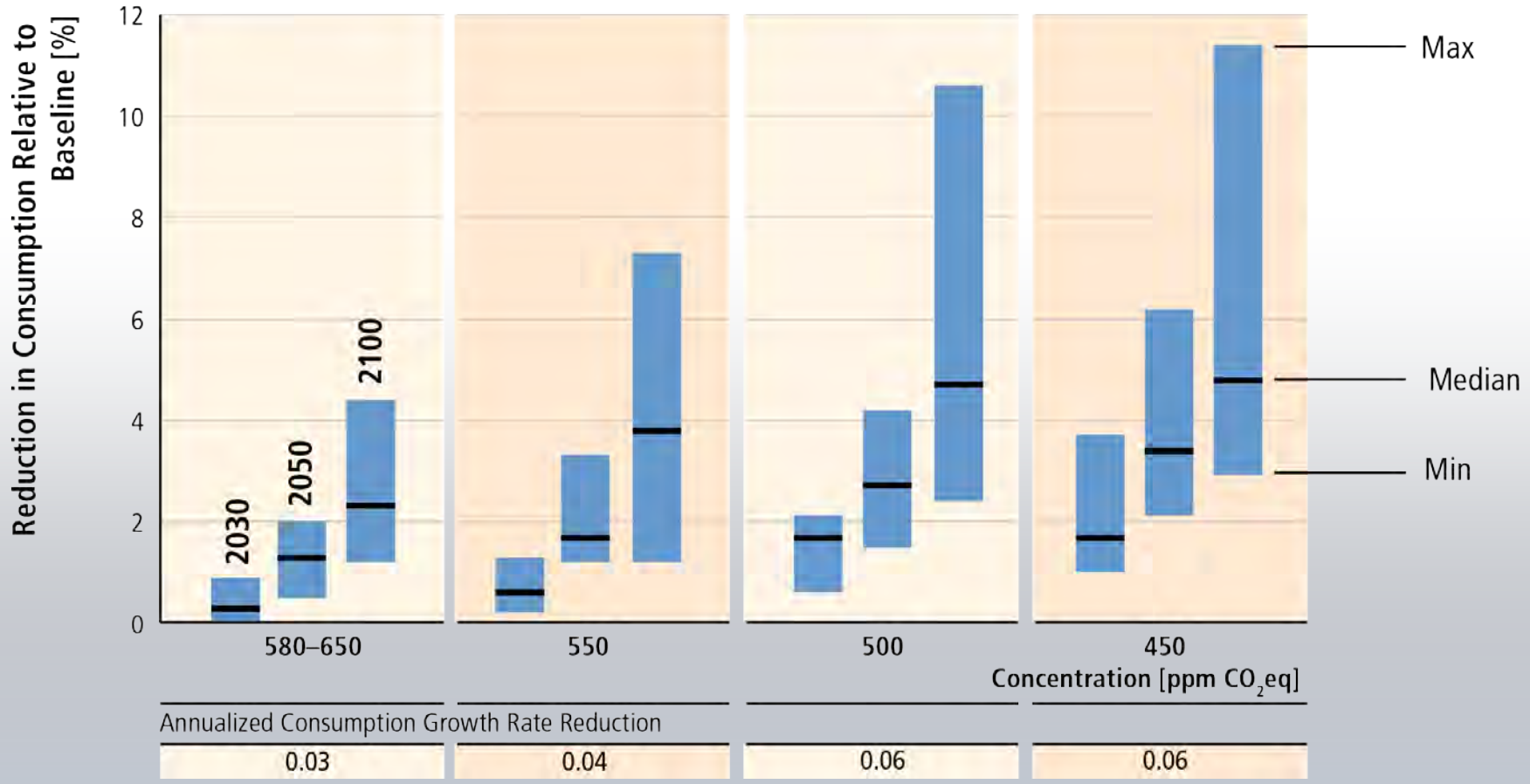
Scientific evidence on the 1.5°C goal remains limited.

A comprehensive assessment is difficult in the absence of multi-model comparison studies and the limited number of studies focusing on the 1.5°C goal. Existing studies indicate:

