ipcc
INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014

Mitigation of Climate Change

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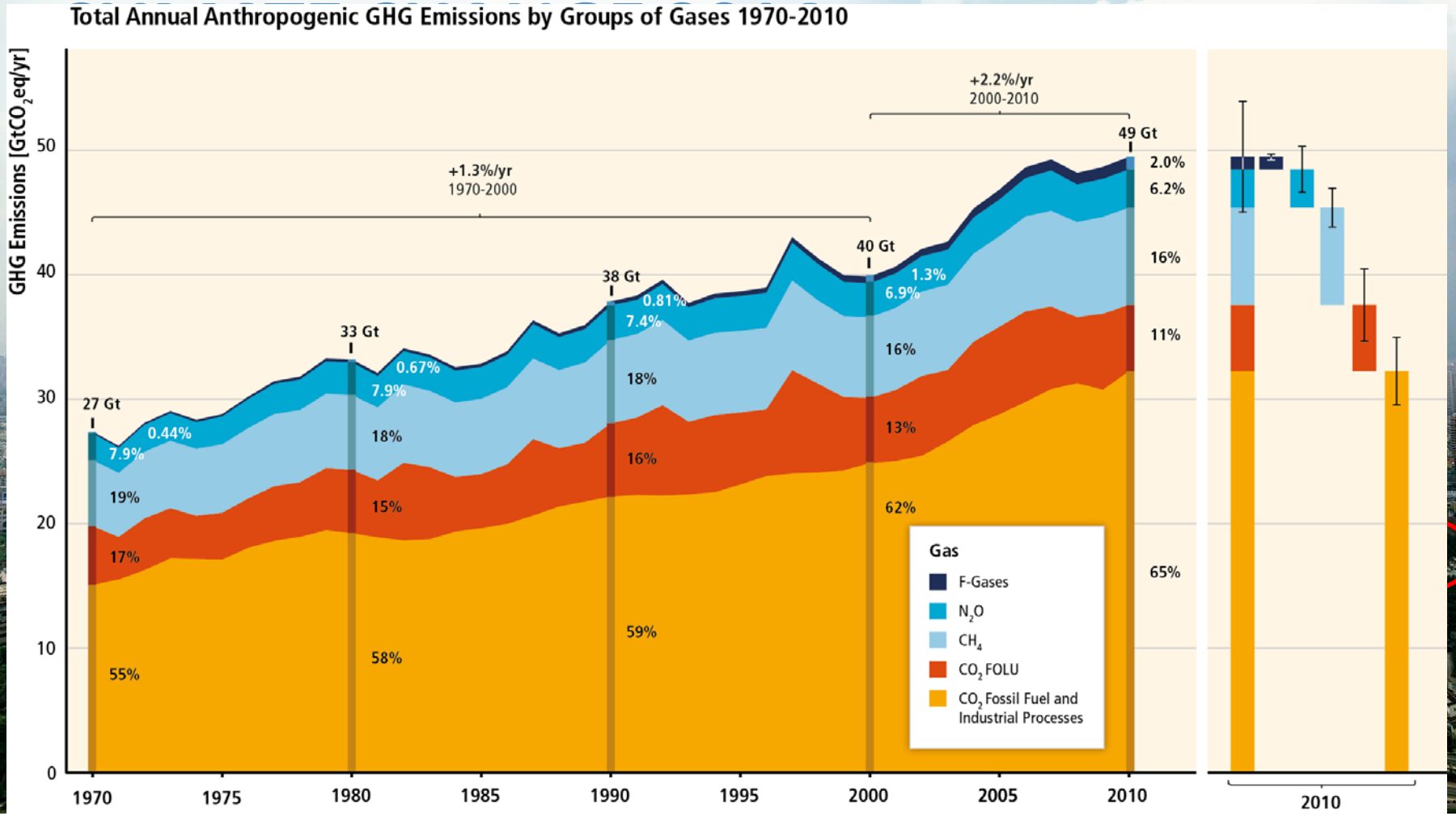
Working Group III contribution to the
IPCC Fifth Assessment Report

WMO UNEP

Outline

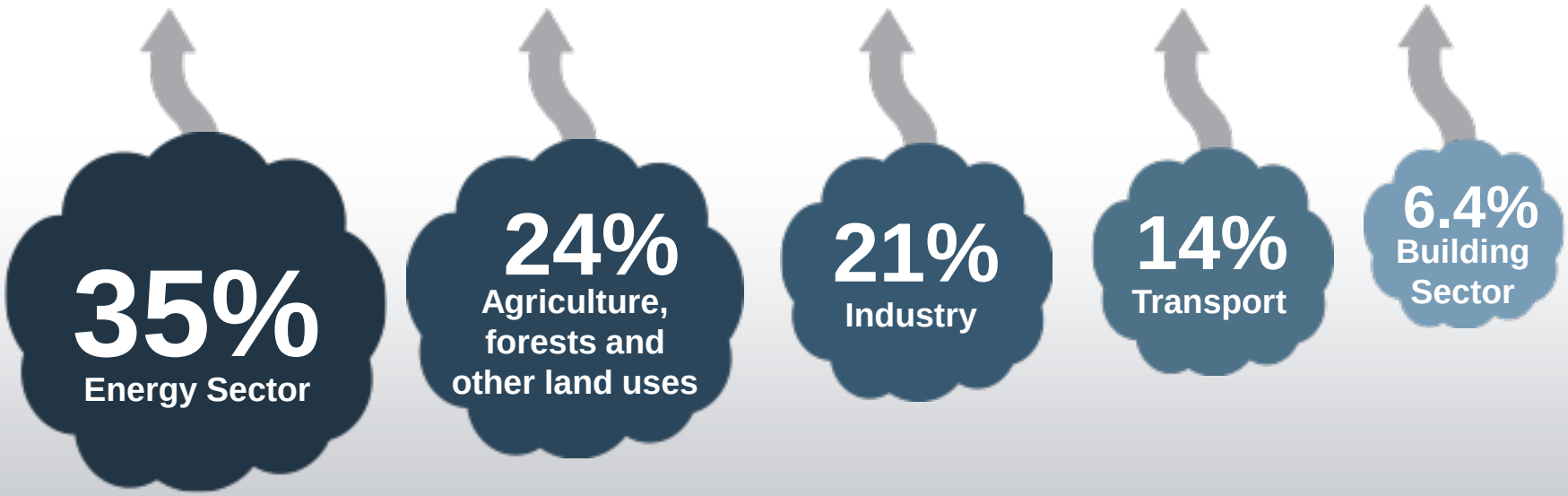
- Mitigation pathways
- Mitigation opportunities in energy
- Energy access

