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Decarbonizing the Global Energy System: Insights from the New IPCC Report

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Prof. Dr. Thomas Bruckner

Chair for Energy Management and Sustainability
Institute for Infrastructure und Resources Management – IIRM, University of Leipzig
Department for Sustainability Management and Infrastructure Economy, Fraunhofer MOEZ
Coordinating Lead Author of the Chapter on Energy Systems, WG III, IPCC AR5

INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014

Mitigation of Climate Change

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Prof. Dr. Thomas Bruckner

Coordinating Lead Author

Chapter “Energy Systems”

Working Group III contribution to the
IPCC Fifth Assessment Report

WMO UNEP

1 Summary for Policymakers

1 Technical Summary

16 Chapters

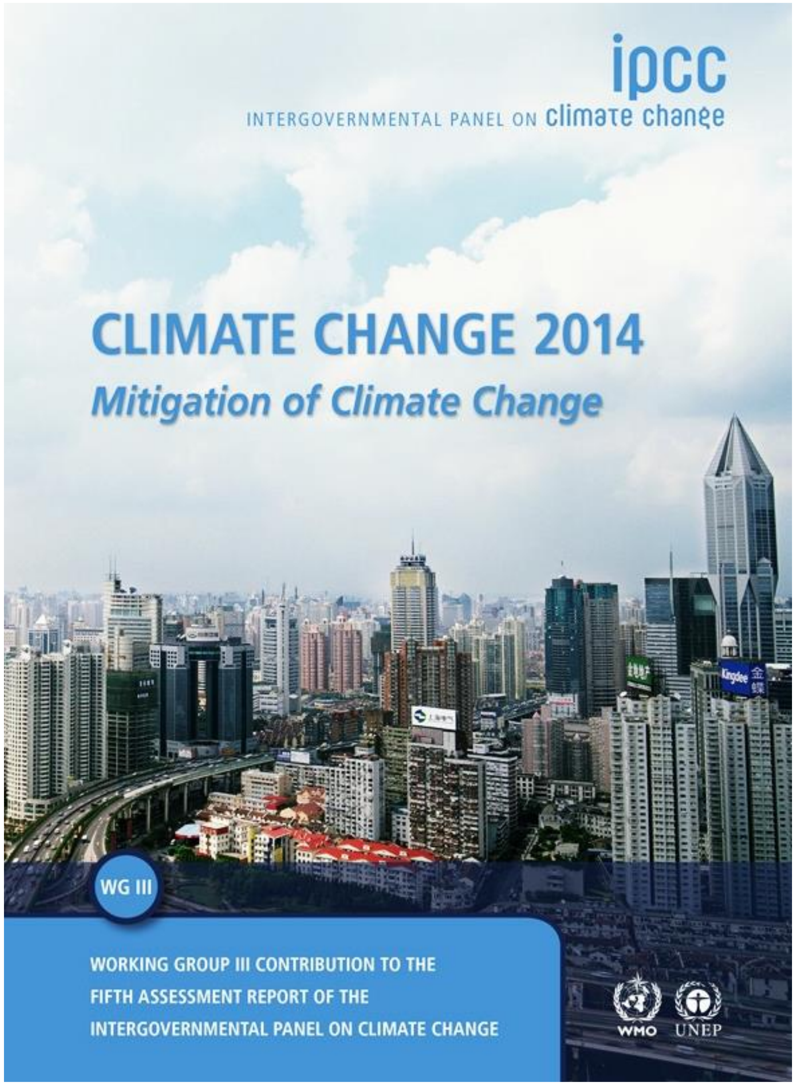
235 Authors

800+ Reviewers

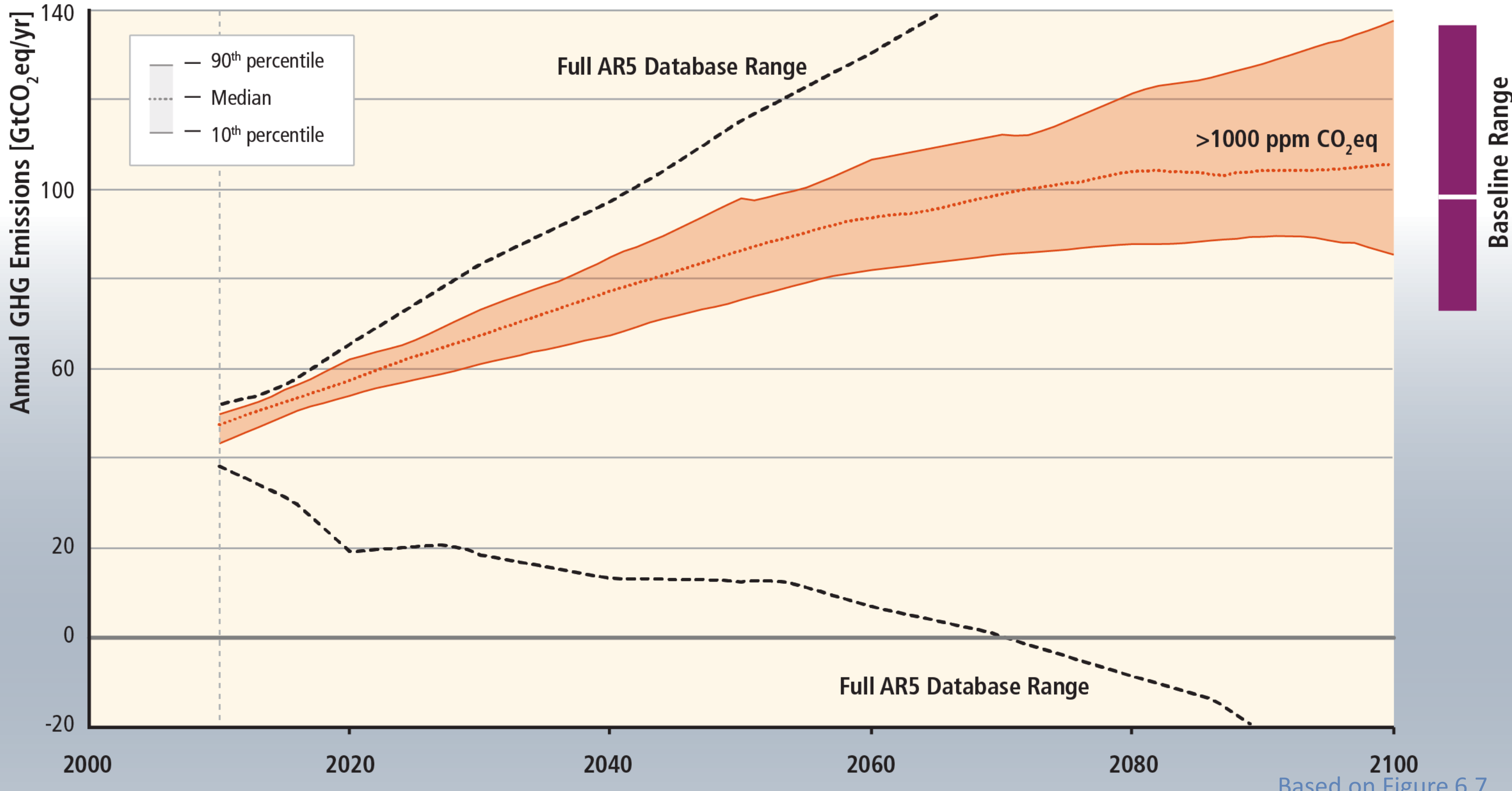
Close to 1500 pages

Close to 10,000 references

Database with 1200 scenarios

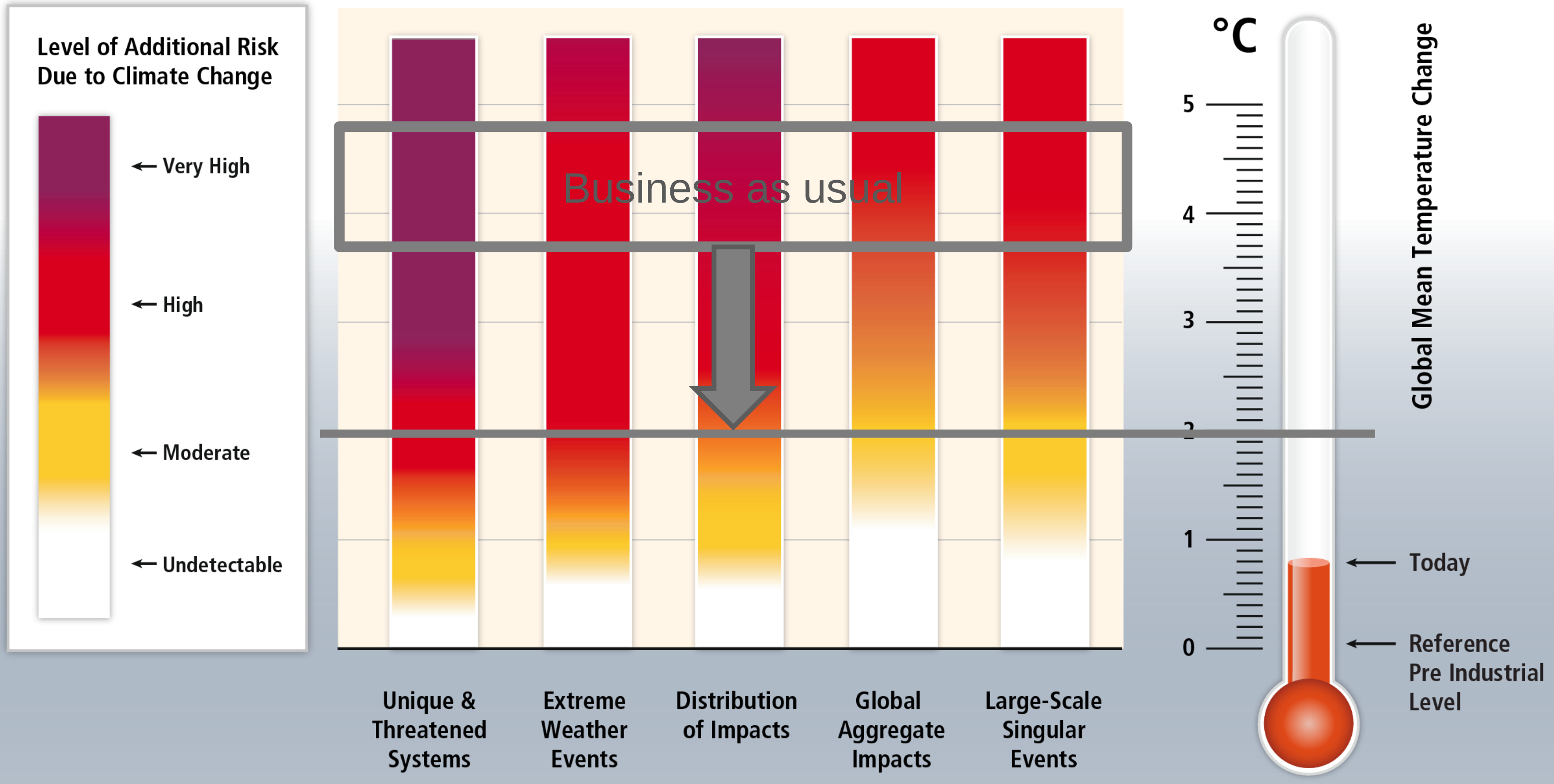


In the business-as-usual scenarios, greenhouse gas emissions and associated concentrations are expected to grow