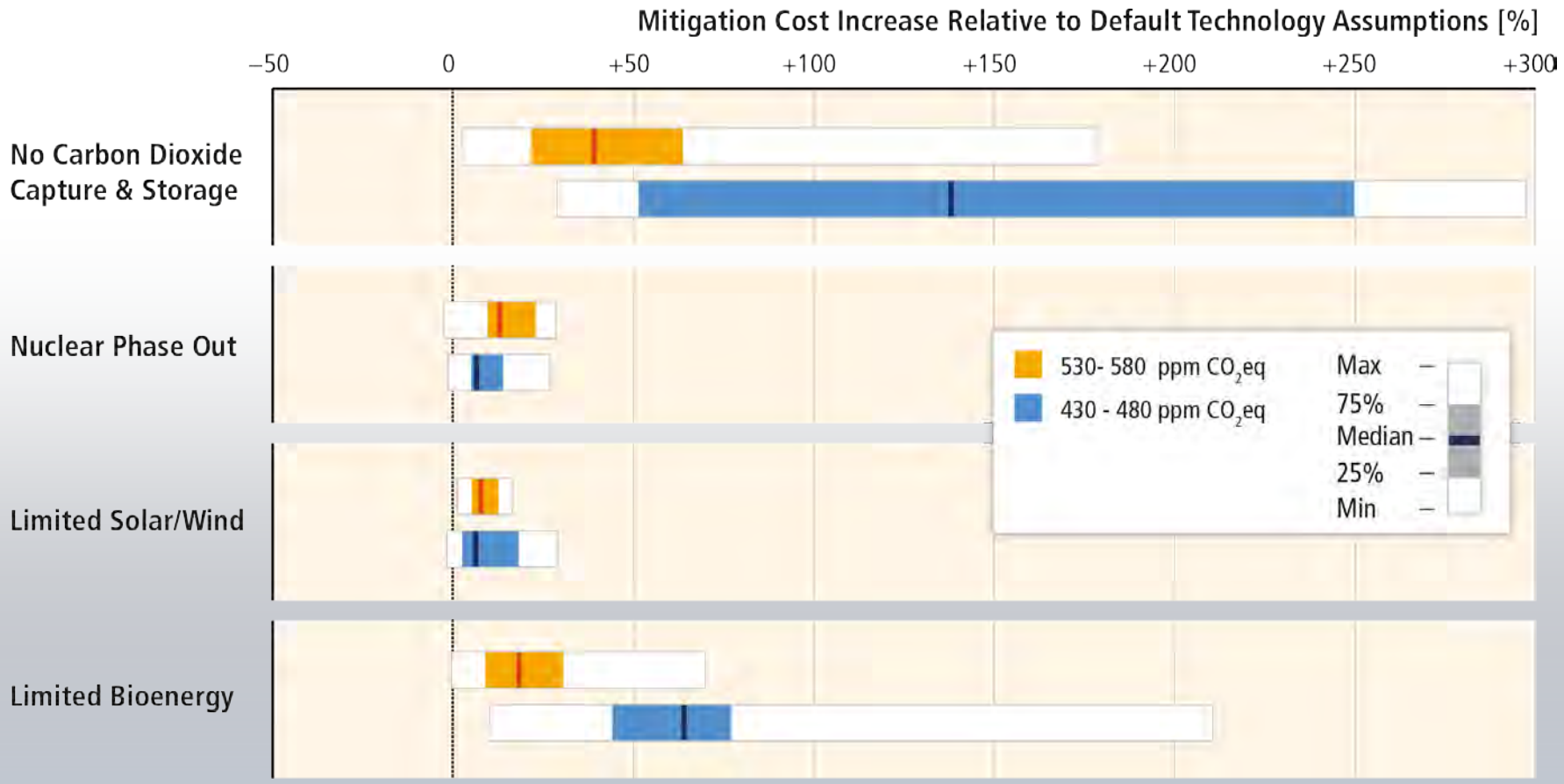
- Temperature overshoot and large scale application of carbon dioxide removal technologies
- Immediate mitigation action
- Rapid upscaling of the *full* set of technologies
- Development along a low energy demand pathway

Mitigation cost estimates vary, but global GDP growth is not strongly affected.

Global costs rise with the ambition of the mitigation goal.