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



Sources of emissions

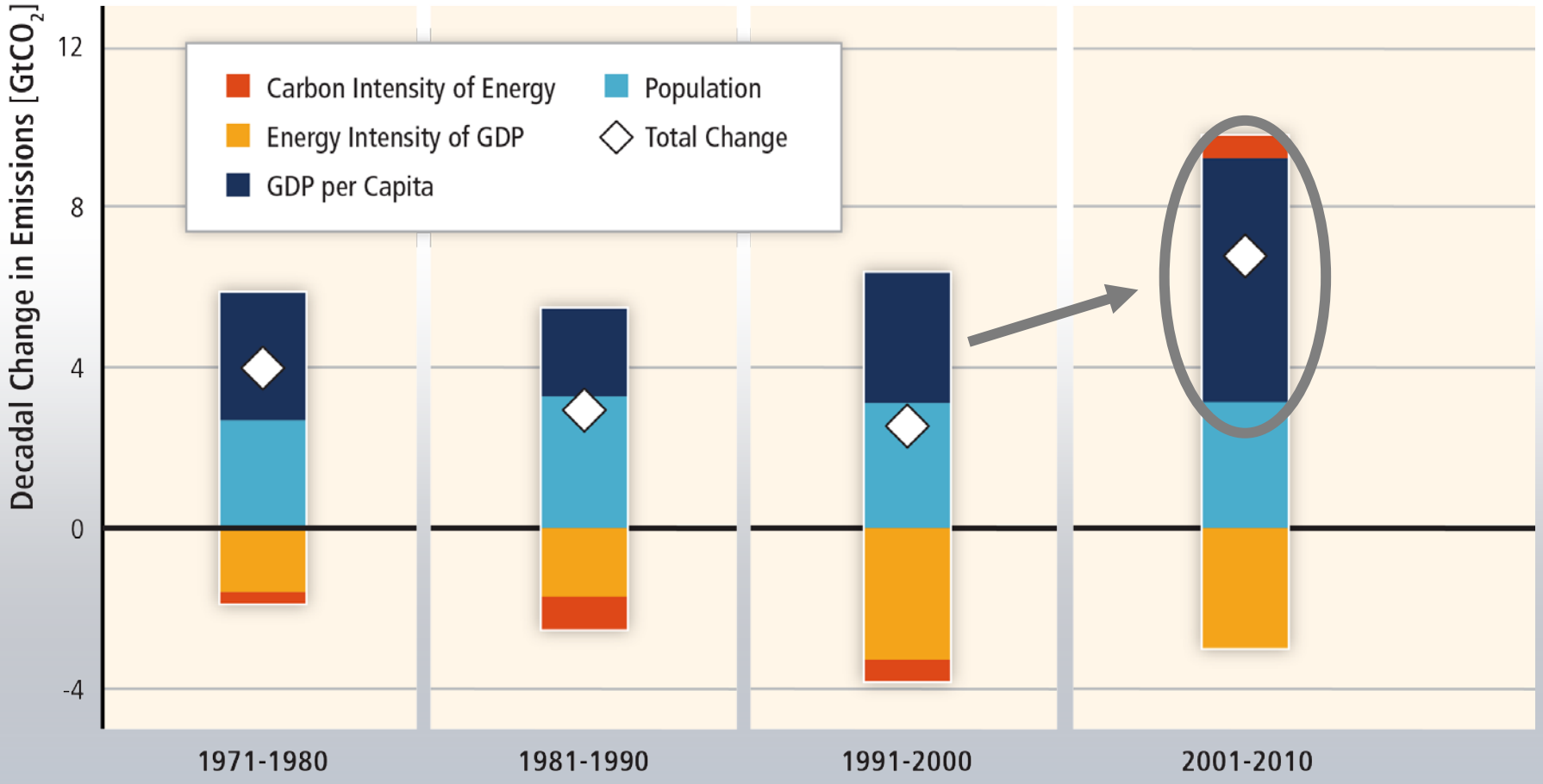
Energy production remains the primary driver of GHG emissions



2010 GHG emissions

AR5 WGIII SPM

GHG emissions rise with growth in GDP and population; long-standing trend of decarbonisation of energy reversed.

