IPCC
INTERGOVERNMENTAL PANEL ON climate change

Ökonomische Auswirkungen der globalen Klima- und Energiepolitik

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Co-Chair, IPCC Working Group III

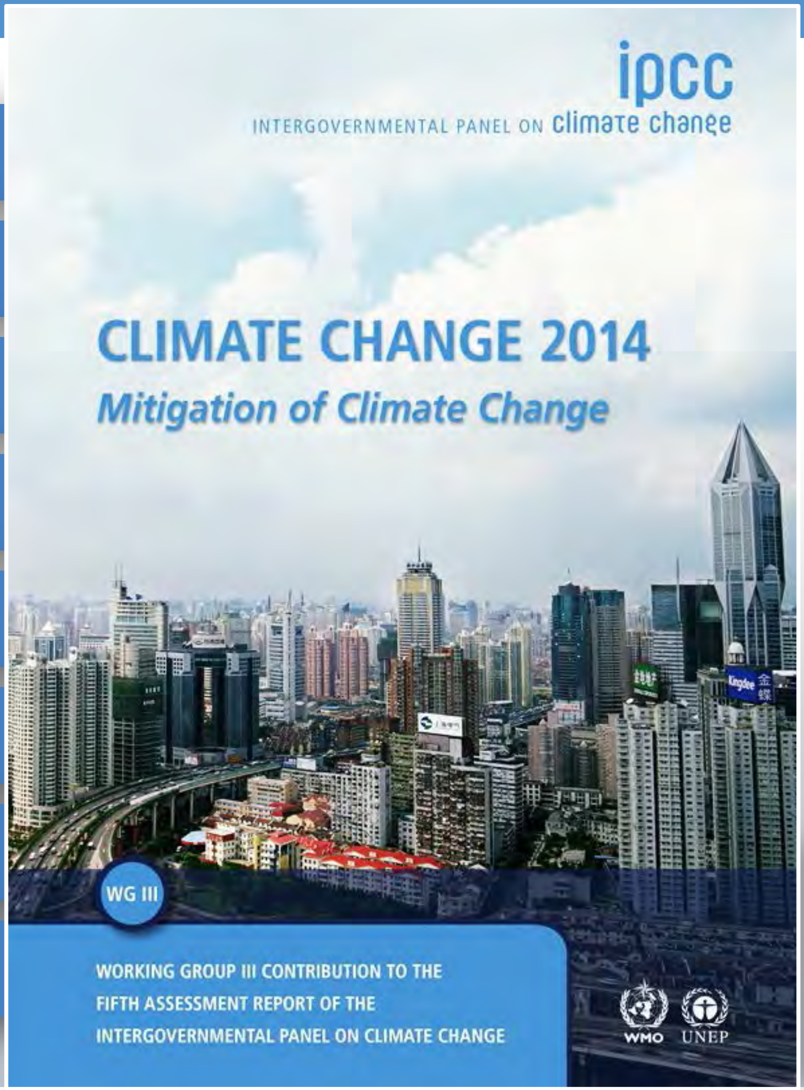
Krems, Österreich,
4. September 2014

Working Group III contribution to the