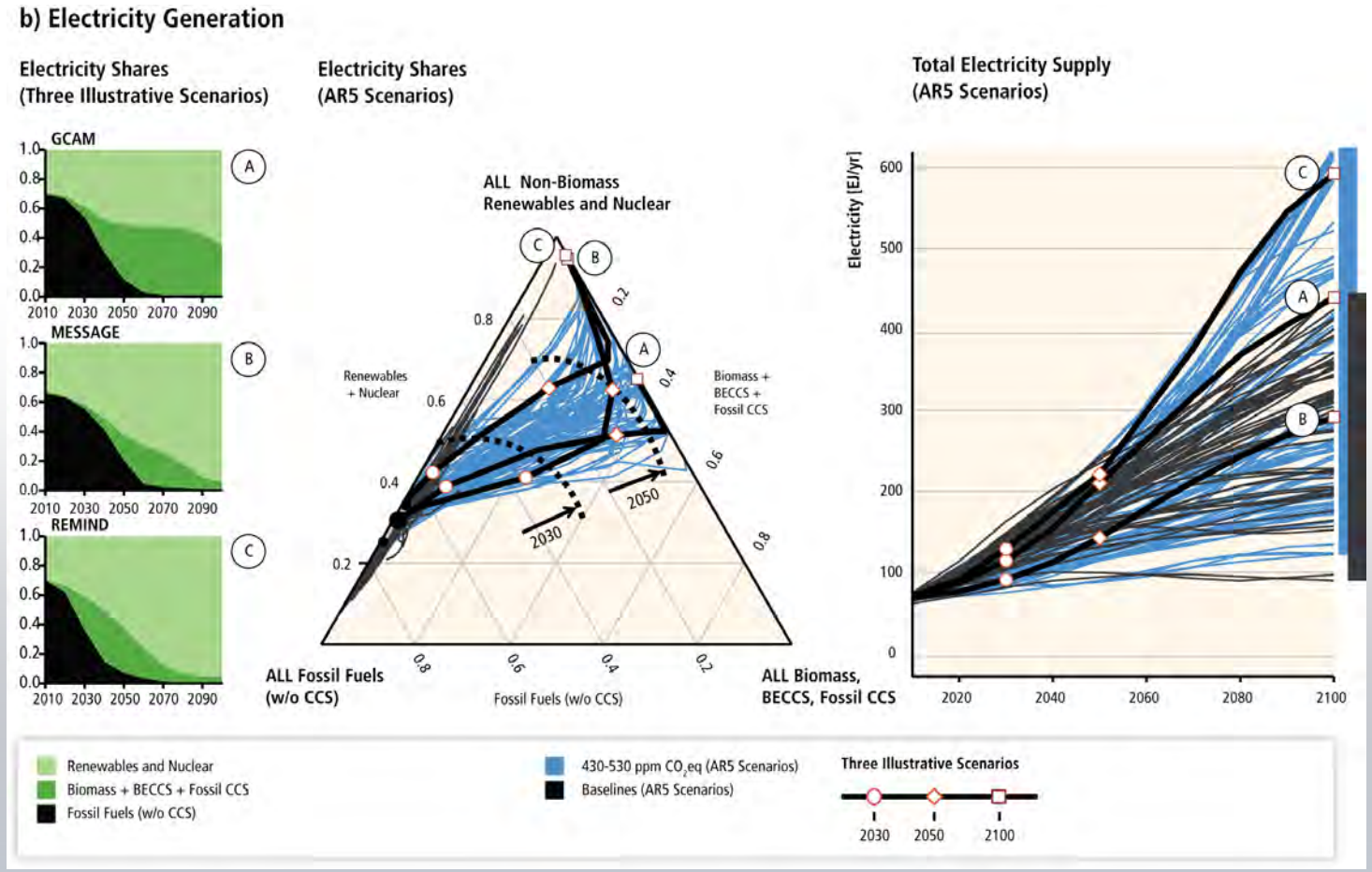


Limited availability of technologies can greatly increase mitigation costs.



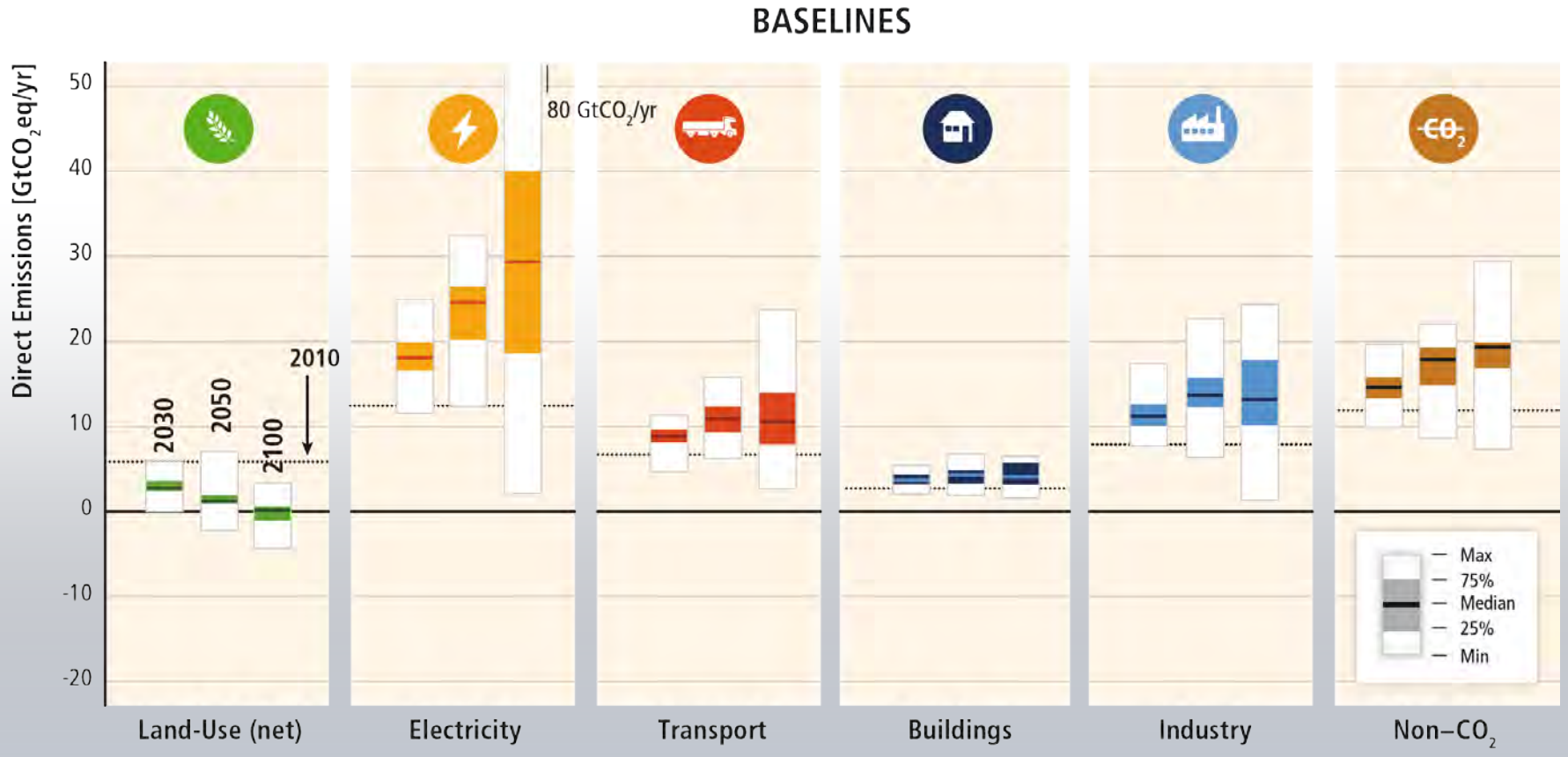

#3
What are the sectoral and technological options for reducing GHG emissions?