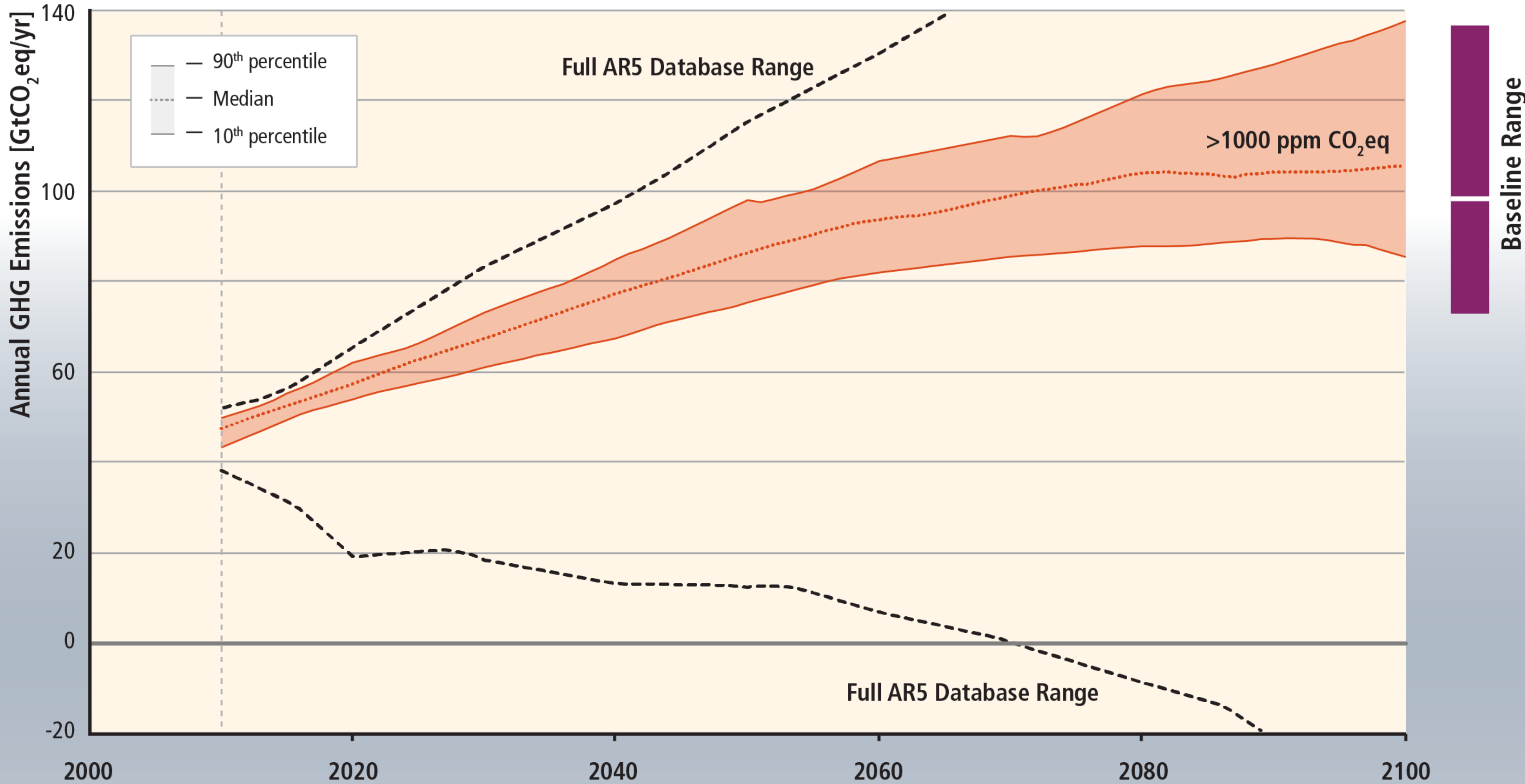
Based on Figure 6.7

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

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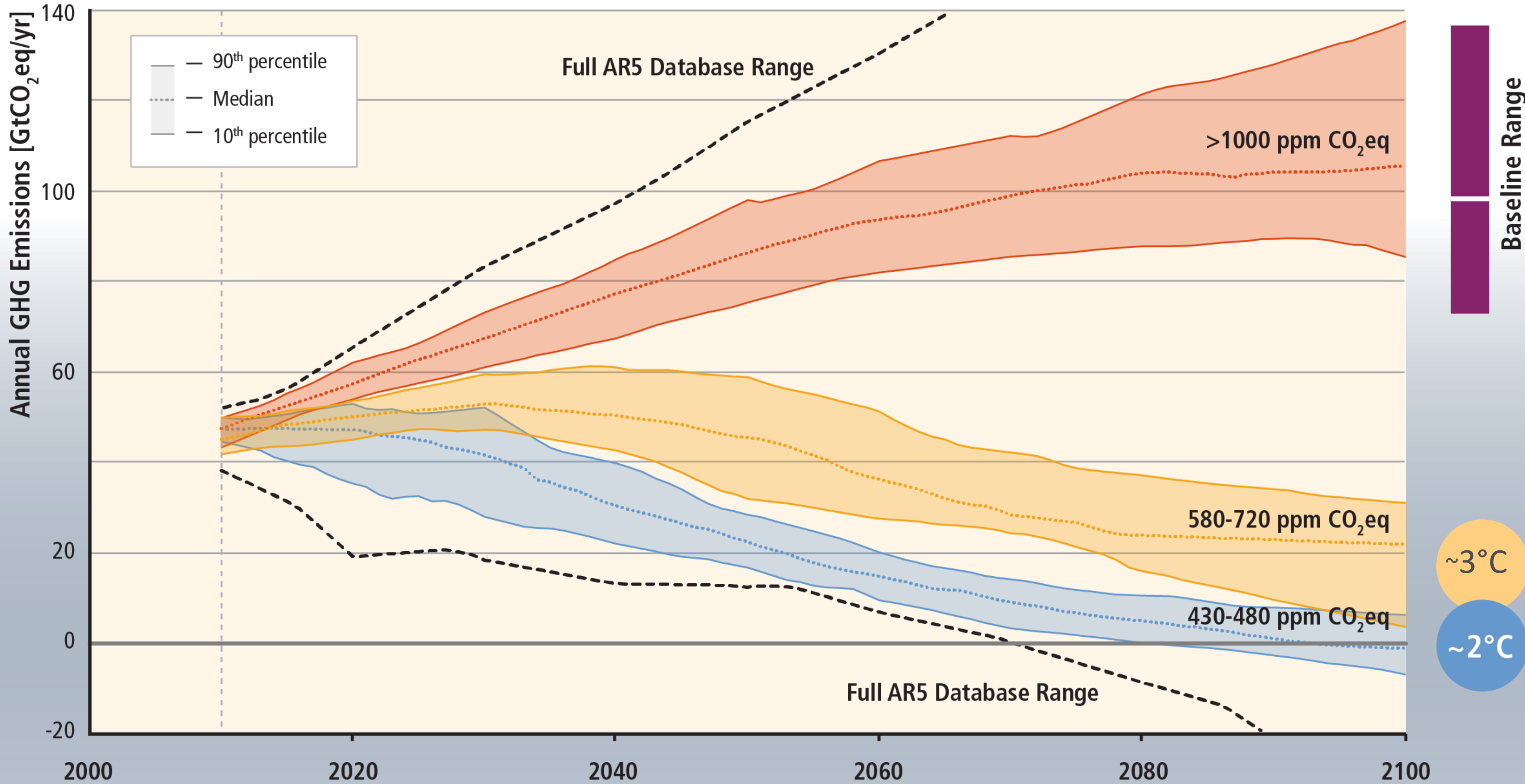
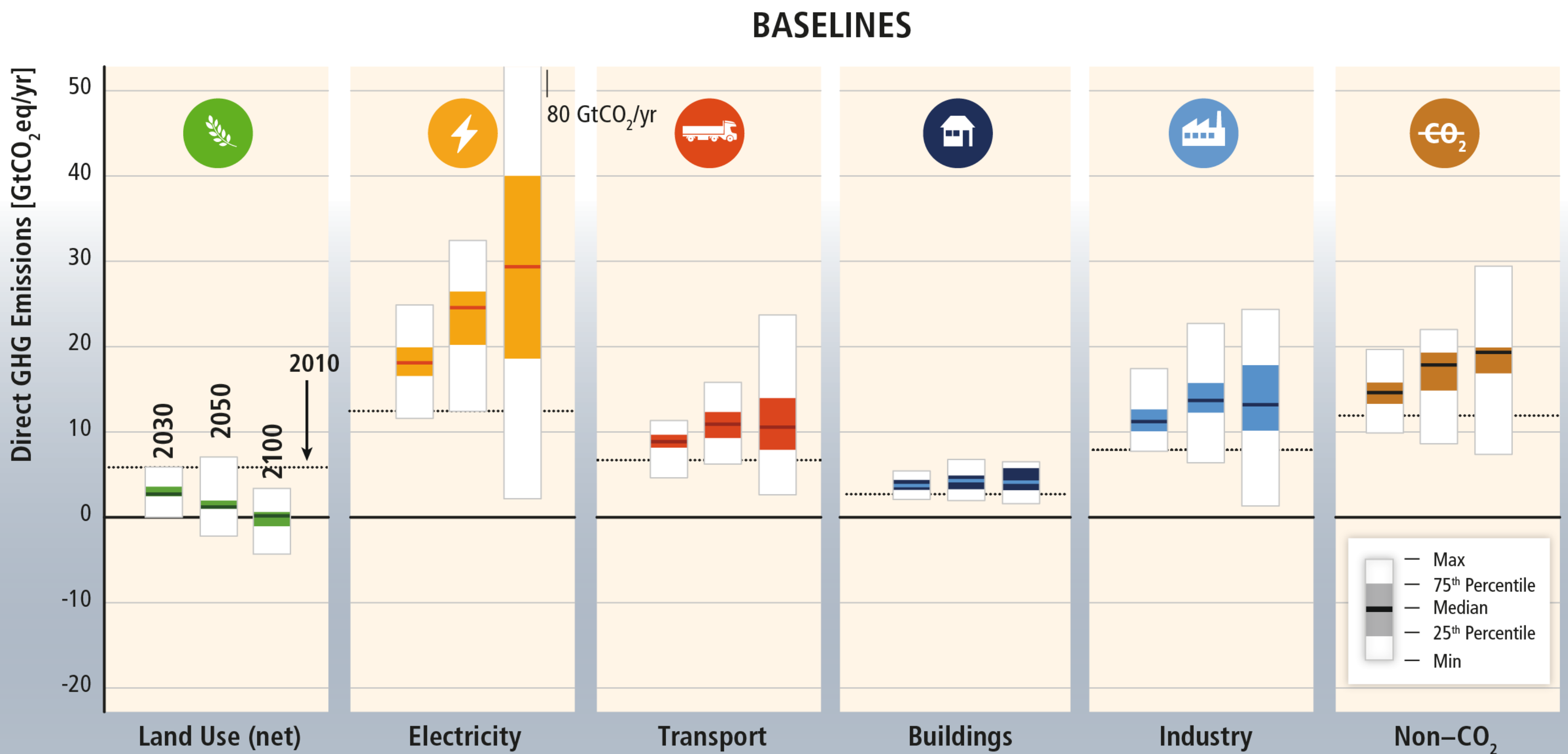