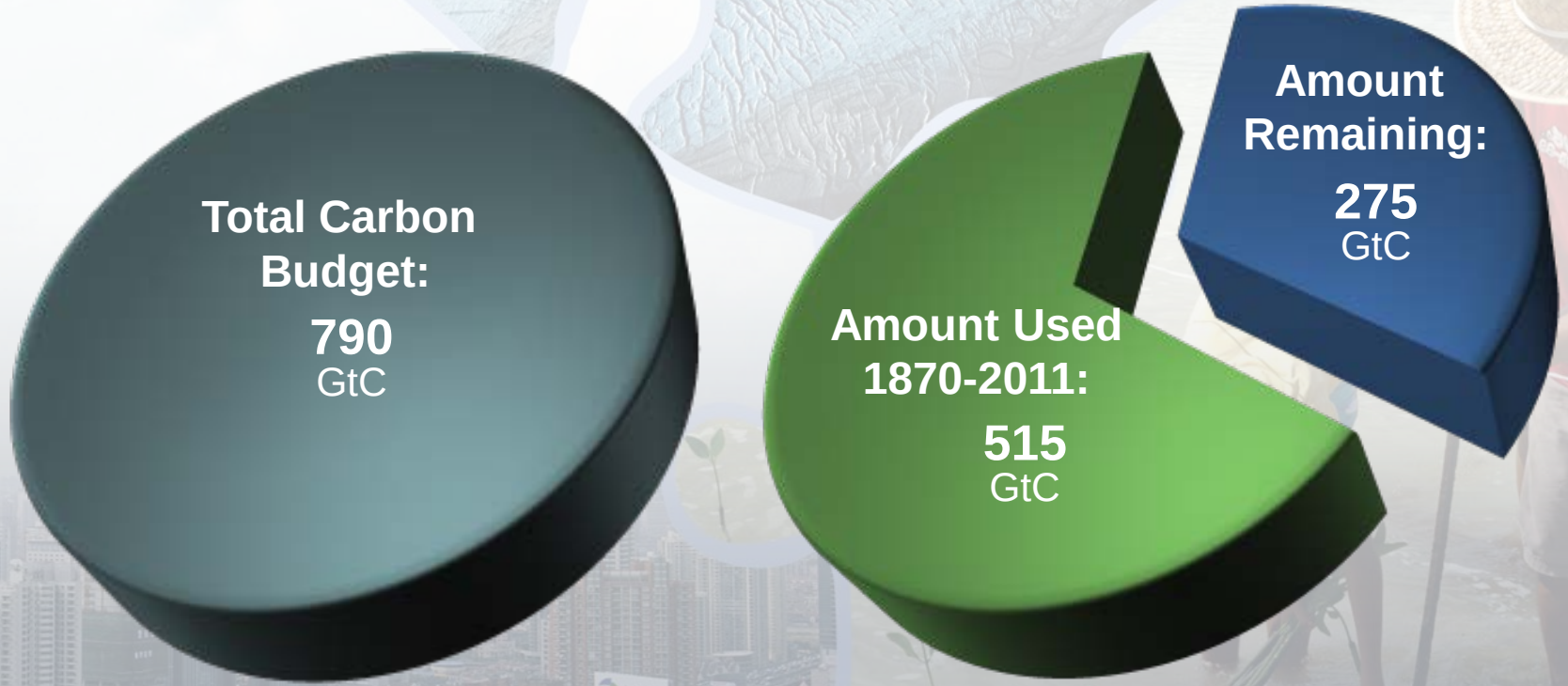


Based on Figure 1.7

Limiting warming to 2°C involves substantial technological, economic and institutional challenges.

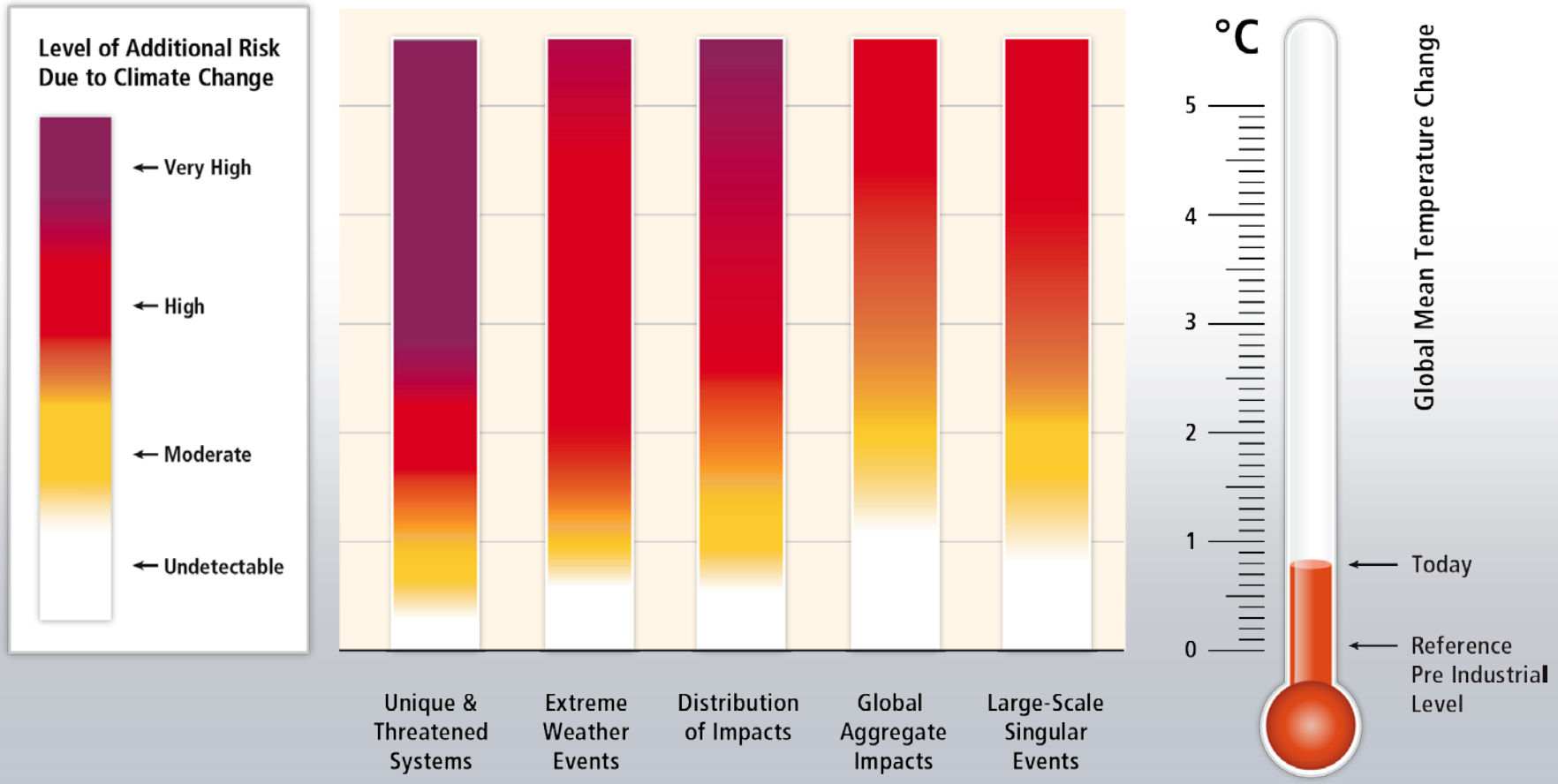
The window for action is rapidly closing