In low CO_2 concentration stabilization scenarios, fossil fuel use without CCS is phased out in the long-term.



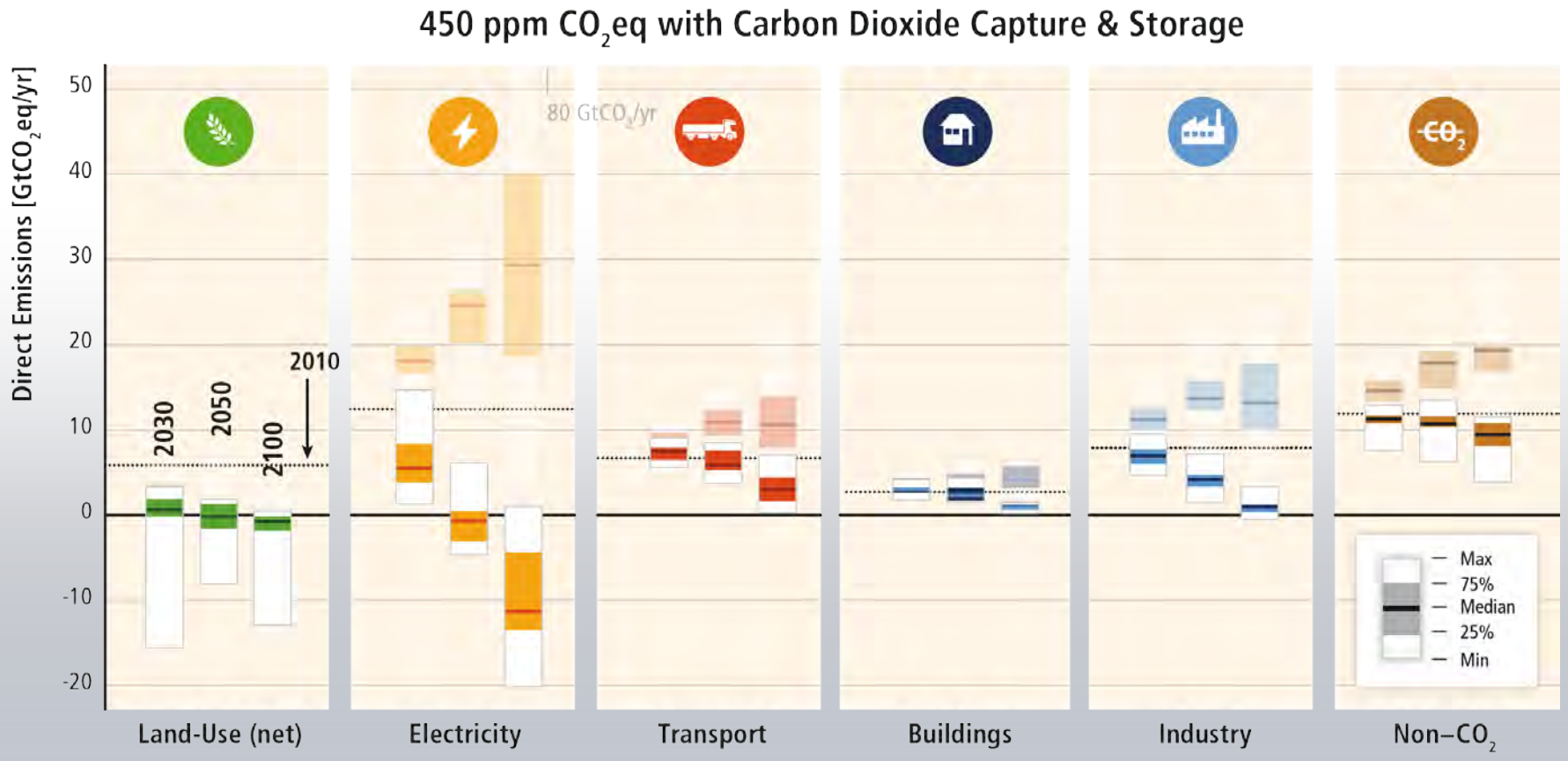
Based on Figure 7.15b

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



Based on Figure TS.17

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

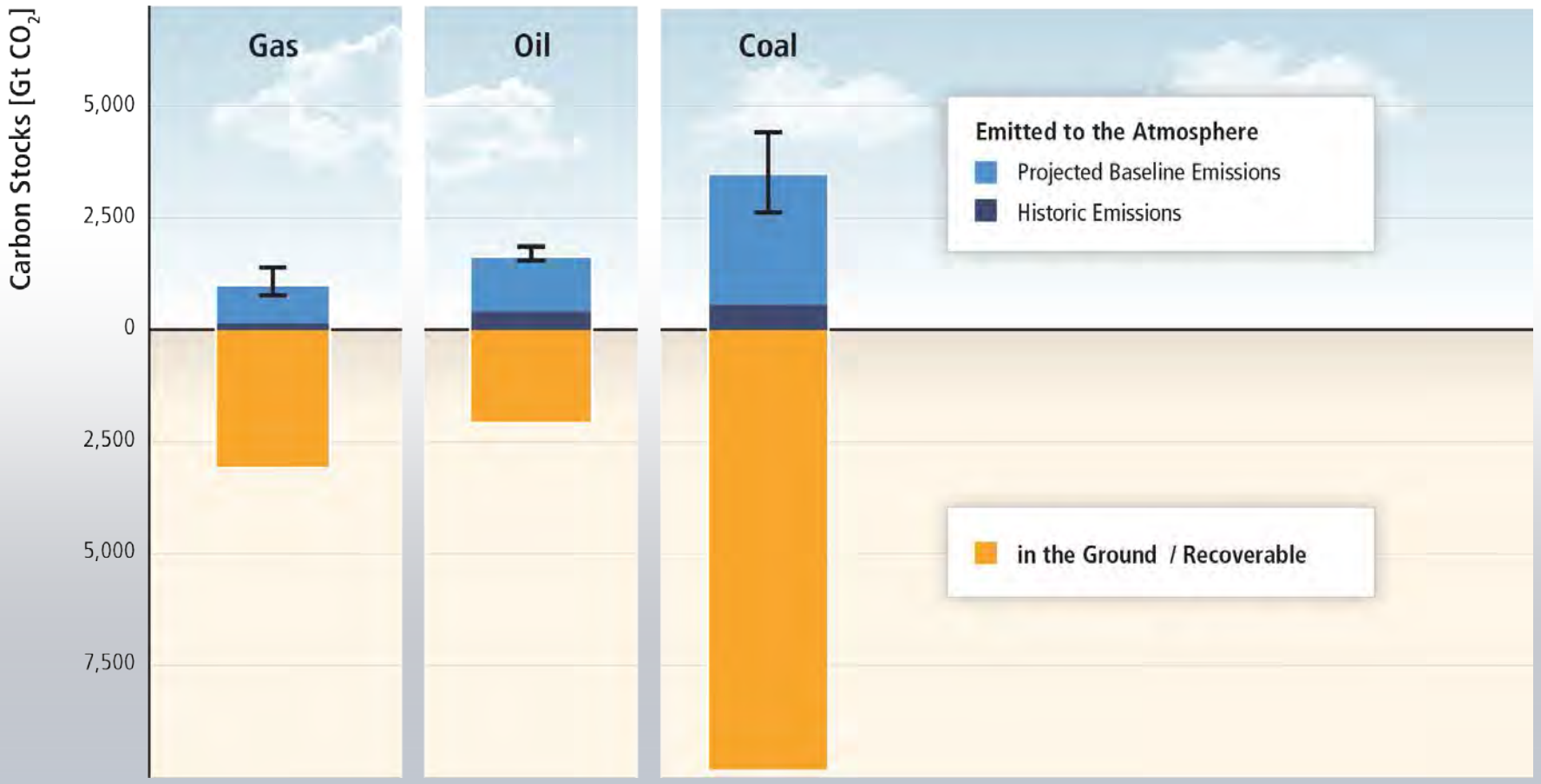