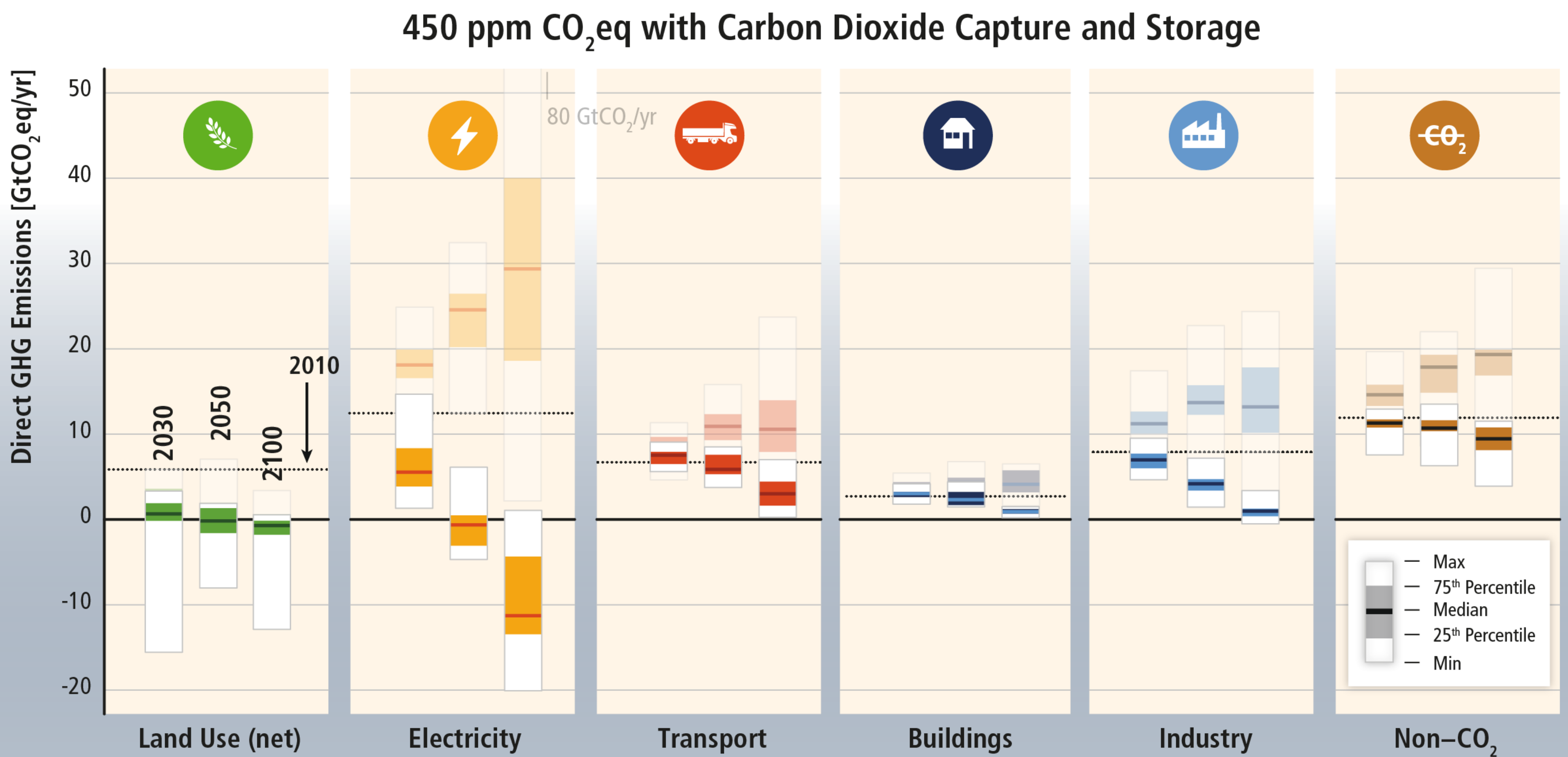
Based on Figure 6.7

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



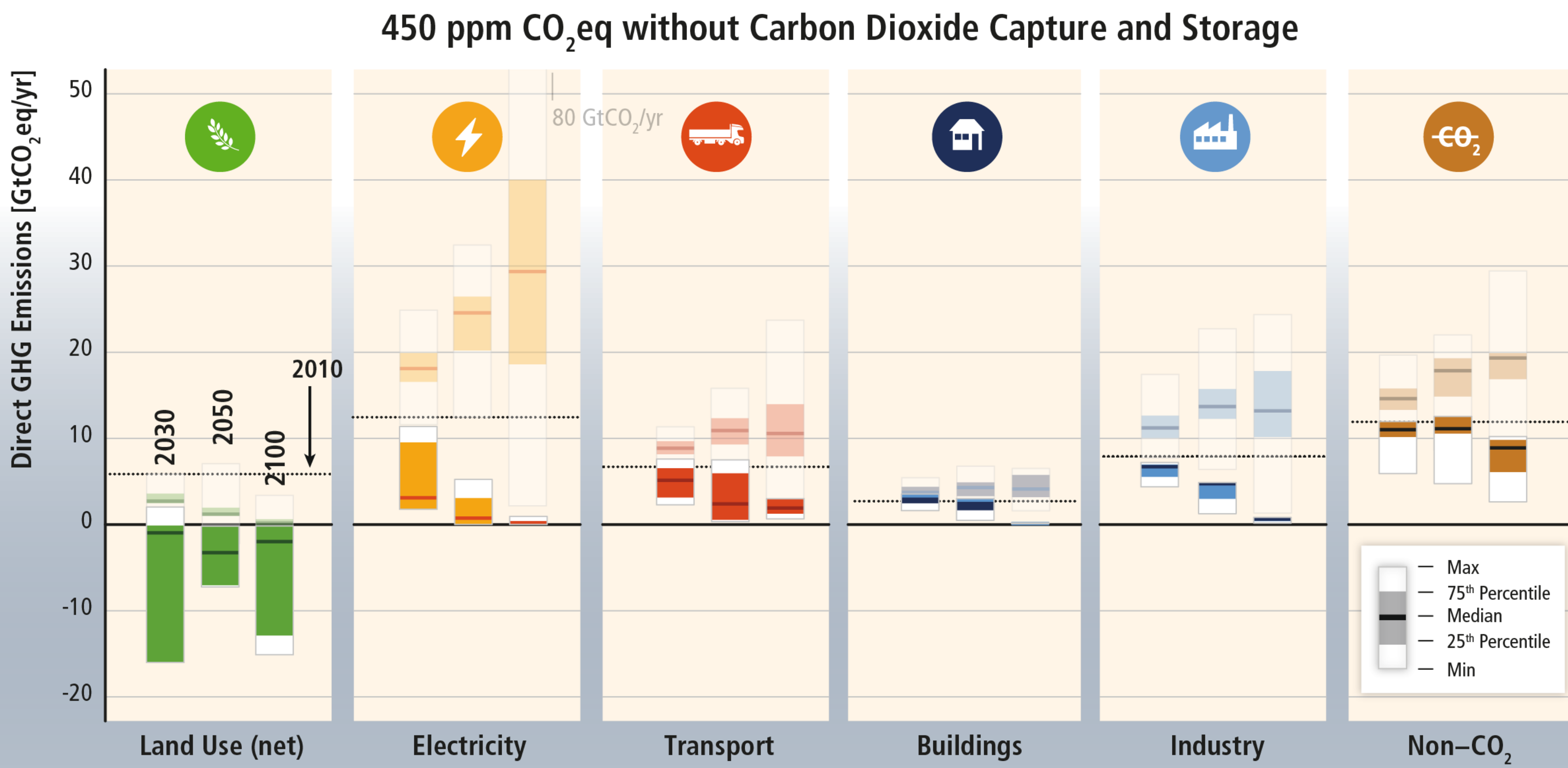
Based on Figure TS.15

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



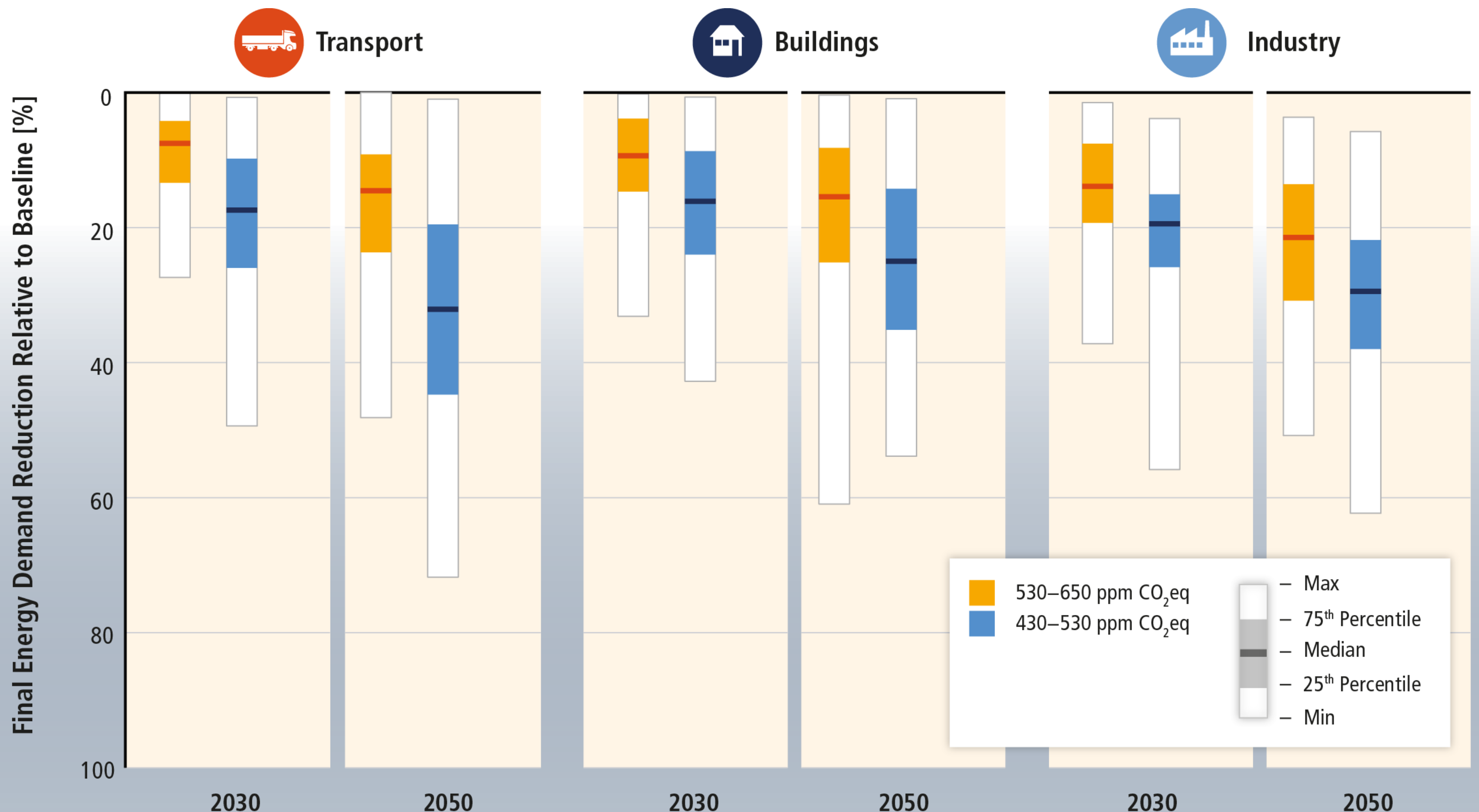
Based on Figure TS.17

Mitigation efforts in one sector determine efforts in others.



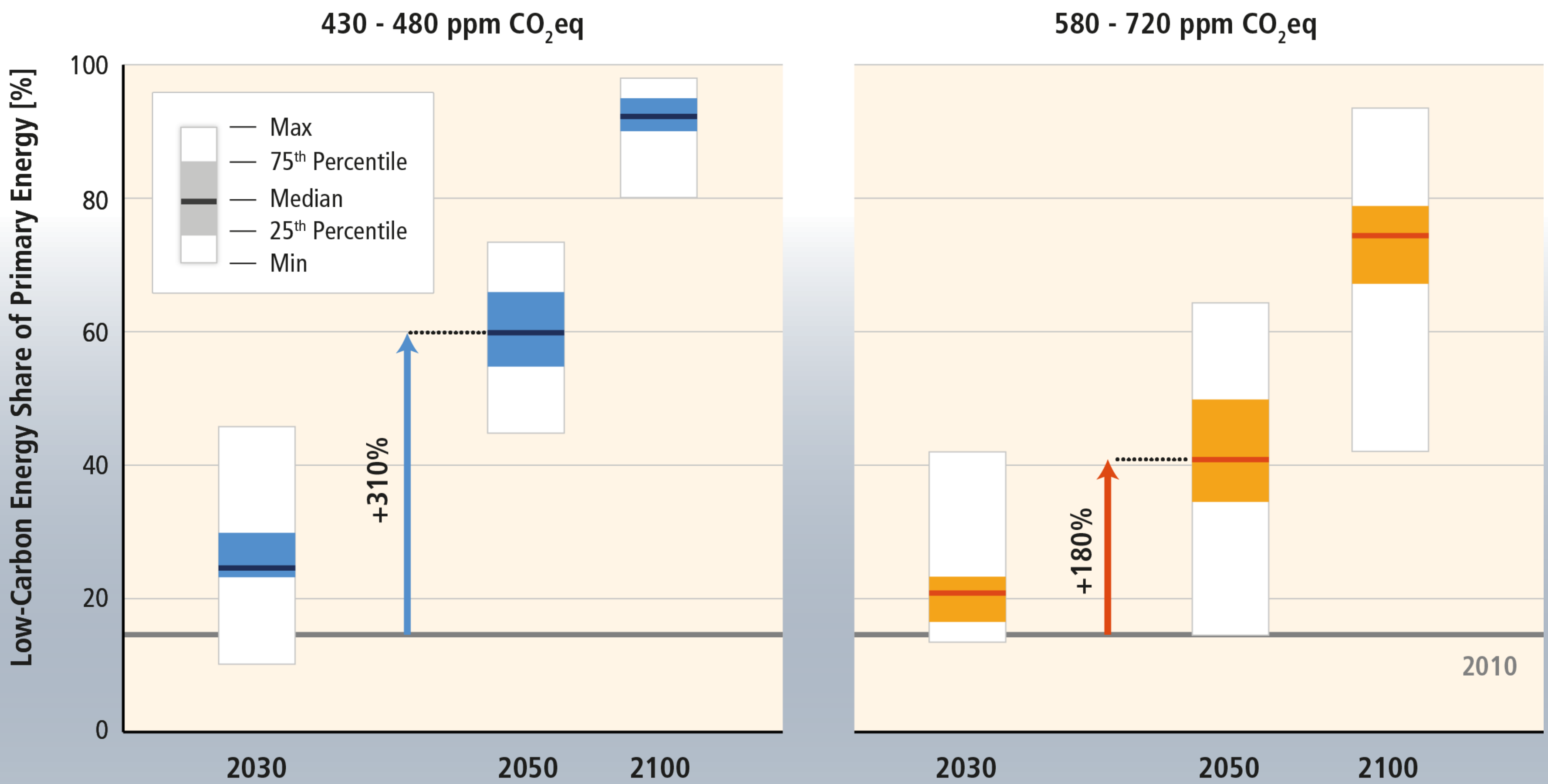