65% of our carbon budget compatible with a 2°C goal already used



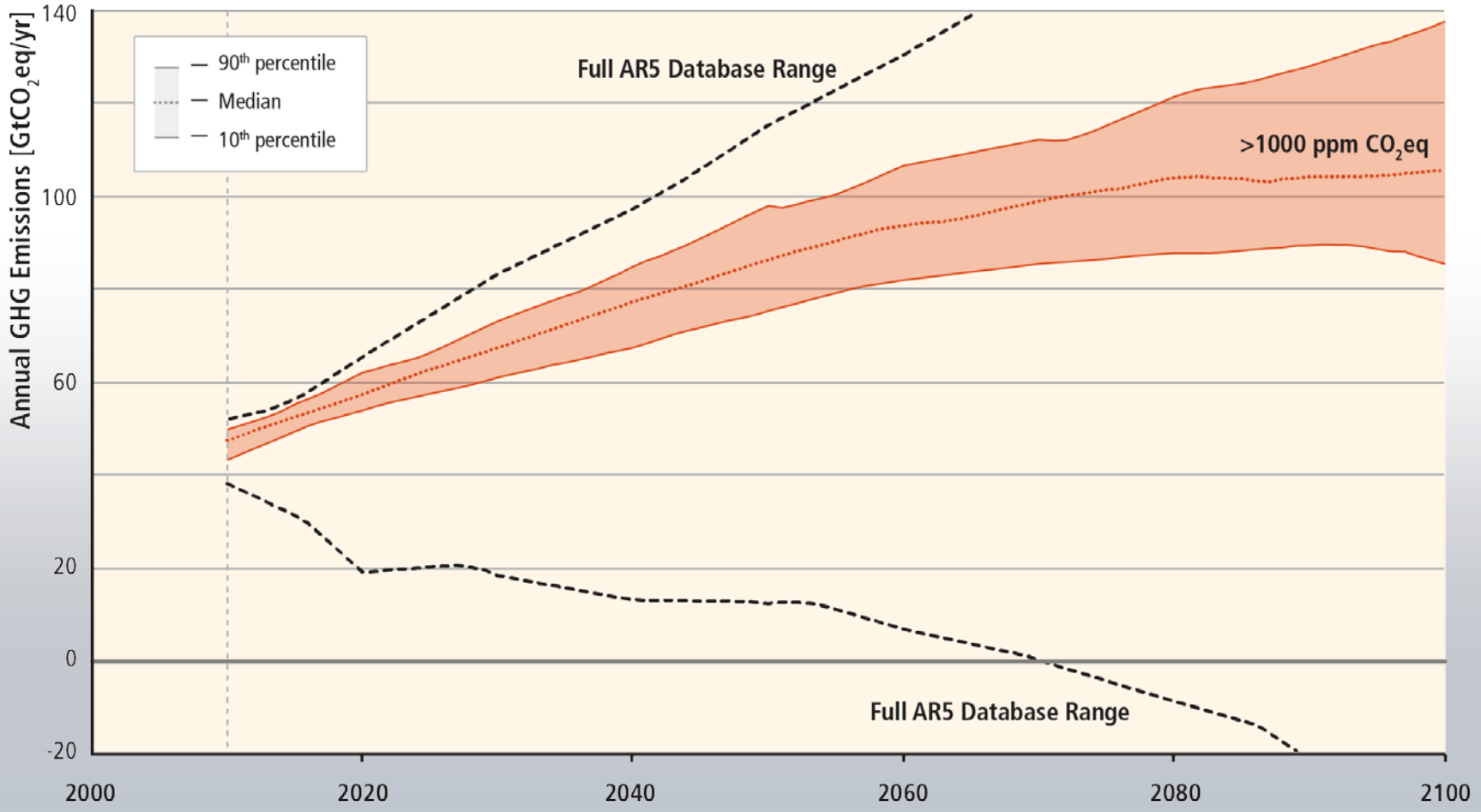
AR5 WGI SPM

Without additional mitigation, global mean surface temperature is projected to increase by 3.7 to 4.8°C over the 21st century.