Based on Figure TS.17

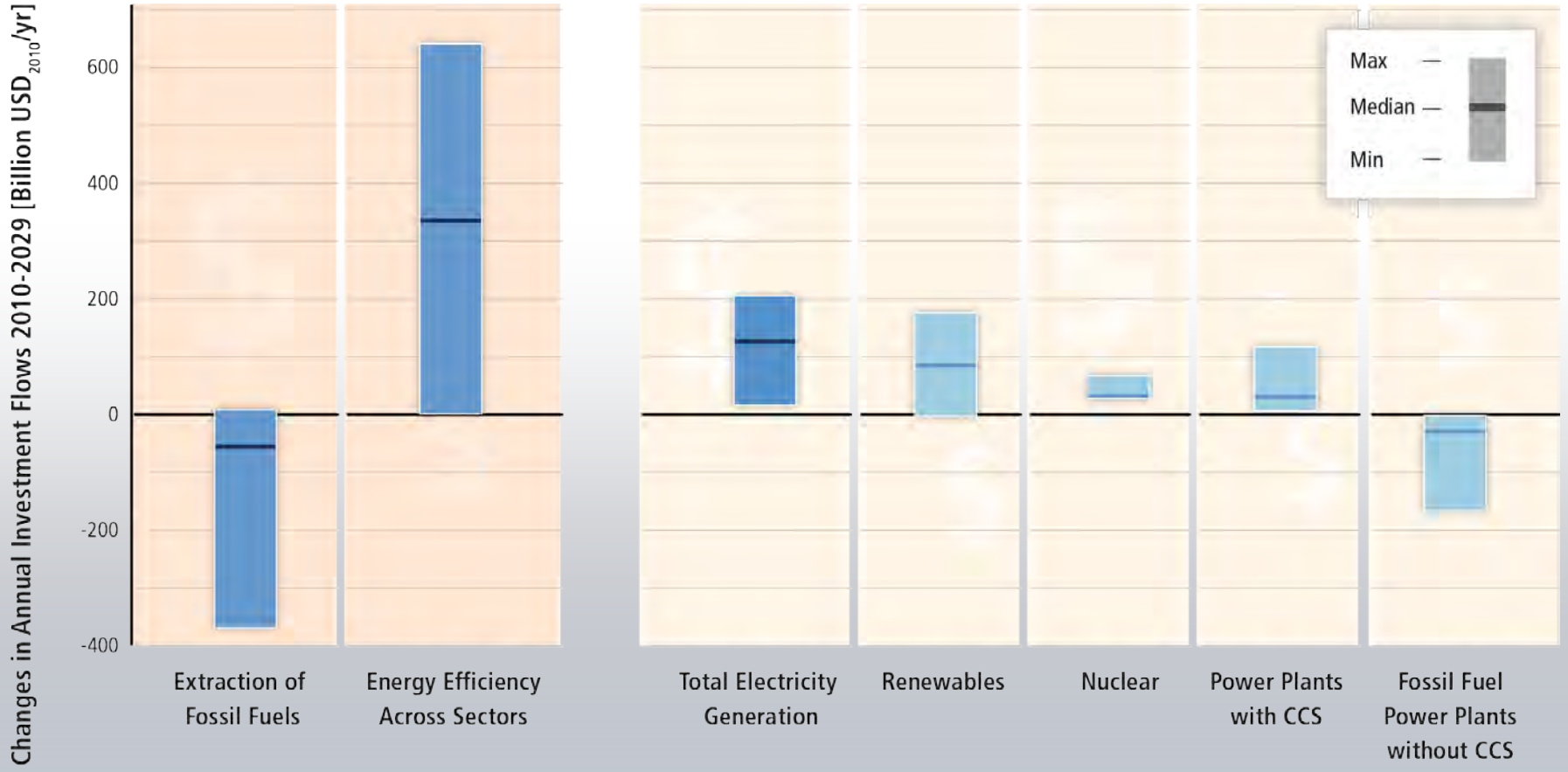

#4
What is the role of international cooperation and national policies in reaching mitigation goals?

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

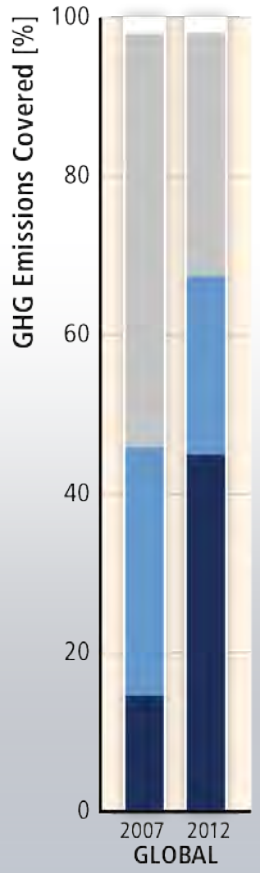
There is far more carbon in the ground than emitted in any baseline scenario.