IPCC Fifth Assessment Report

Technische Universität Berlin
WMO UNEP

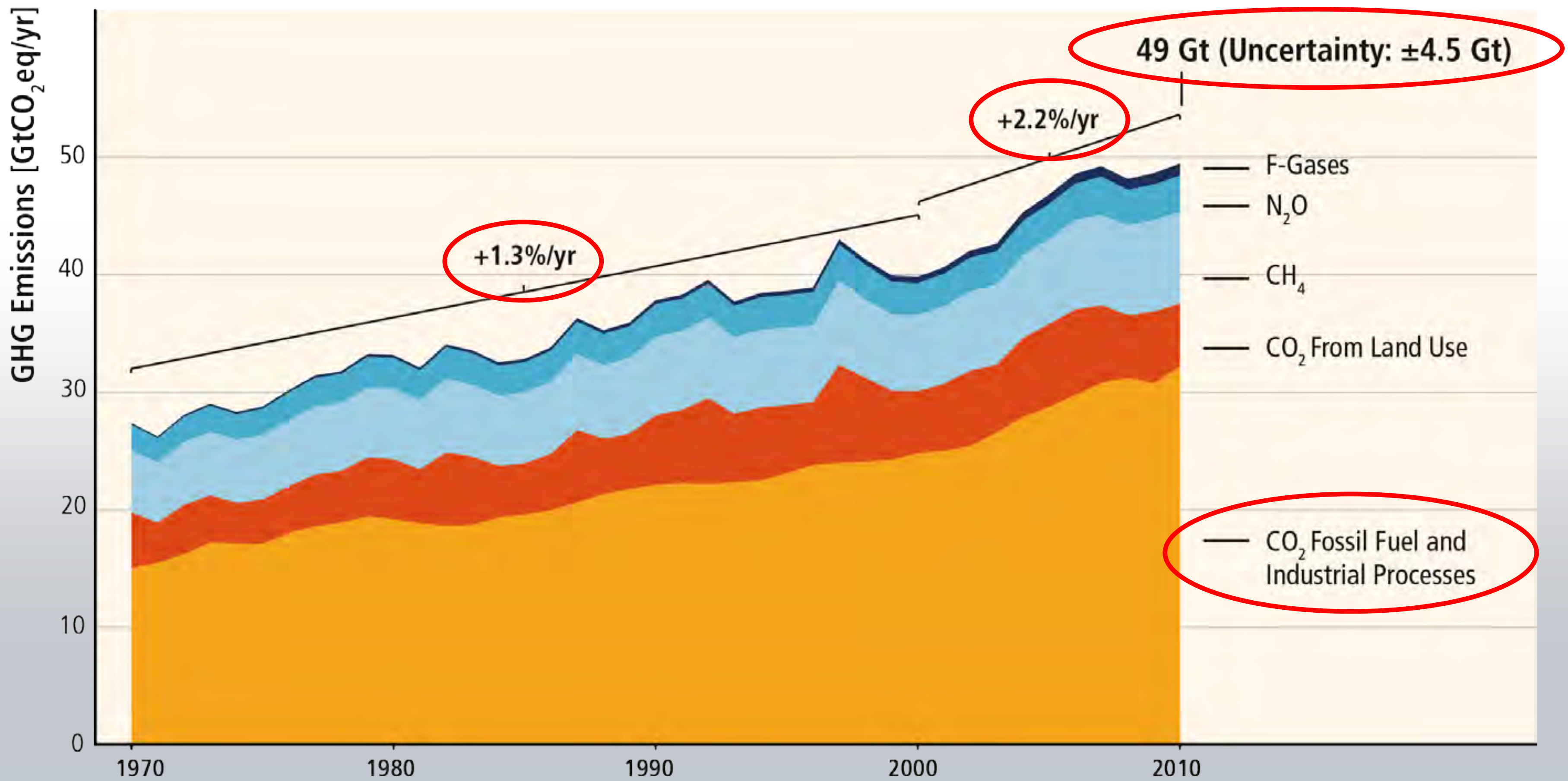
IPCC reports are the result of extensive work of many scientists from around the world.

- 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



GHG emissions growth has accelerated despite reduction efforts.