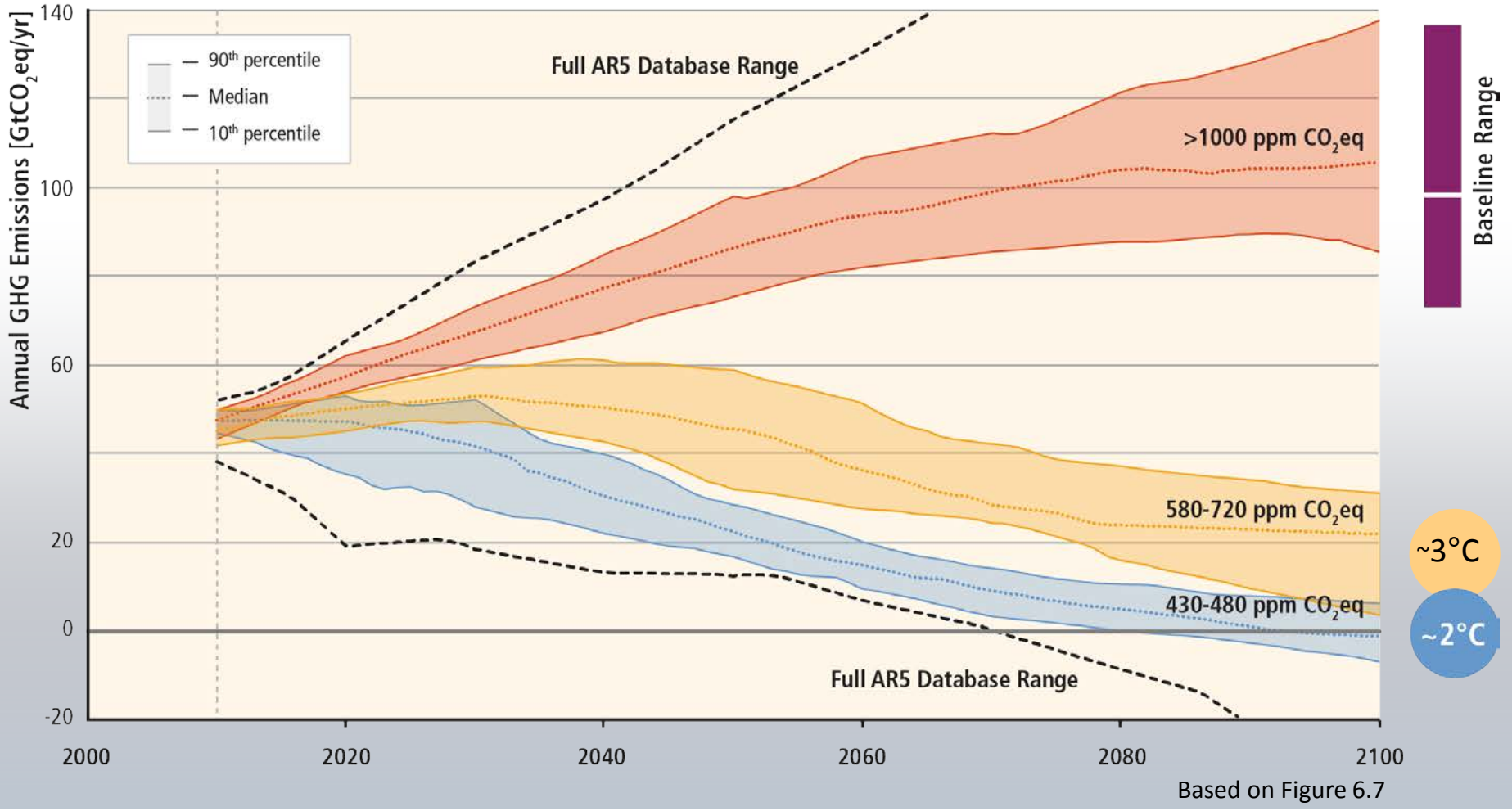
Based on WGII AR5 Figure 19.4

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



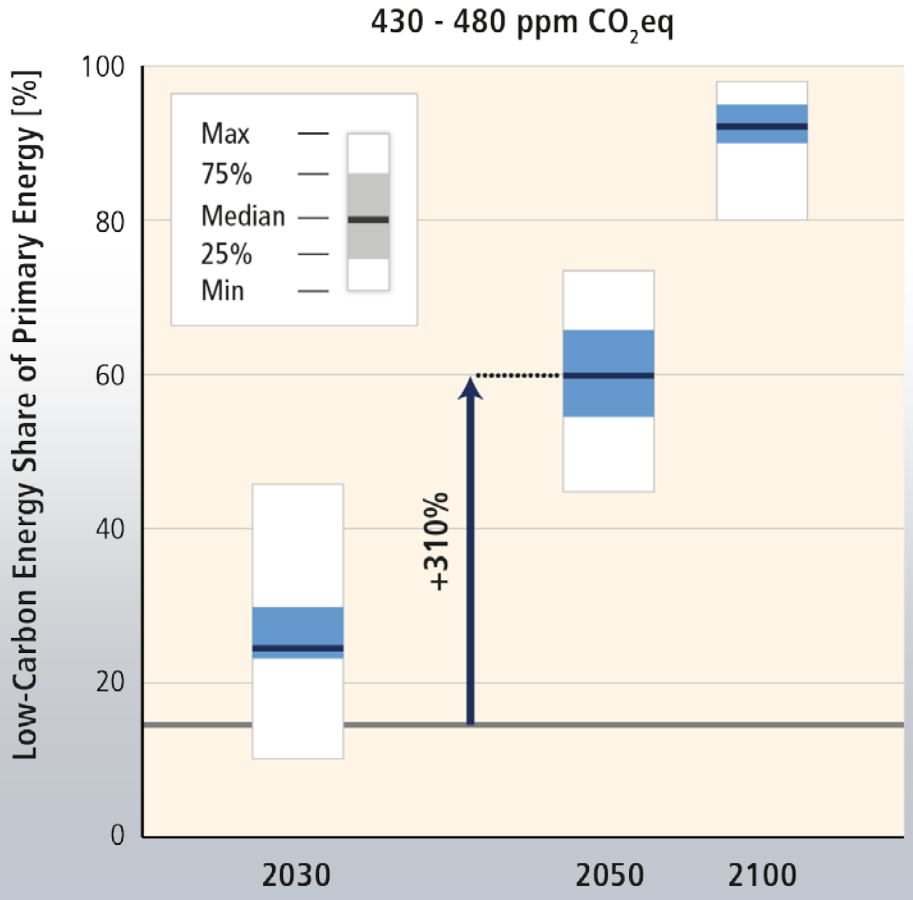
Based on Figure 6.7

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



Based on Figure 6.7

Mitigation involves substantial upscaling of low-carbon energy.