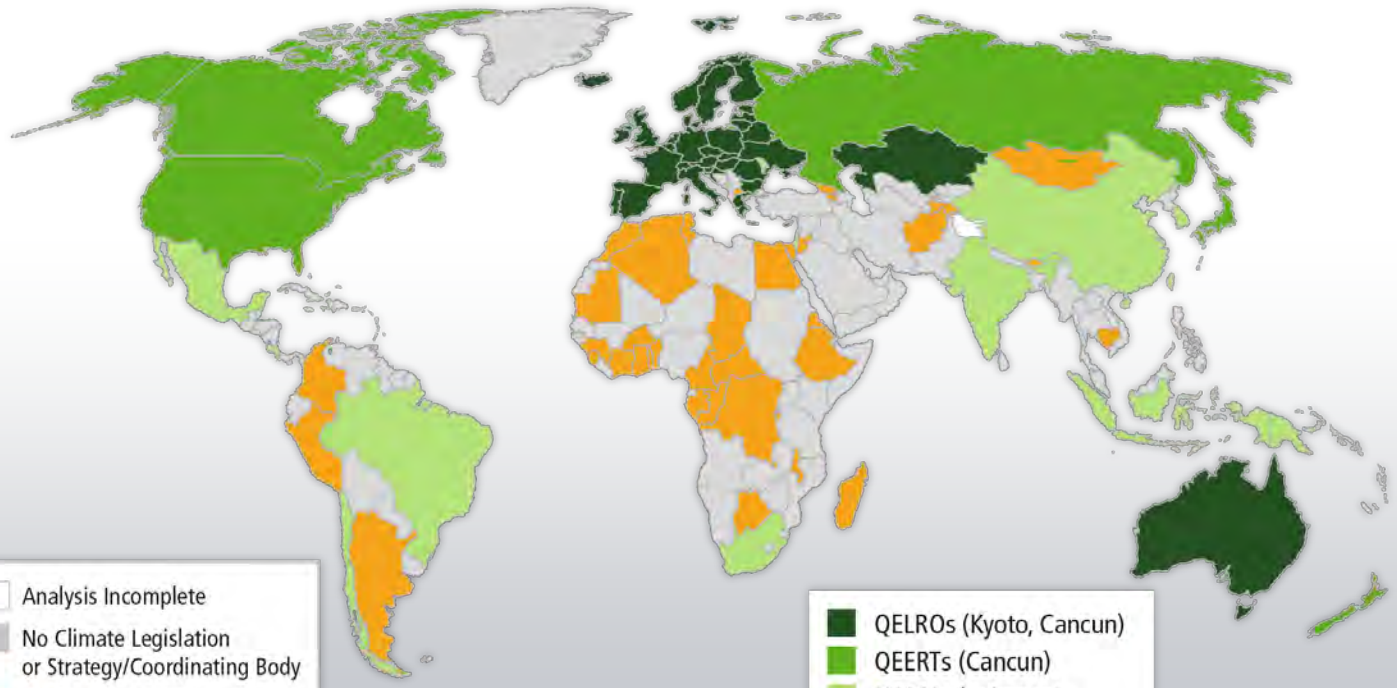


Substantial reductions in emissions would require substantial changes in investment patterns.



The number of climate change policies at the national and international level is growing. So far, these policies have not influenced the emission trend significantly.