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



Based on Figure 1.3

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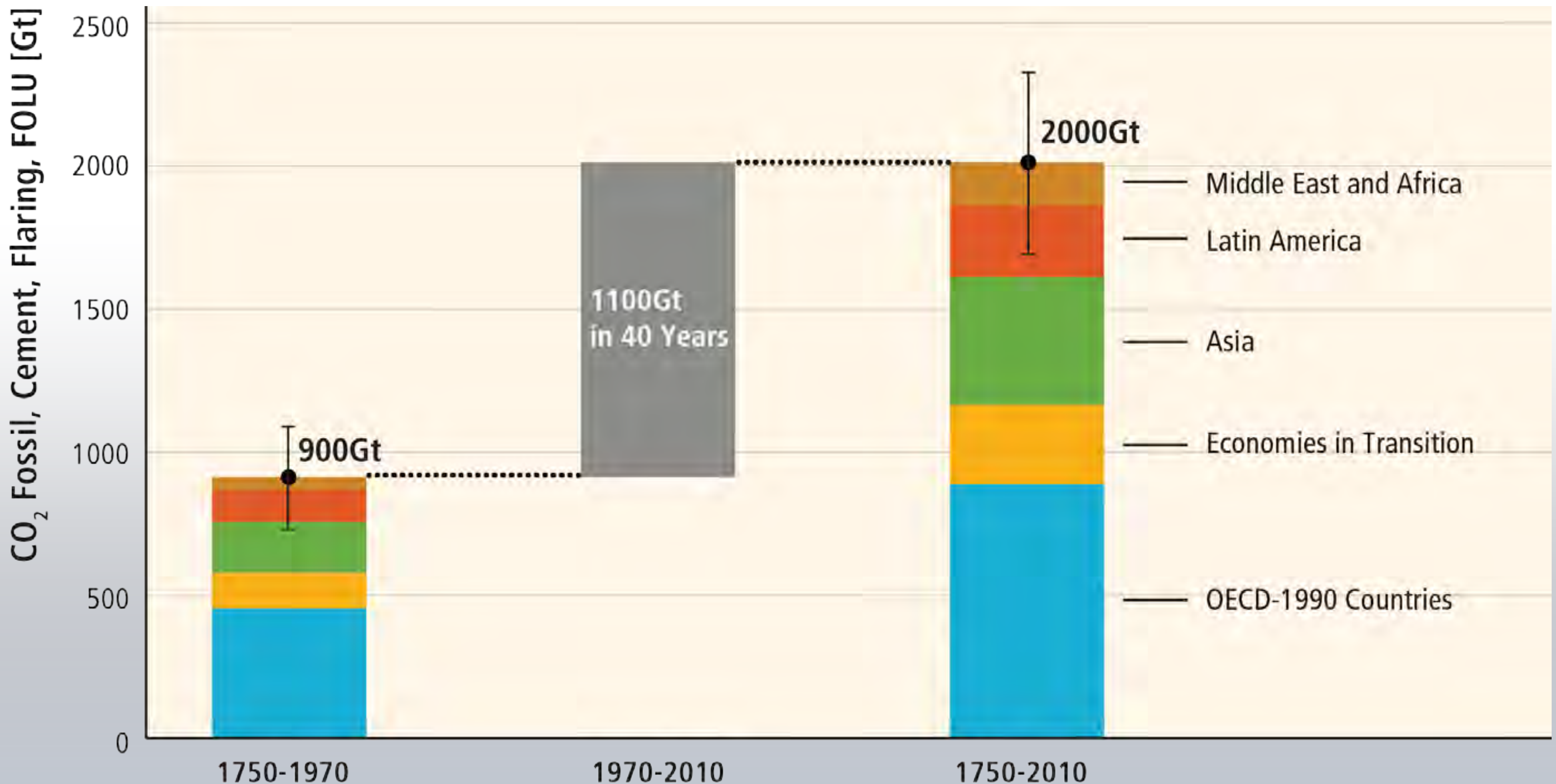