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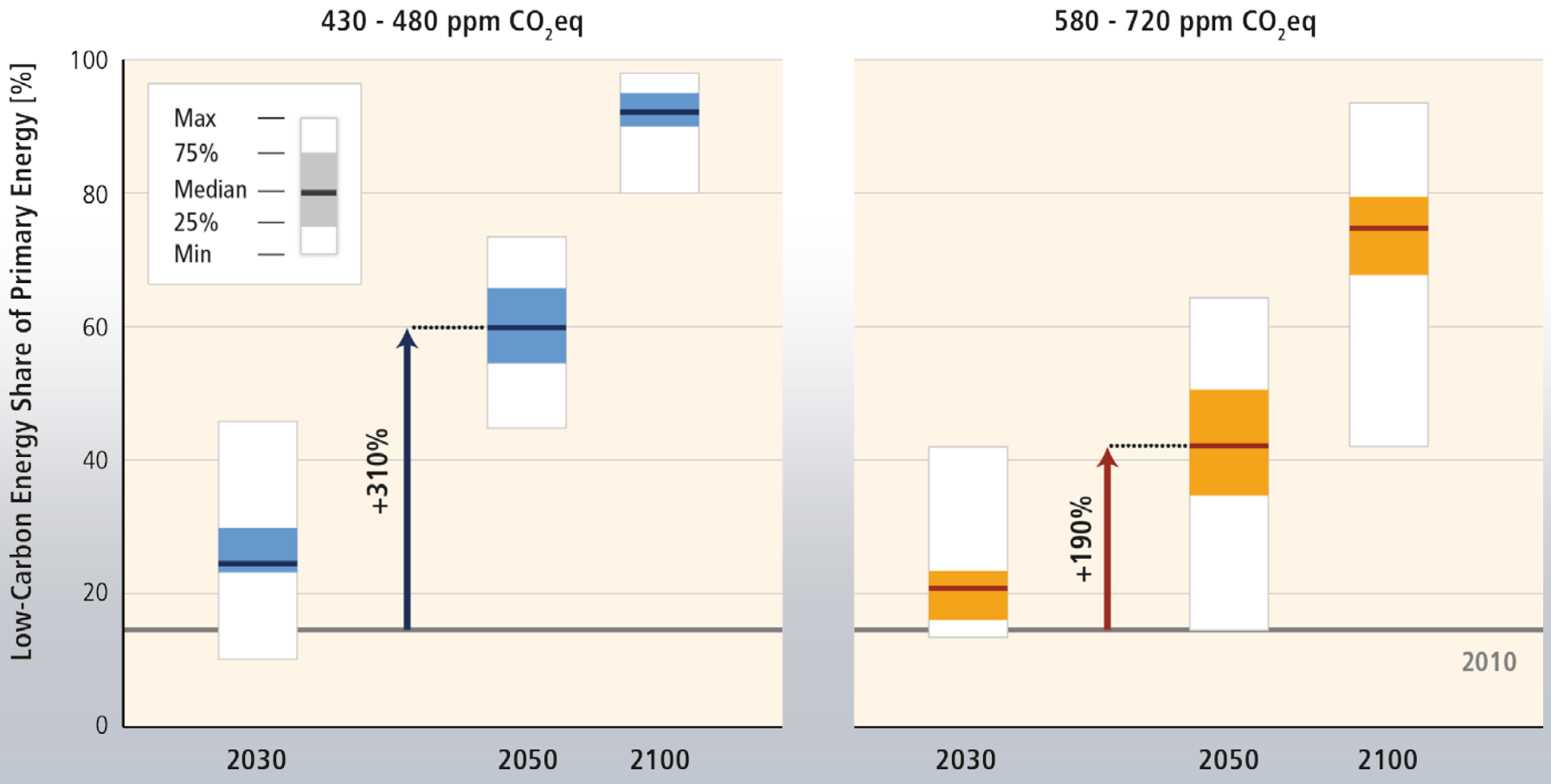
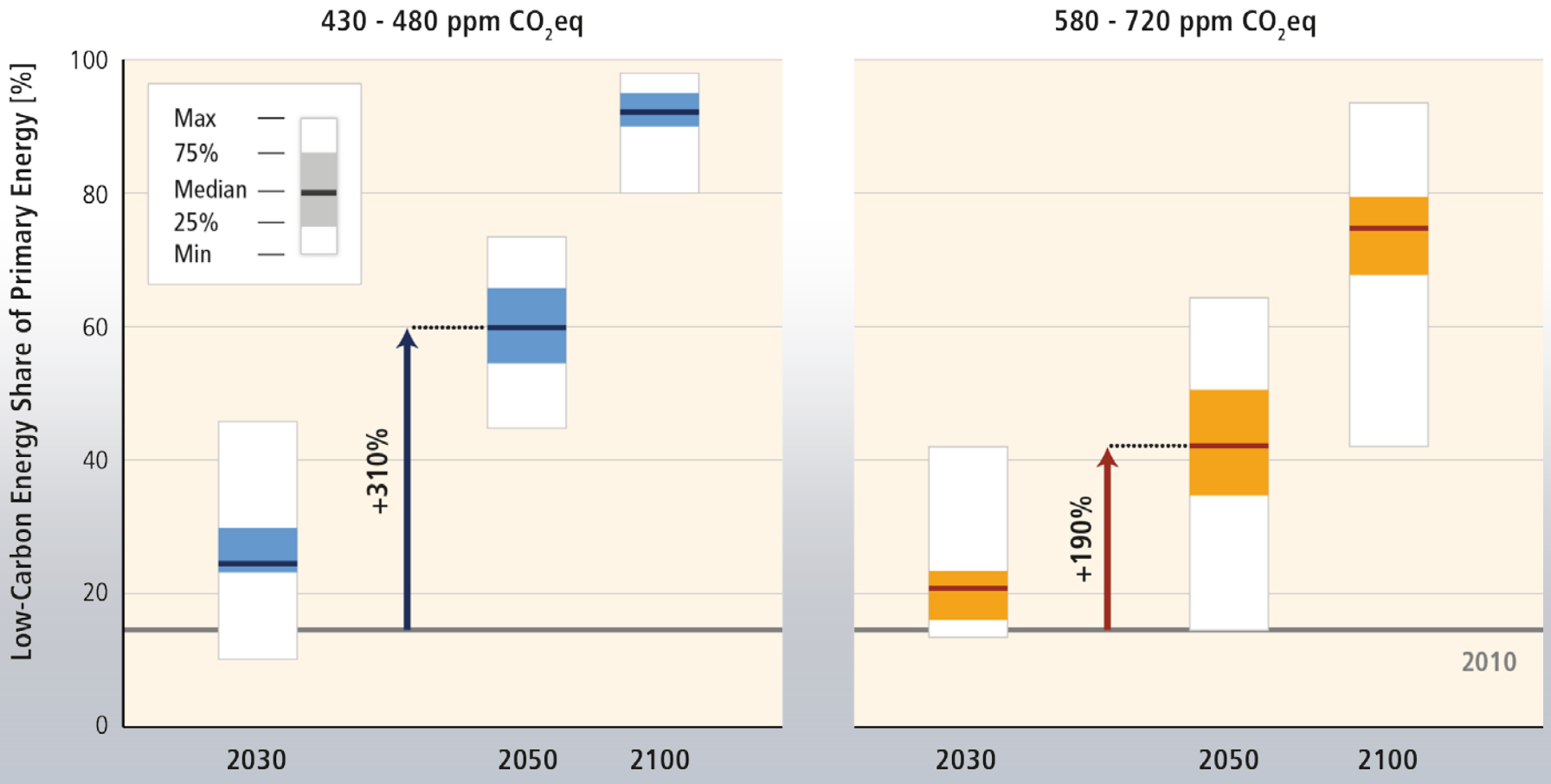