Based on Figure TS.17

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



Based on Figure 6.37

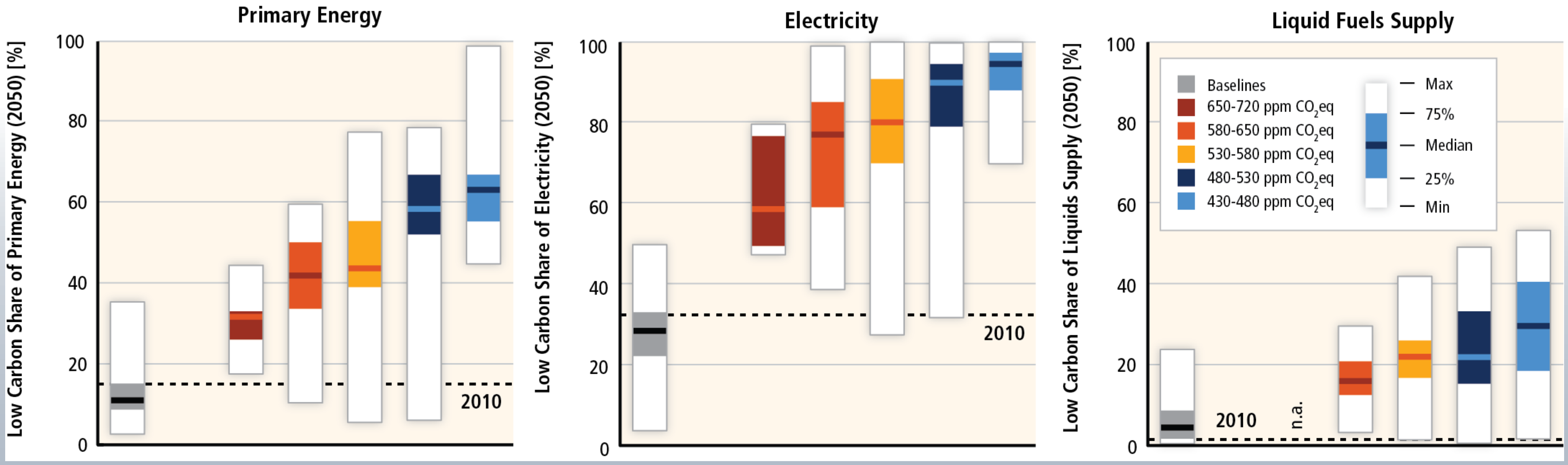
Mitigation involves substantial upscaling of low-carbon energy.



Based on Figure 7.16

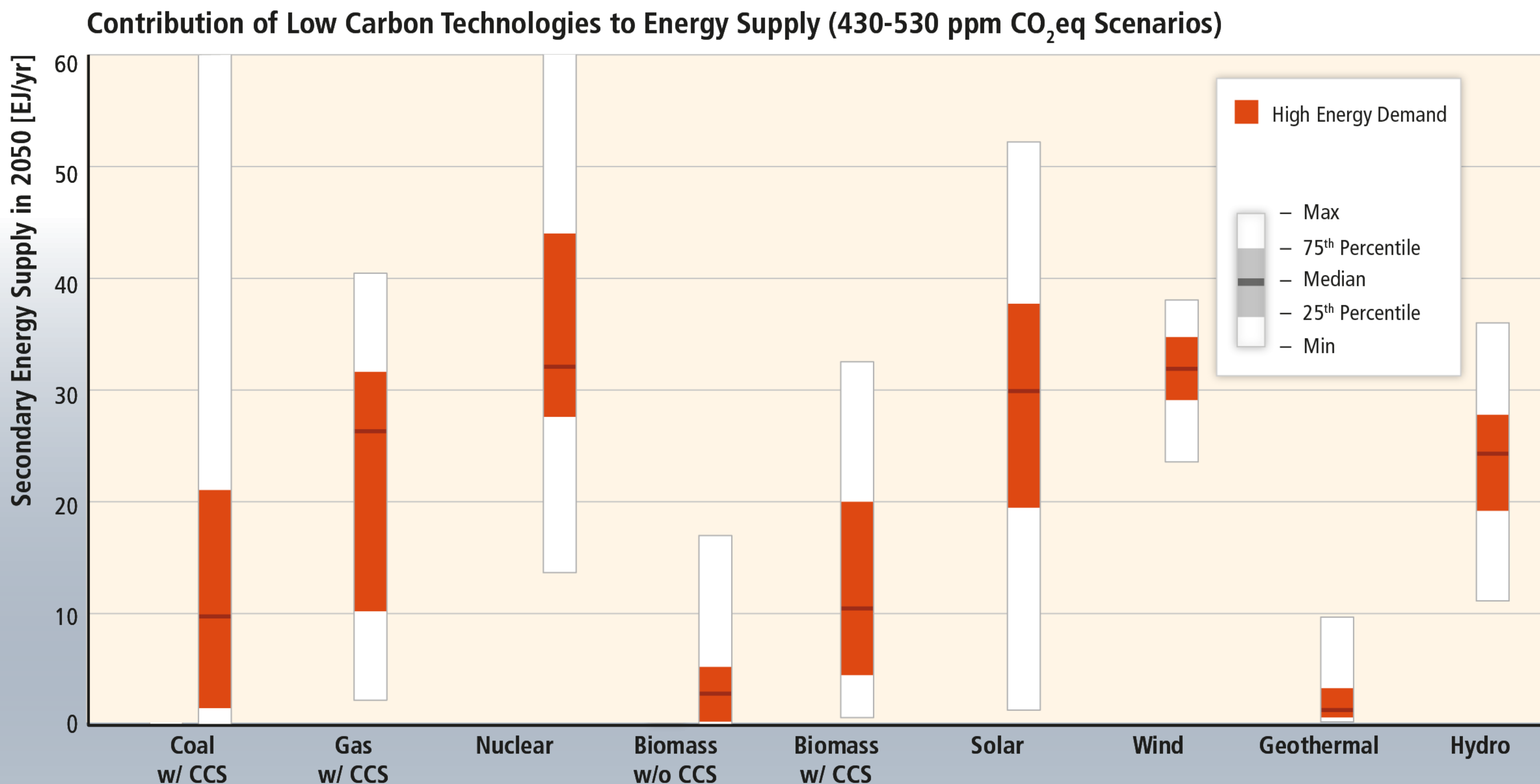
Decarbonizing electricity generation is a key component of cost-effective mitigation strategies