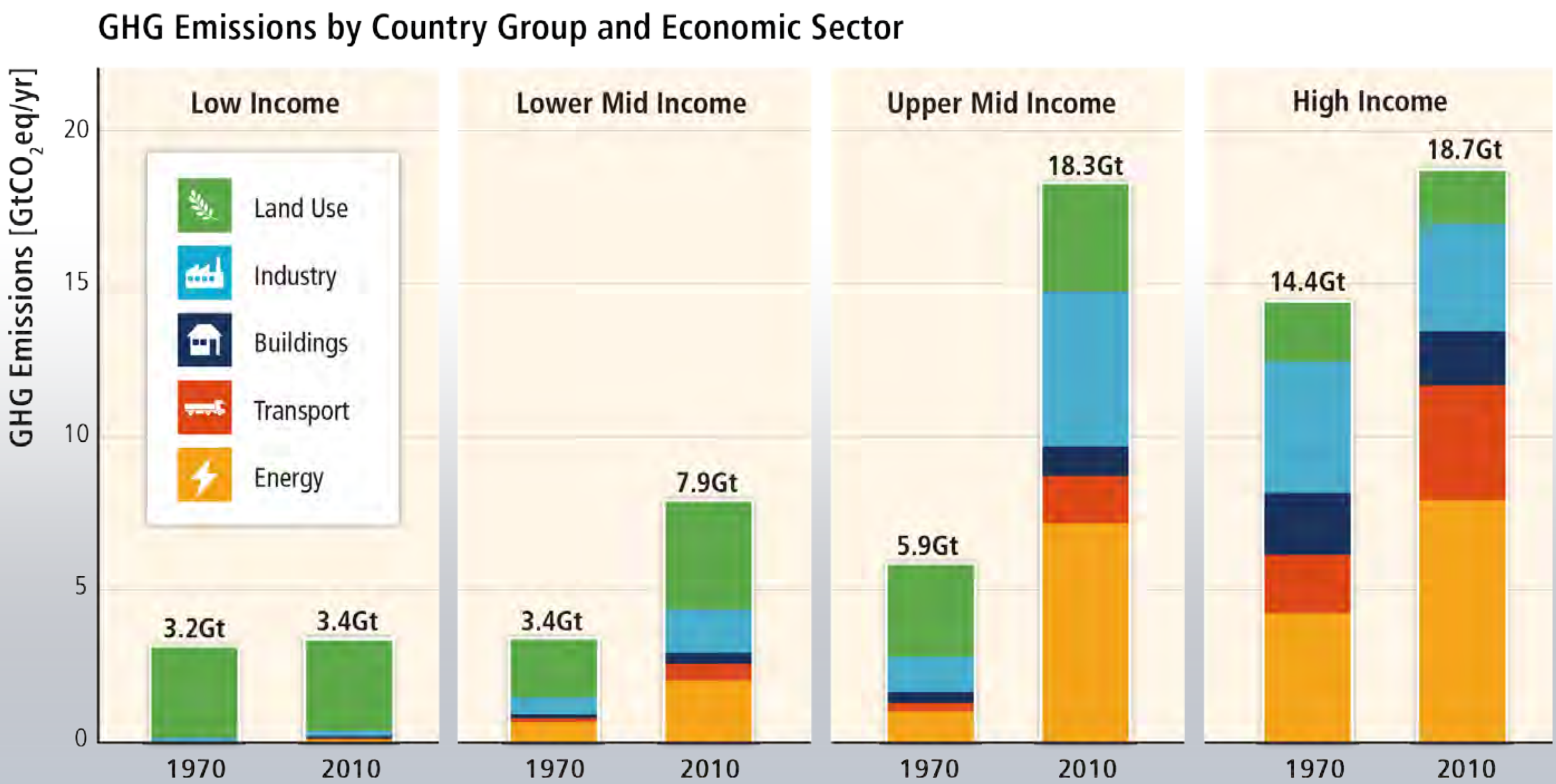
About half of cumulative anthropogenic CO_2 emissions between 1750 and 2010 have occurred in the last 40 years.