Examples of the performance of emission taxes

UK Climate Change Levy: 10% tax on electricity use

- Electricity use reduction >22% at plants subject to the levy compared to plants with voluntary agreement
- No evidence of detrimental effect on the economy or migration of industry

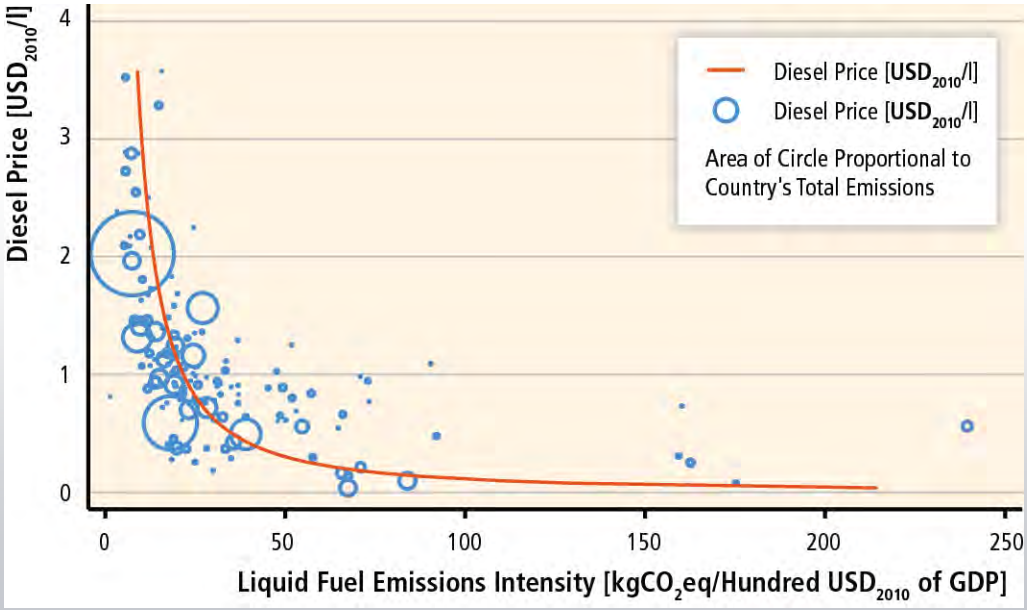
Swedish carbon tax

- Reductions in carbon intensity of GDP of 40%

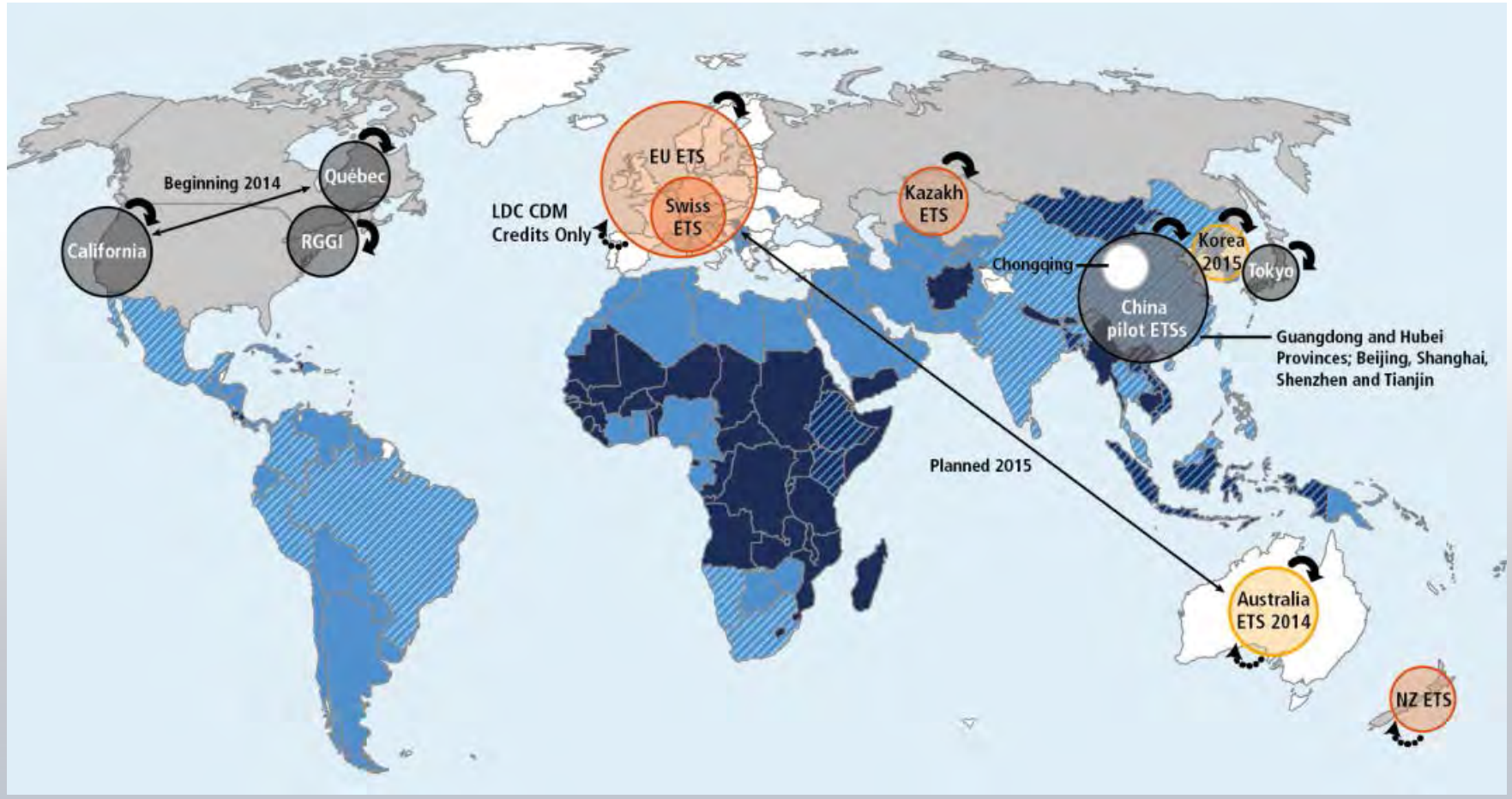
Examples of the performance of emission taxes