Share of low-carbon energy in total primary energy, electricity and liquid supply sectors for the year 2050.



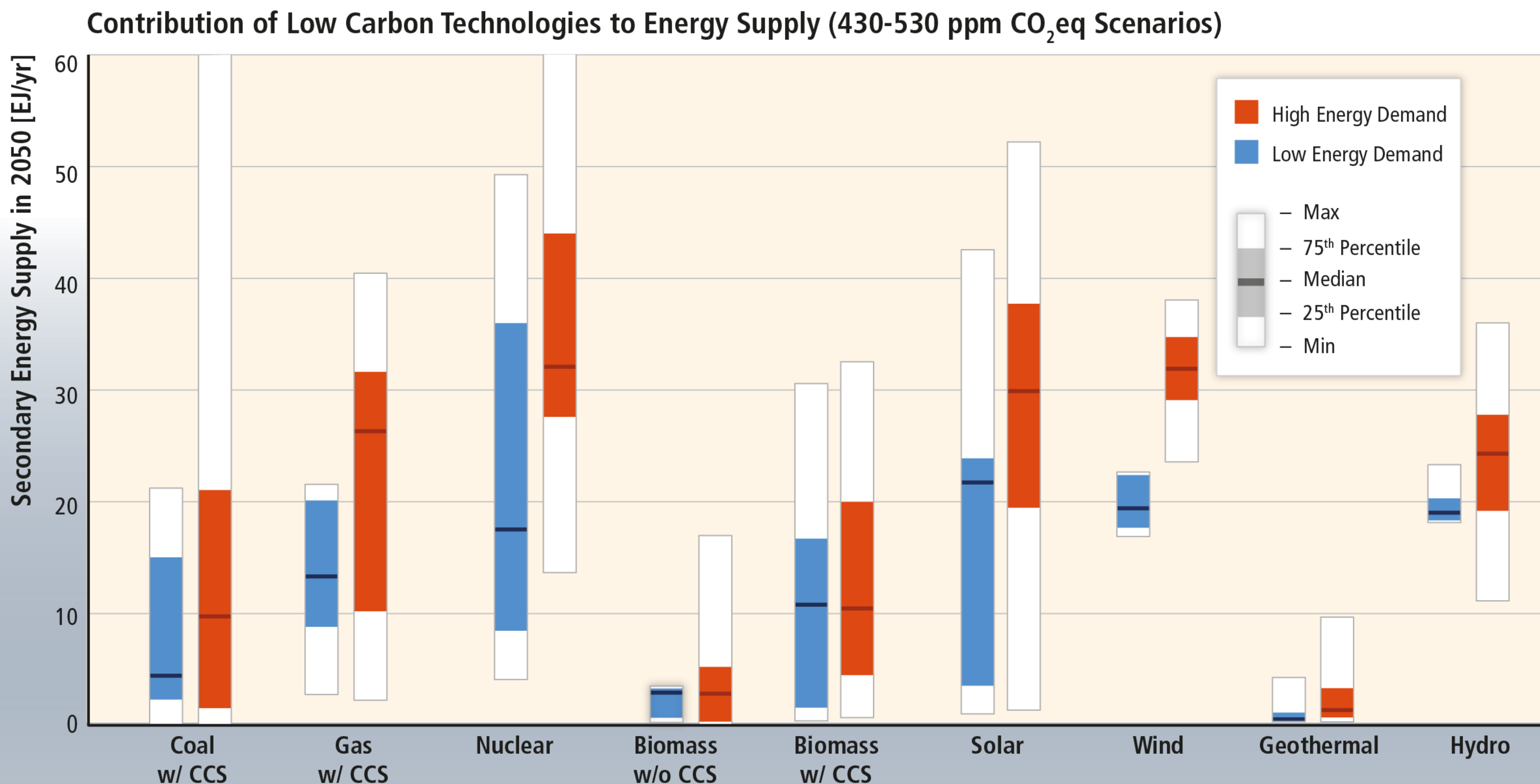
IPCC, AR5, WG III, Figure 7.14

Decarbonization of energy supply is a key requirement for limiting warming to 2°C.



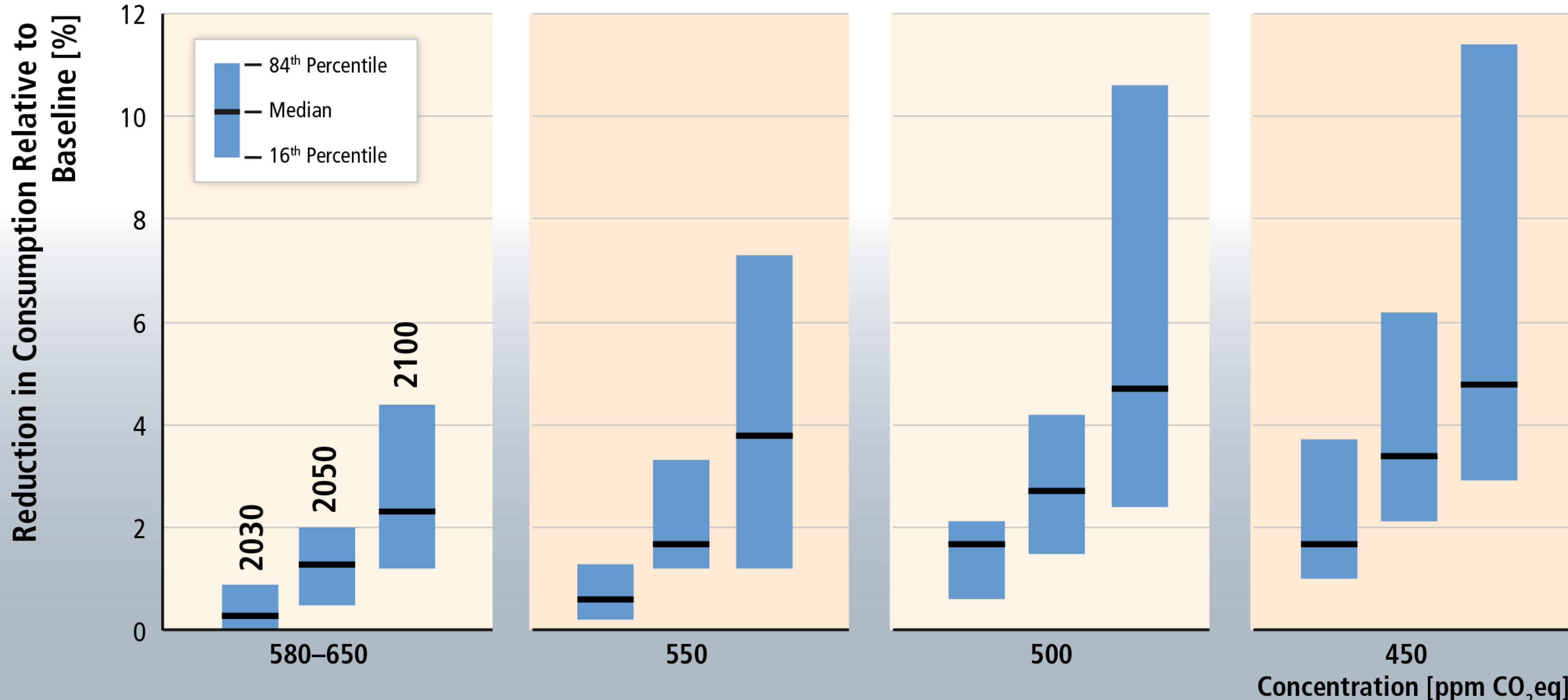
Based on Figure 7.11

Energy demand reductions can provide flexibility, hedge against risks, avoid lock-in and provide co-benefits.



Based on Figure 7.11

Global costs rise with the ambition of the mitigation goal.