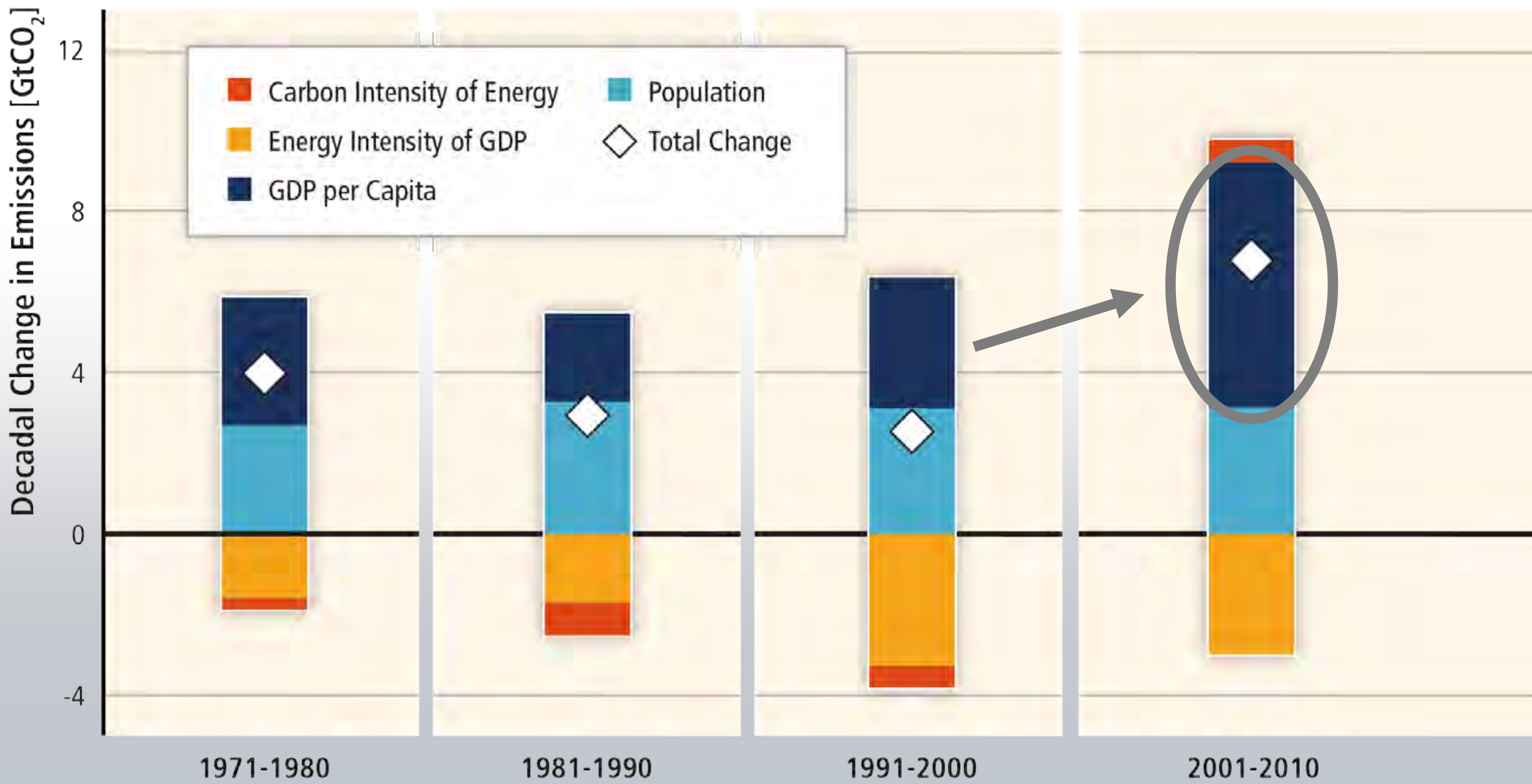
Based on Figure 5.3

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