Fuel taxes

- In the long run 10% higher fuel prices will lead to a roughly 7% reduction in fuel use and emissions
- OECD could have decreased fuel use by more than 35% if all member countries had chosen taxes as high as in the UK



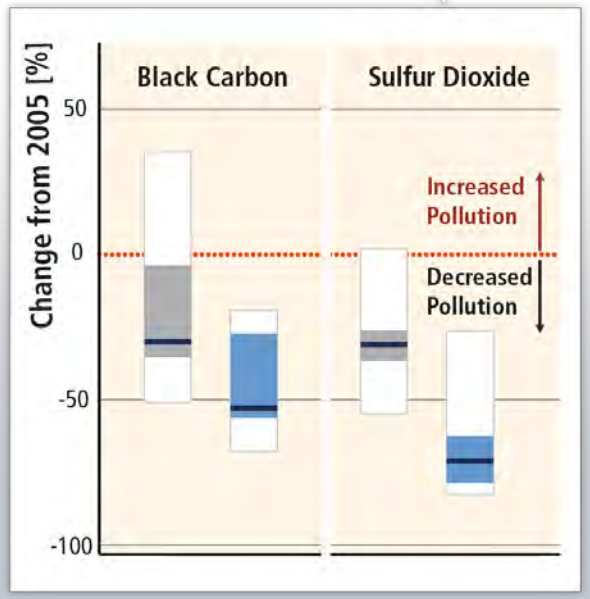
Regions are starting to cooperate.

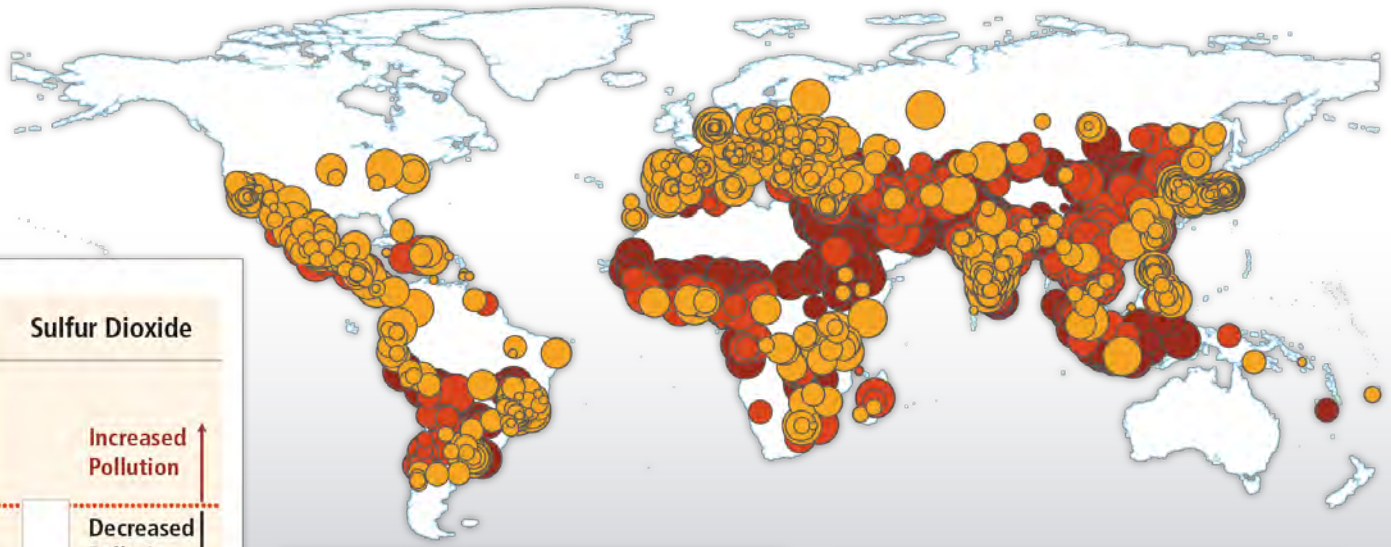


International climate policy is only slowly taking shape.

- The UNFCCC regime is the only platform with broad legitimacy.
- Cooperation outside the UNFCCC has increased but except for the Montreal Protocol did not lead to significant emissions reduction.
- The Kyoto Protocol was less successful than envisaged.
  - The emissions commitments were reached, benefitting from economic changes in countries in transition.
  - The market mechanisms have mobilized low-cost mitigation, whose additionality is however debated.

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





Impact of Mitigation Policy on Emissions of Air Pollutants (2005-2050)

- Baseline
- Stringent Climate Policy
- Max
- 75%
- Median
- 25%
- Min

Polution

- Medium
- High
- Very High

Exposure

- Low
- High

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