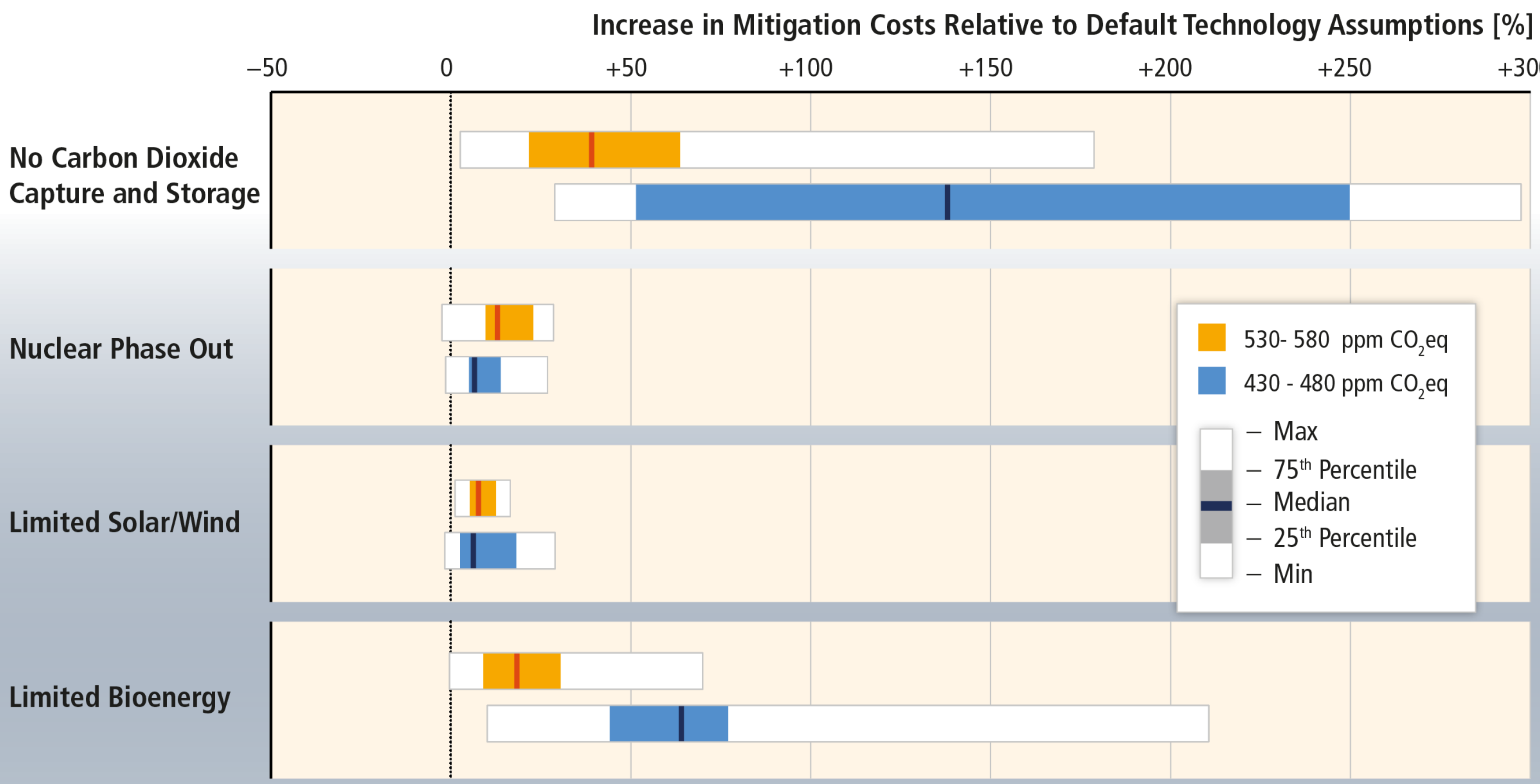


Percentage Point Reduction in Annualized Consumption Growth Rate over 21st Century

580–650	550	500	450
0.03 (0.01-0.05)	0.04 (0.01-0.09)	0.06 (0.03-0.13)	0.06 (0.04-0.14)

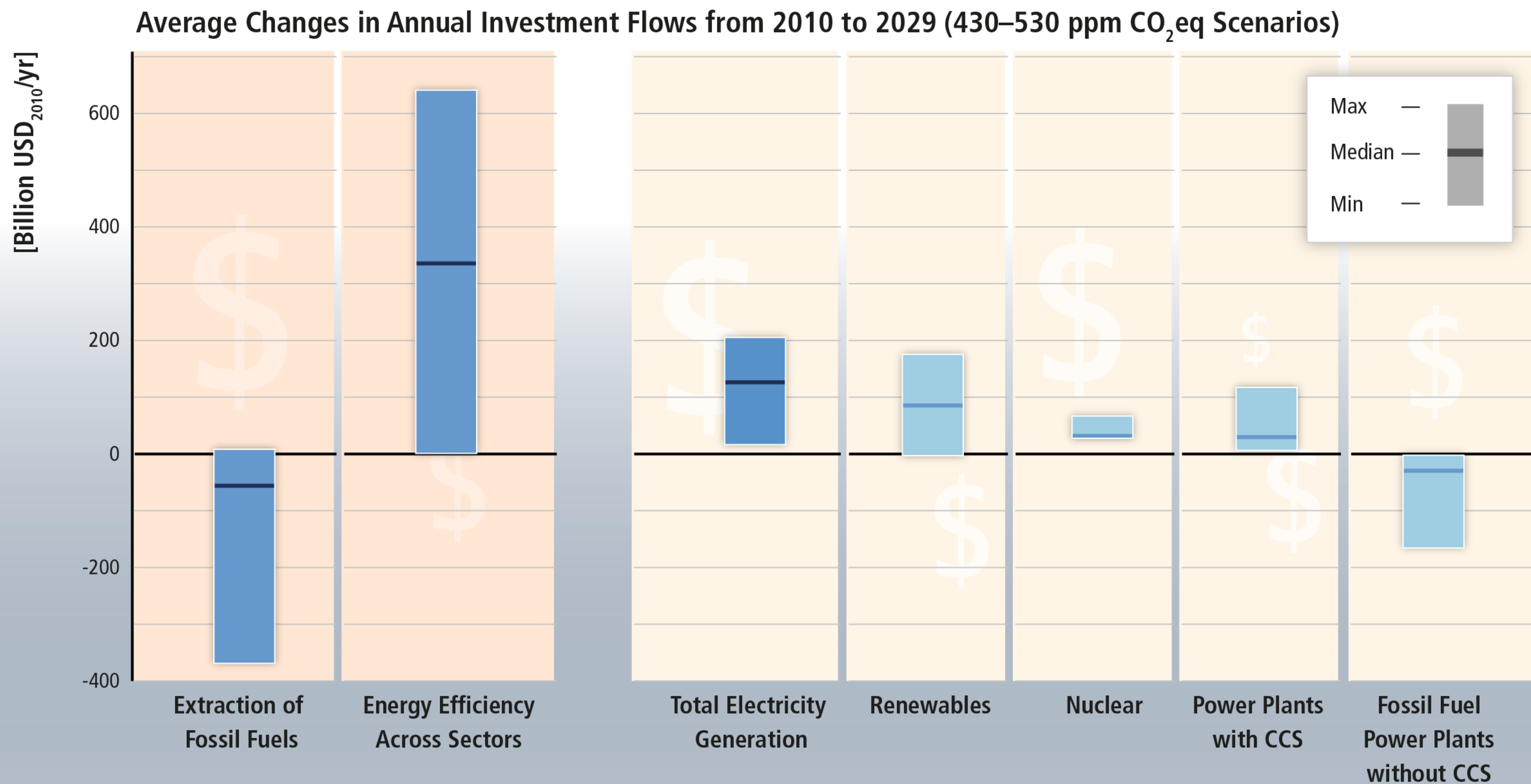
Based on Table SPM.2

Technological limitations can increase mitigation costs, but the increase in cost differs depending on the restricted technology



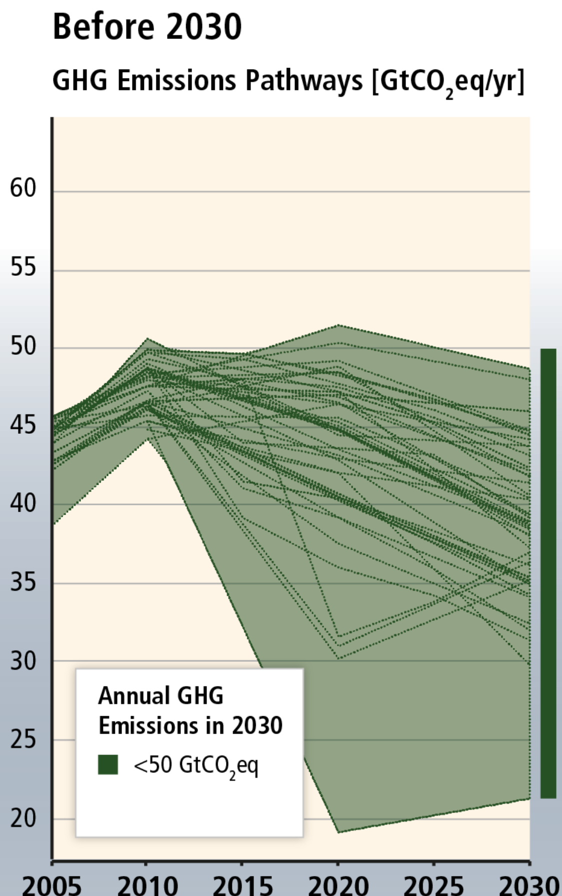
Based on Figure 6.24

Substantial reductions in emissions require significant changes in investment patterns and appropriate policies.



Based on Figure 16.3

The "immediate action" scenarios shown make it at least *about as likely as not* that warming will remain below 2°C

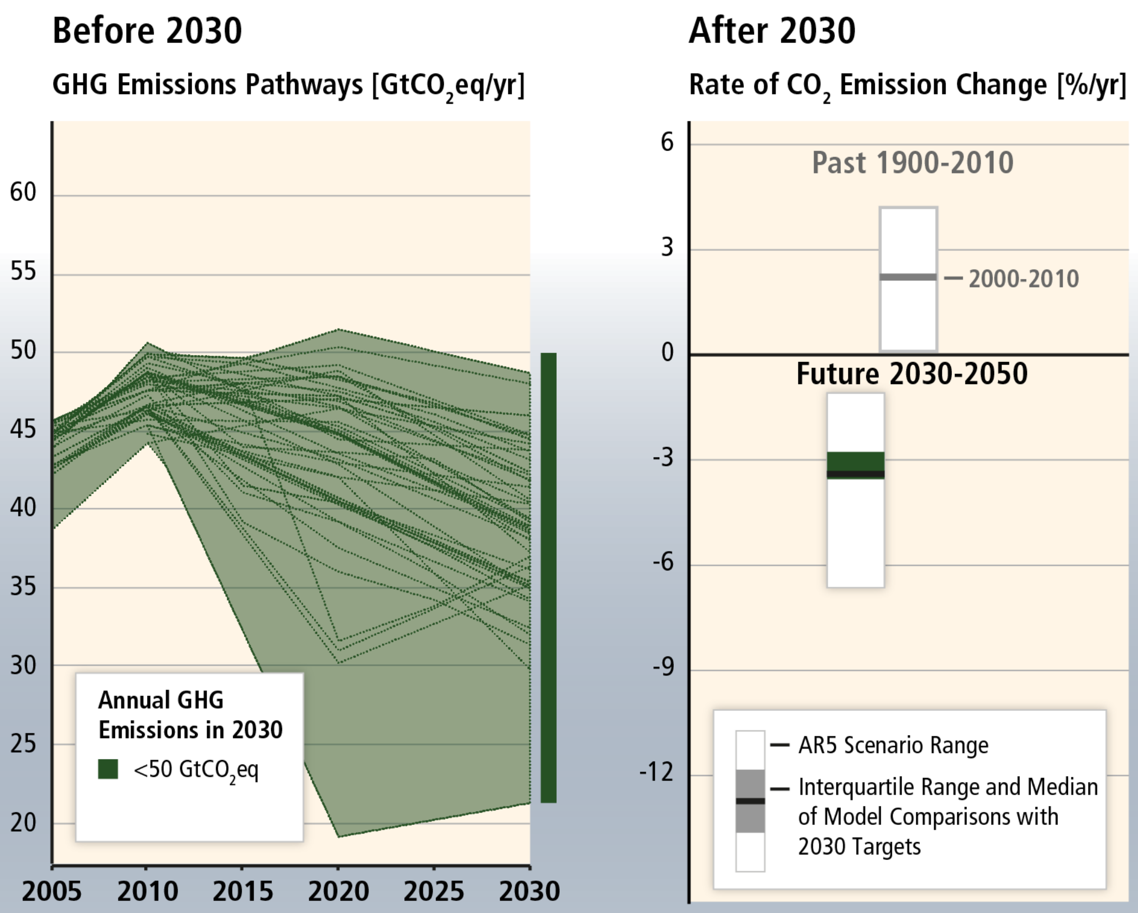


"Immediate Action"