Based on Figure 1.6

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



Based on Figure 1.7

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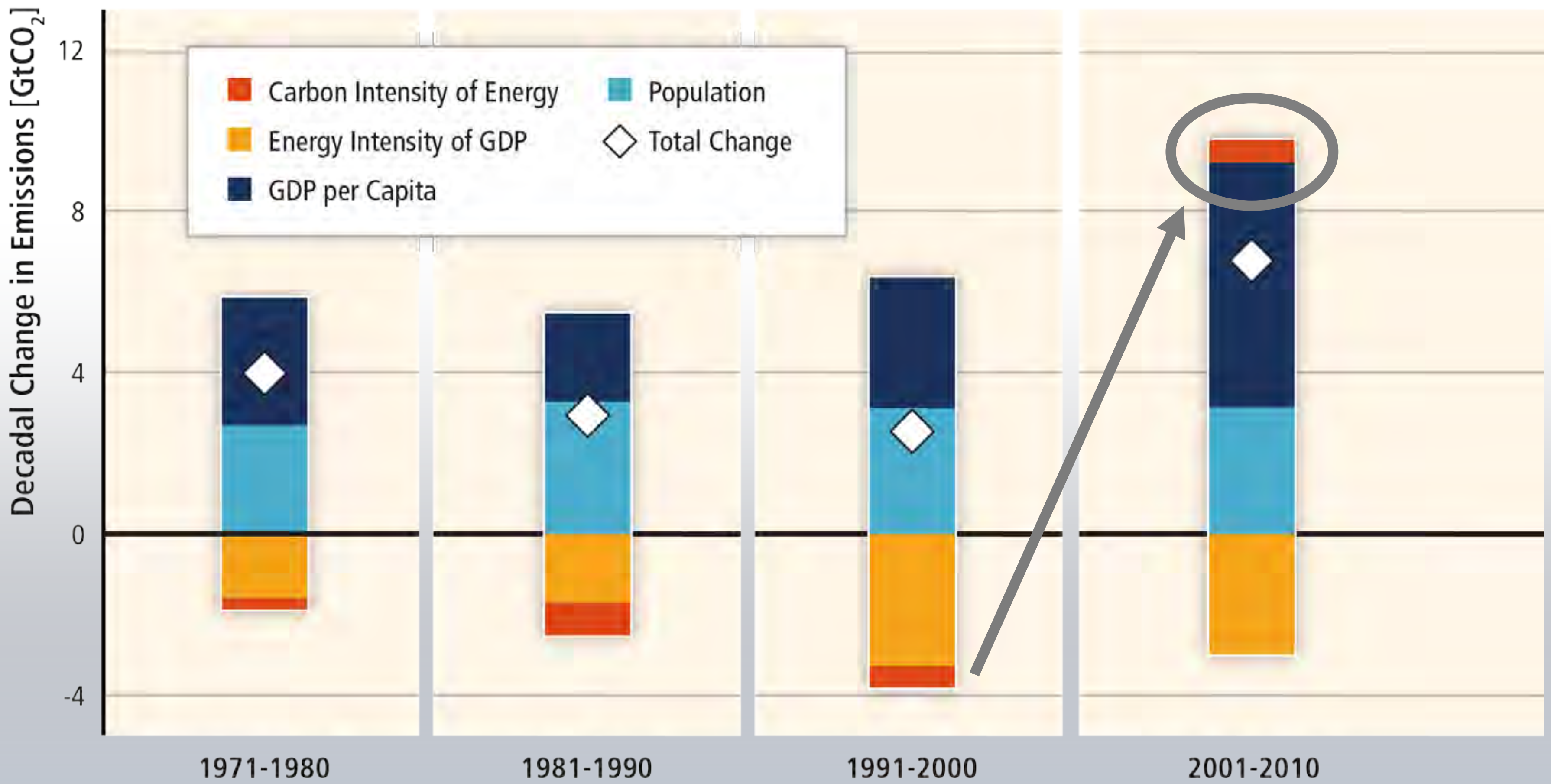
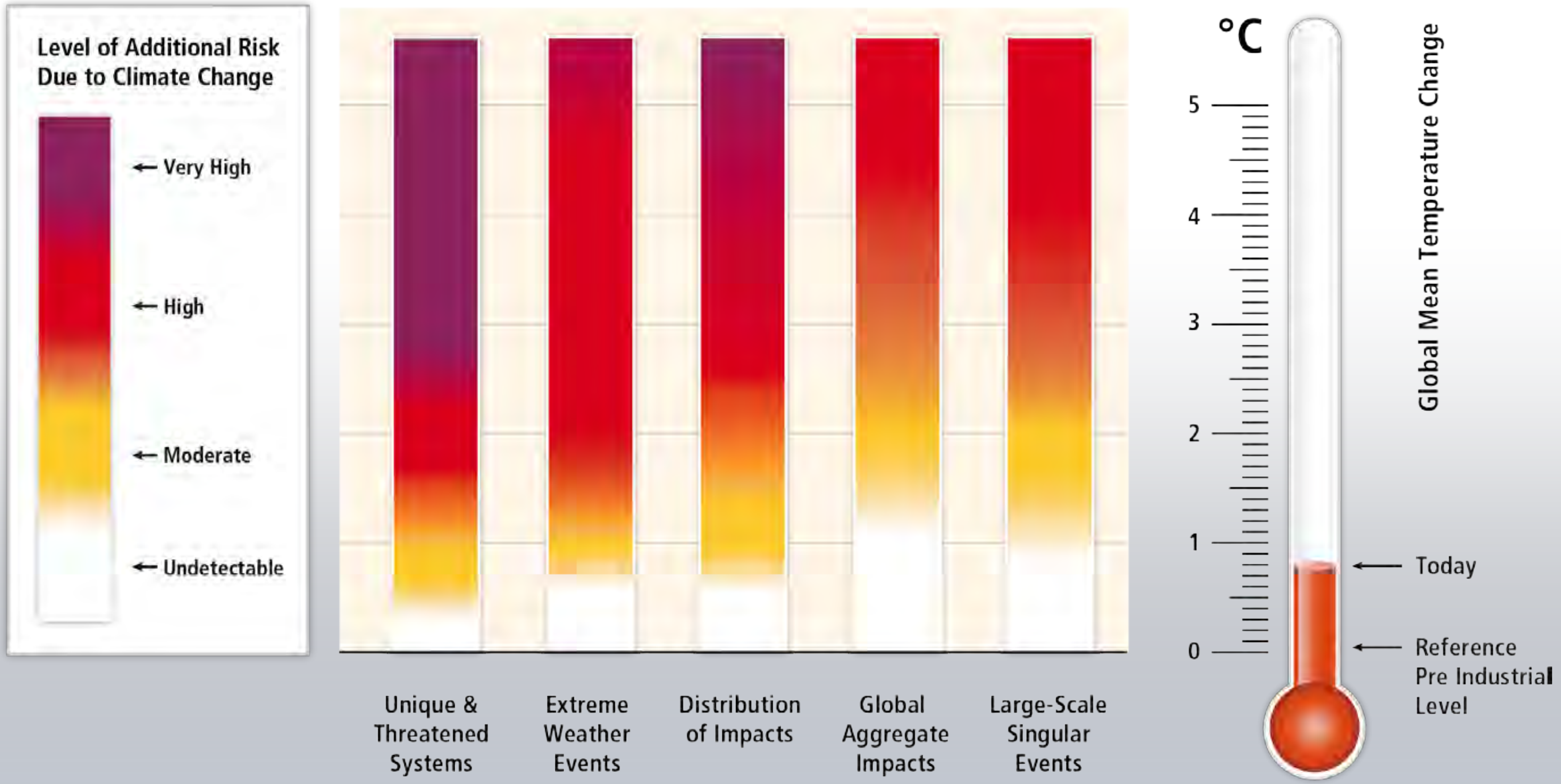