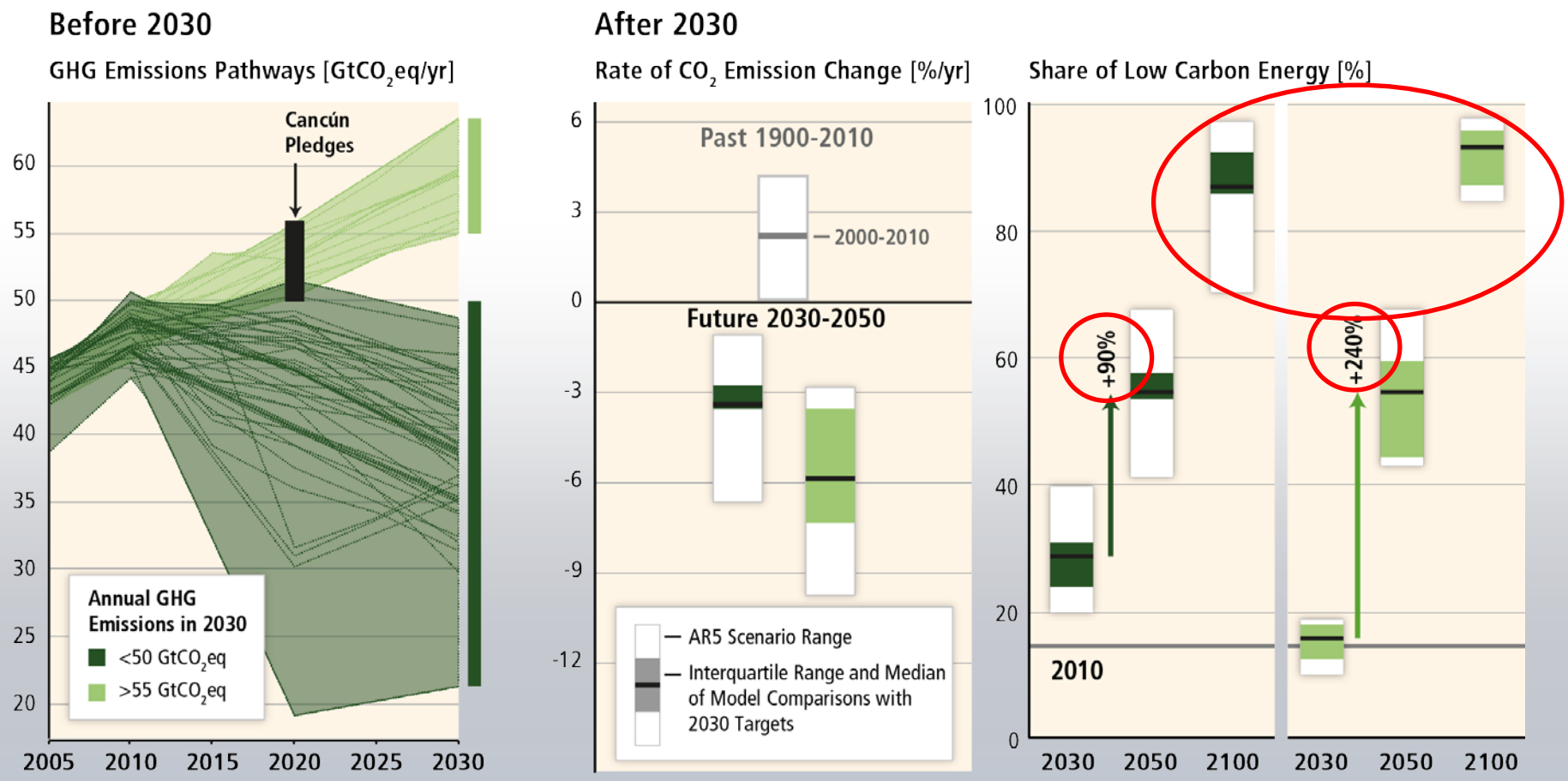
Based on Figure 7.16

Mitigation involves substantial upscaling of low-carbon energy.



Based on Figure 7.16

Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.



Based on Figures 6.32 and 7.16

Mitigation opportunities in the energy sector

- Decarbonization of electricity generation – key strategy to achieve low stabilization levels (30% to 80% share)
- Renewable energy technologies – improvements, cost reductions, & growing number of RETs are mature techs
- Nuclear energy could make an increasing contribution to low-carbon energy supply, but a barriers and risks exist
- Replacement of world average coal-fired power plants with modern natural gas combined-cycle power plants
- CCS and BECCS, but entail challenges and risks
- Bioenergy – significant potential for mitigation, but also risks

Based on Figure 7.16

Mitigation opportunities in the energy end-use sectors

Industry

- Wide-scale upgrading and innovation
- Replacement and deployment of best available technologies
- Information programmes to promote energy efficiency
- Efficiency in material use, recycling and waste reduction
- Collaborative approaches across companies and sectors

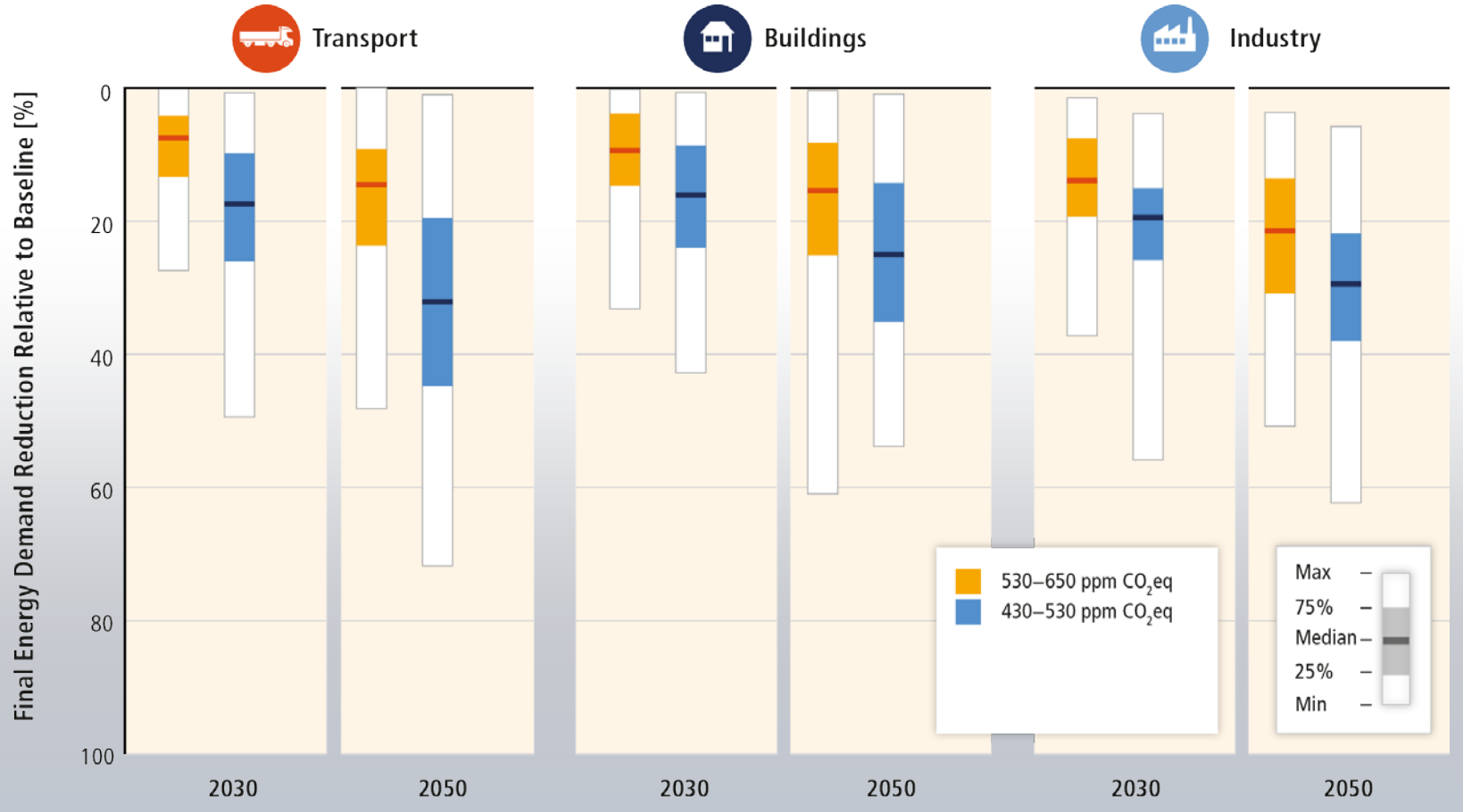
Transport

- Technical and behavioral mitigation measures (energy efficiency and vehicle performance improvements)
- Infrastructure and urban redevelopment investments (more compact urban form that supports cycling and walking, high-speed rail systems)

Buildings

- Adoption of very low building codes for new buildings
- Retrofits for existing buildings
- Lifestyle, culture and behavior influence energy consumption in buildings

Reducing energy demand through efficiency enhancements and behavioural changes are a key mitigation strategy.