Based on Figures 6.32 and 7.16

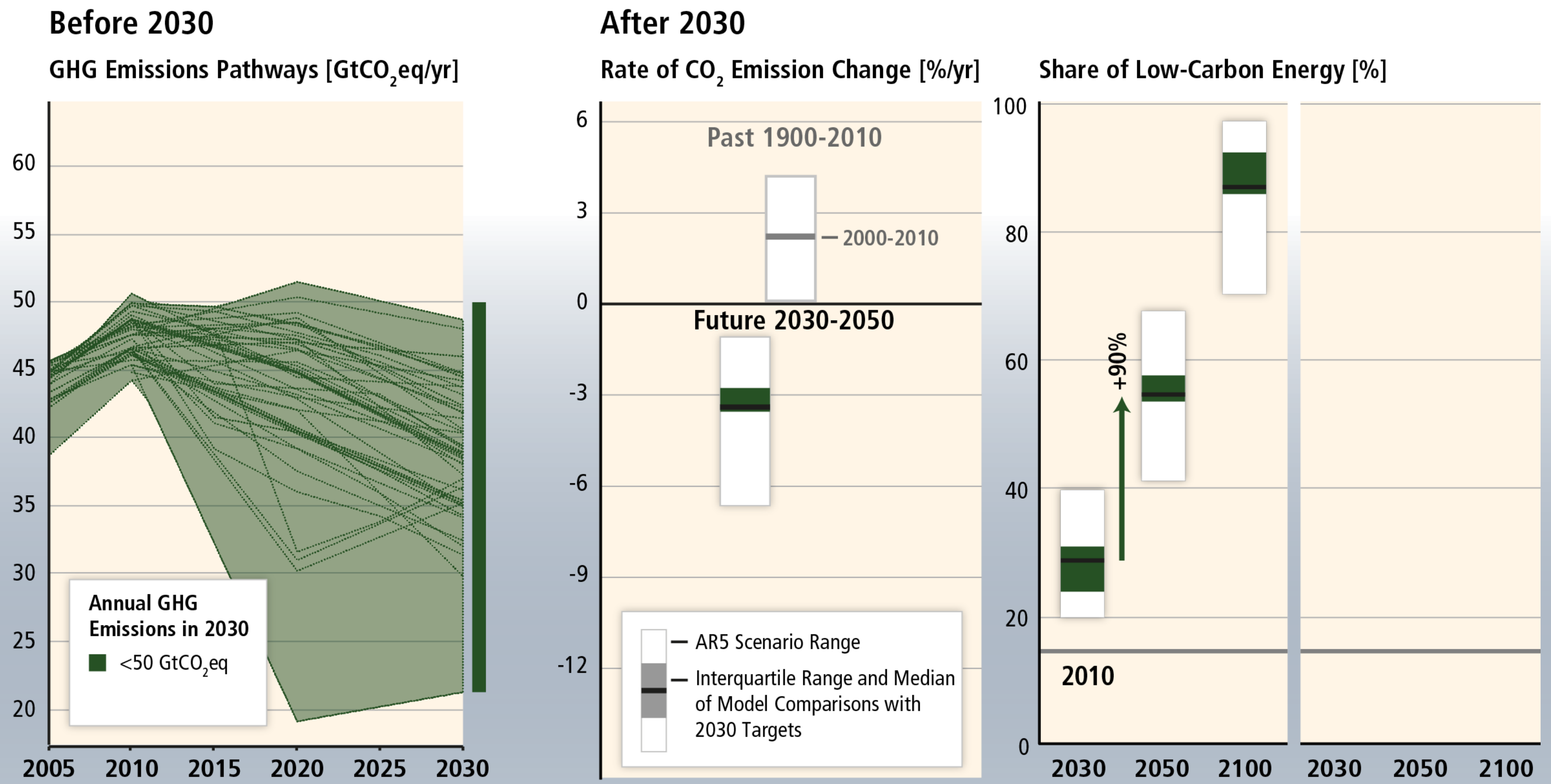
INTERGOVERNMENTAL PANEL ON climate change

Still, between 2030 and 2050, emissions would have to be reduced at an unprecedented rate...



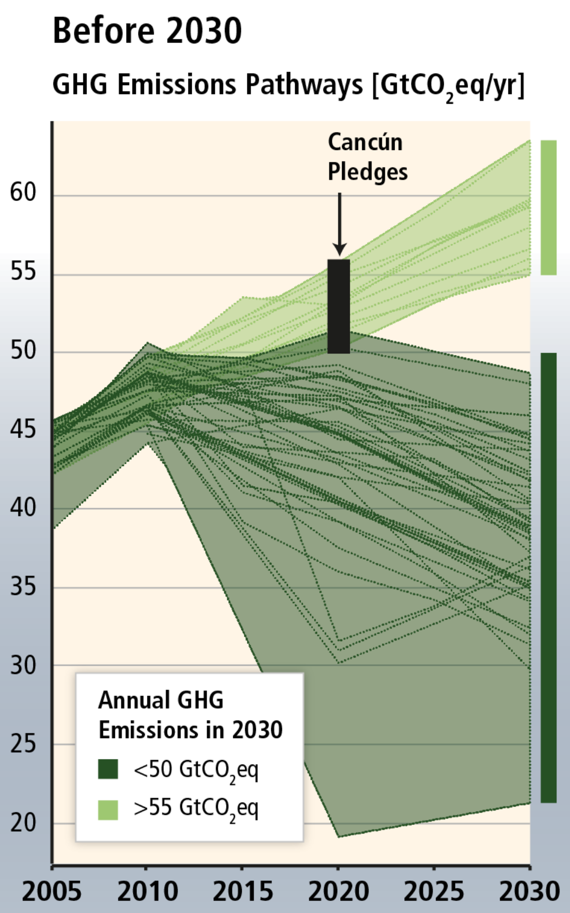
Based on Figures 6.32 and 7.16

...implying a rapid scale-up of low-carbon energy.



Based on Figures 6.32 and 7.16

Delaying emissions reductions increases the difficulty and narrows the options for mitigation.

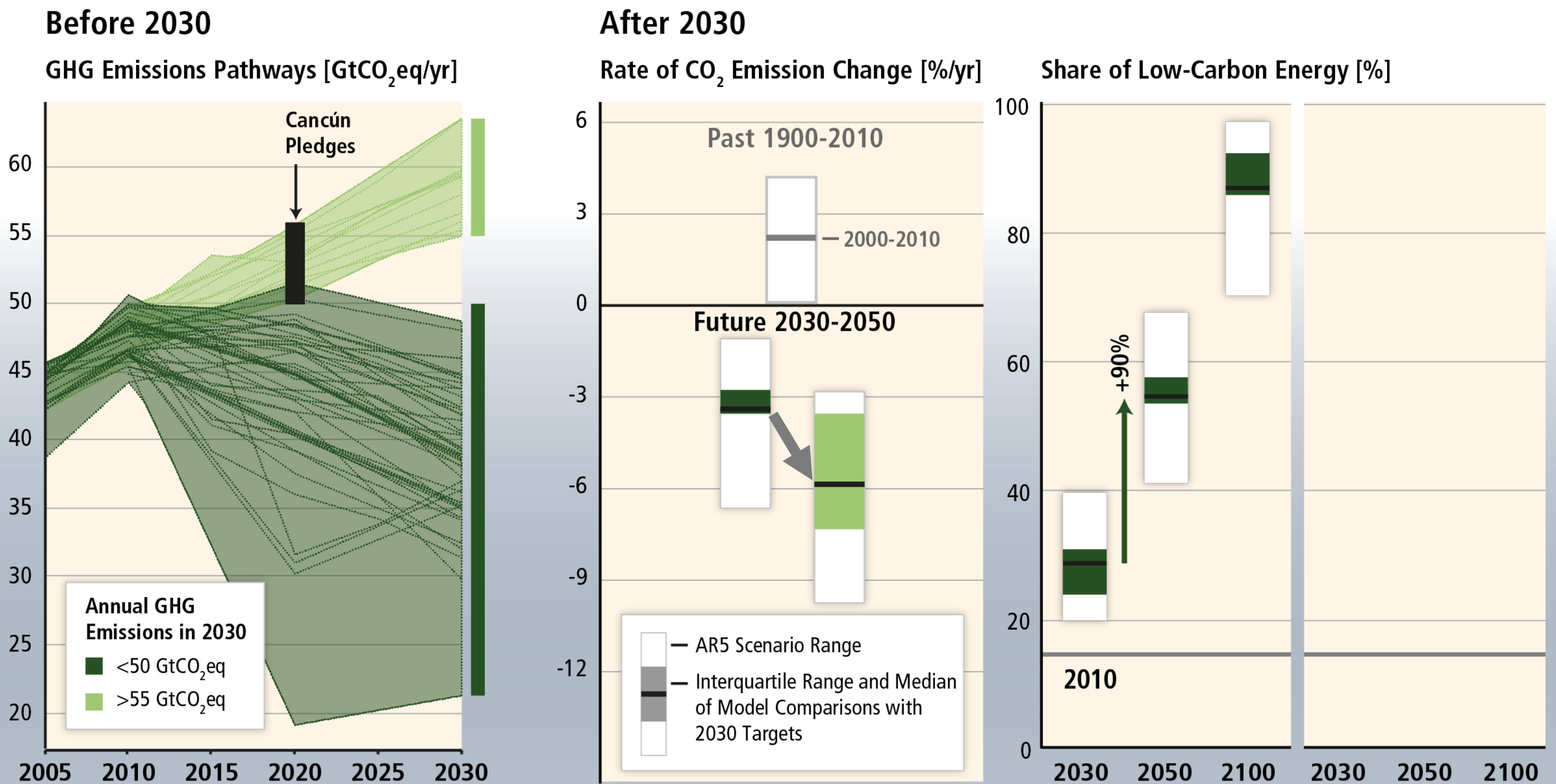


“Delayed Mitigation”

“Immediate Action”

Based on Figures 6.32 and 7.16

Delaying emissions reductions increases the difficulty and narrows the options for mitigation.