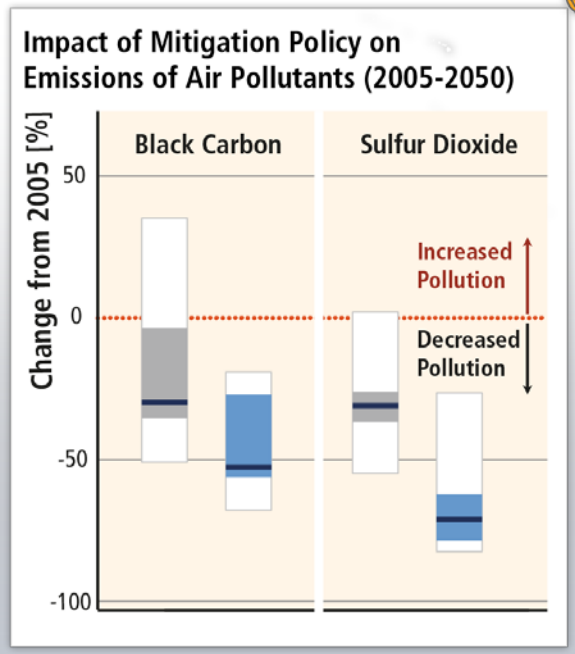
Based on Figure 6.37

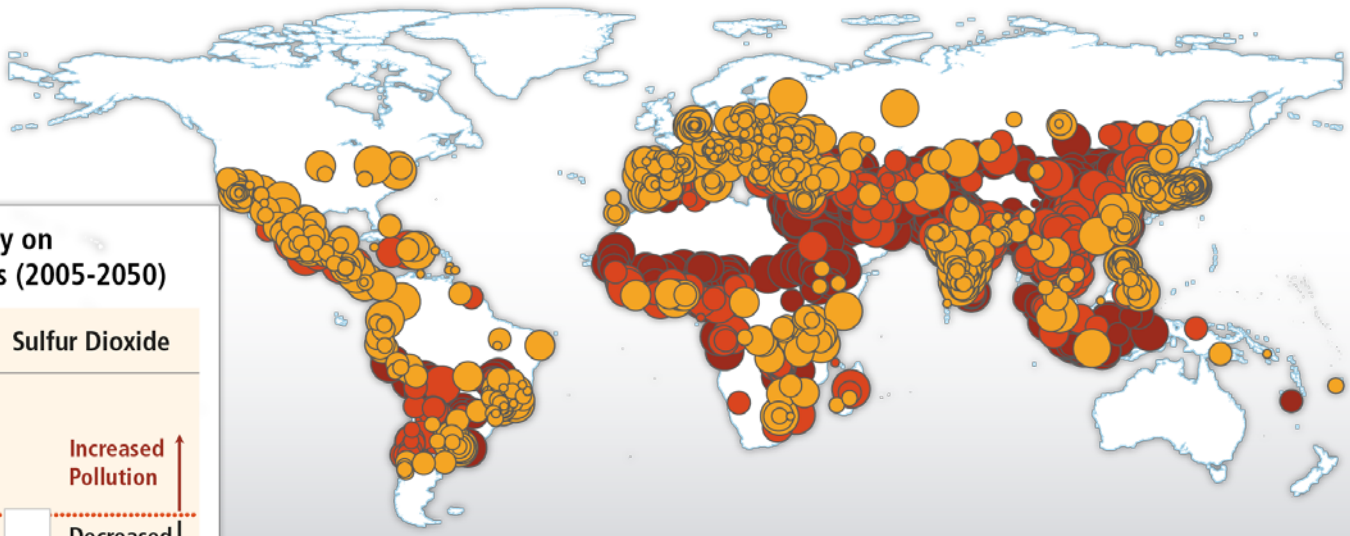
Energy mitigation options can lead to a range of socio-economic co-benefits

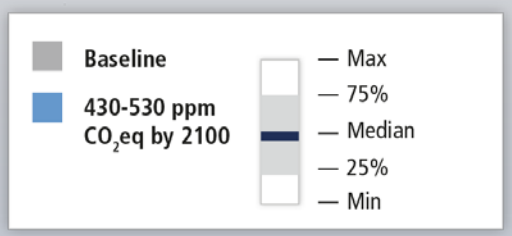
- **Employment**
  - increased share of jobs in RE but cost/job created can be high
- **Energy security**
  - high share of energy - vulnerability to price fluctuations
  - Importers - climate policies can meet national energy demand by decreasing imports
  - biggest energy security issues facing DCs the need to dramatically expand energy systems to support economic growth and development
- **Rural development** – Some REs already cost competitive
  - Caution: distributive impacts of low carbon energy does not become a burden on low income

Based on Figure 7.16

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







Based on Figures 6.33 and 12.23

Energy access

- 79% of the LDC population lack access to electricity, compared to 28% average in the developing countries; About 71% of people in LDCs rely exclusively on biomass burning for cooking
- The costs of achieving nearly universal access to electricity and clean fuels for cooking and heating projected to be USD 72-95 billion/year until 2030 with minimal effects on GHG emissions
- A transition away from the use of traditional biomass and the more efficient combustion of solid fuels reduce air pollutant emissions and black carbon, and thus yield large health benefits
- Also other development benefits in education and productive sectors – such as agriculture and commerce
- Caution: Some mitigation policies raise the prices for some energy services – need for complementary policies

Based on Figure 7.16

Summary

- GHG Emissions continue to rise
- Achieving low stabilization is possible, but will require building robust institutions, policies, investment & int'n cooperation
- Well-designed systemic and cross-sectoral mitigation strategies are more effective in cutting emissions than a focus on individual technologies and sectors
- Energy mitigation options can lead to a range of co-benefits
- Energy access challenge is complex but can be achieved with minimum GHG emissions

Based on Figure 7.16

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