Based on Figures 6.32 and 7.16

INTERGOVERNMENTAL PANEL ON climate change

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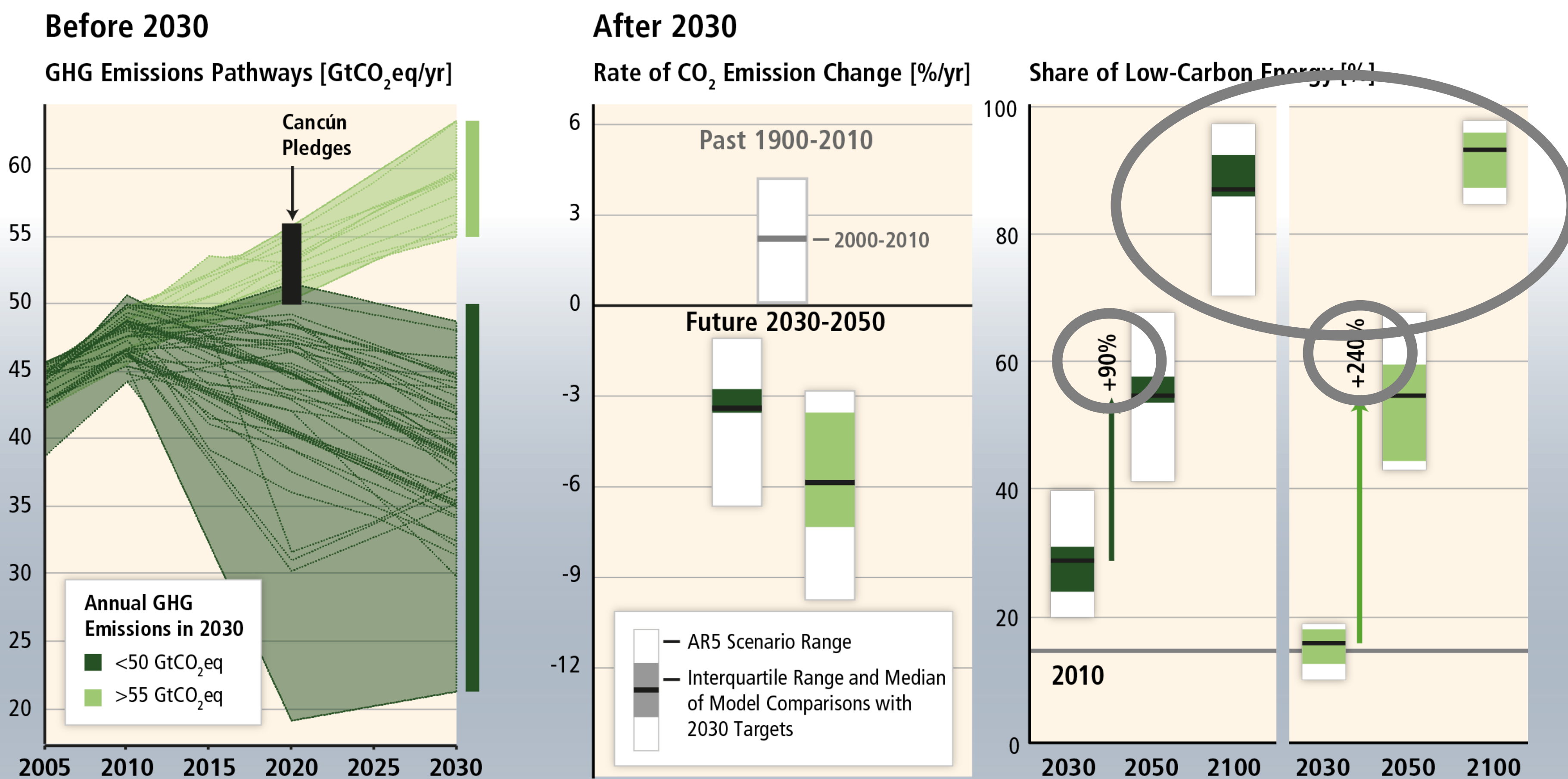
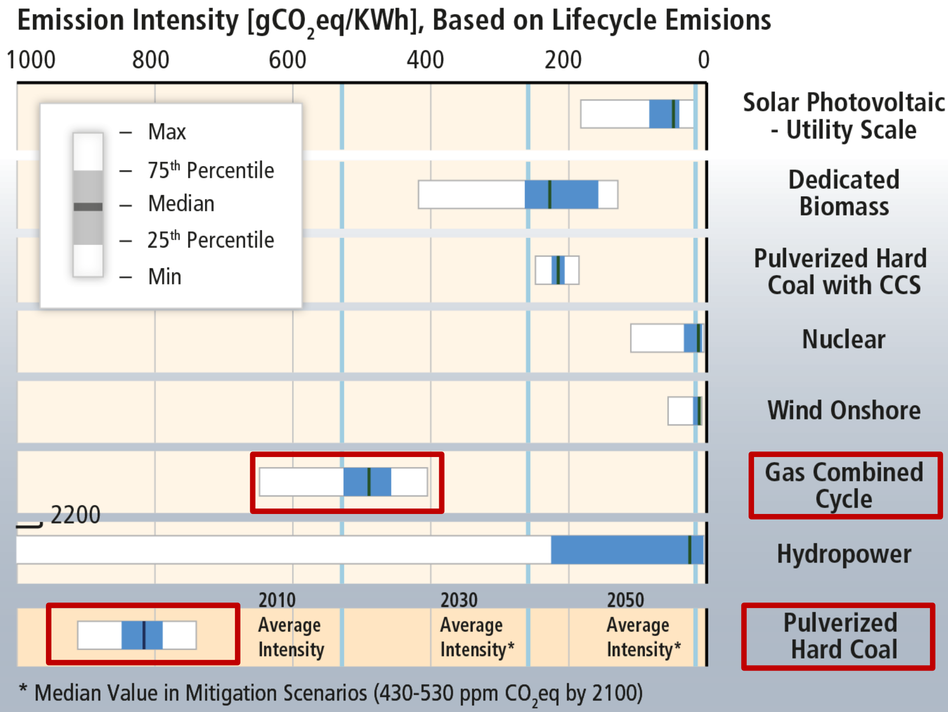


Based on Figures 6.32 and 7.16

Examples from electricity generation: Low emission technologies exist, but emissions are reduced to different degrees.

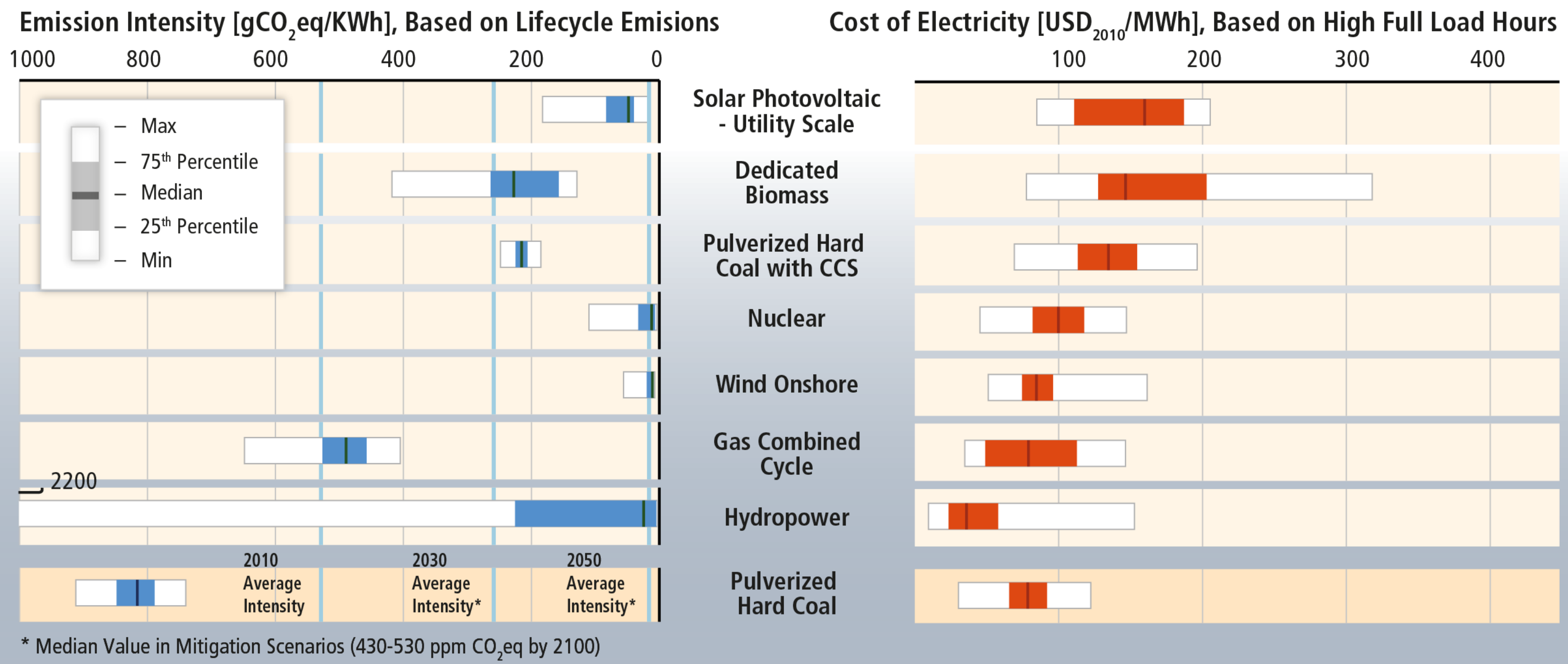


"GHG emissions from energy supply can be reduced significantly by replacing current world average coal-fired power plants with modern, highly efficient natural gas combined-cycle (NGCC) power plants or combined heat and power (CHP) plants, provided that natural gas is available and the fugitive emissions associated with its extraction and supply are low or mitigated."

Chapter 7 Summary for Policy Maker (SPM)

Based on Figure 7.7

Due to cost decline, renewable energy technologies are becoming economical solutions in an increasing number of countries.



Based on Figure 7.7

Contact

Prof. Dr. rer. nat. Thomas Bruckner

Director of the Institute for
Infrastructure and Resources Management (IIRM)
University of Leipzig

Grimmaische Str. 12
04109 Leipzig
Germany

Phone: +49 (0) 341 97 33516

Head of Department
Sustainability Management and Infrastructure Economy
Fraunhofer MOEZ

Neumarkt 9-19, 04109 Leipzig, Germany
thomas.bruckner@moez.fraunhofer.de