Based on Figure 1.7

Limiting warming to 2 C 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 over the 21st century.



Based on WGII AR5 Figure 19.4

Observed impacts of climate change are widespread and consequential.

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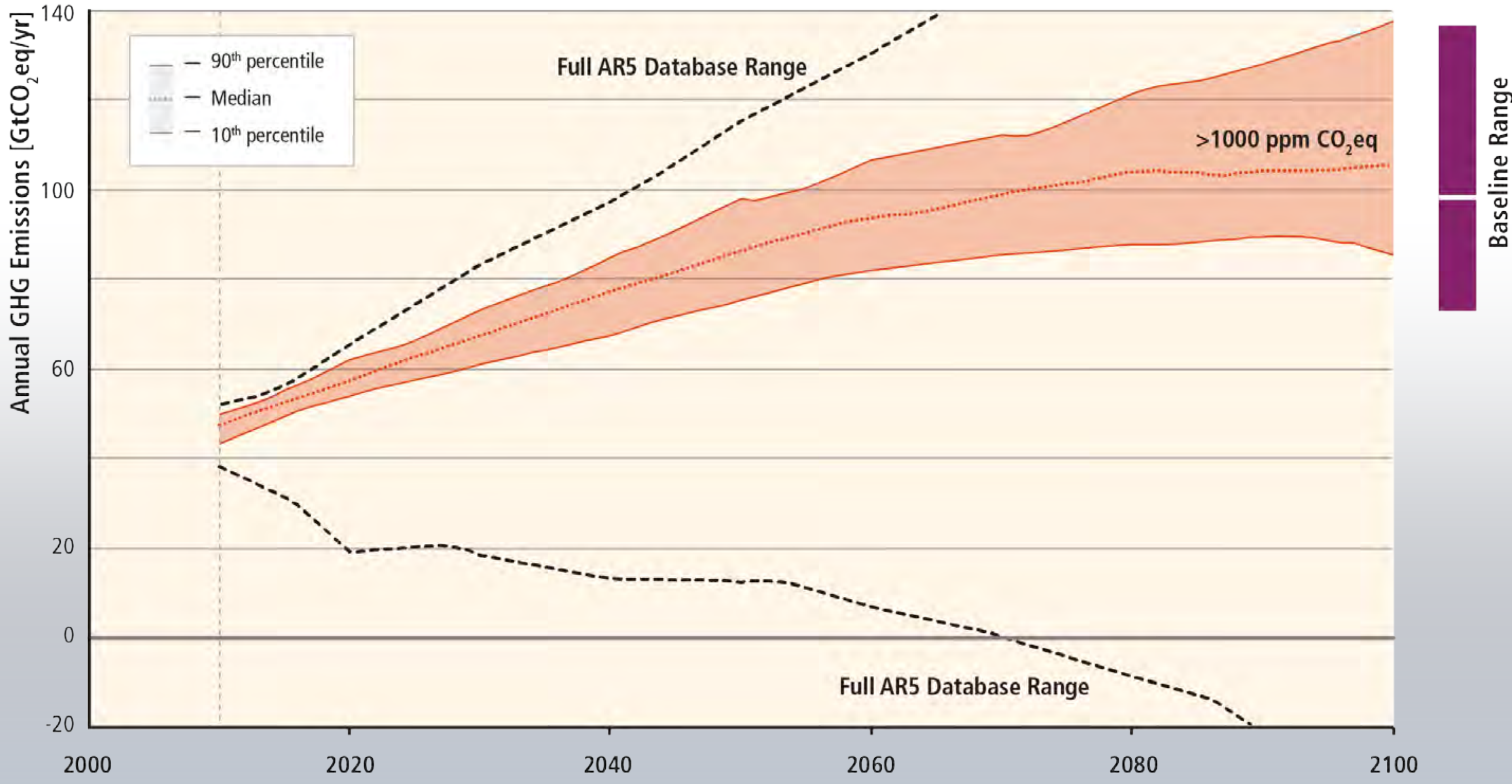
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.



Based on Figure 6.7

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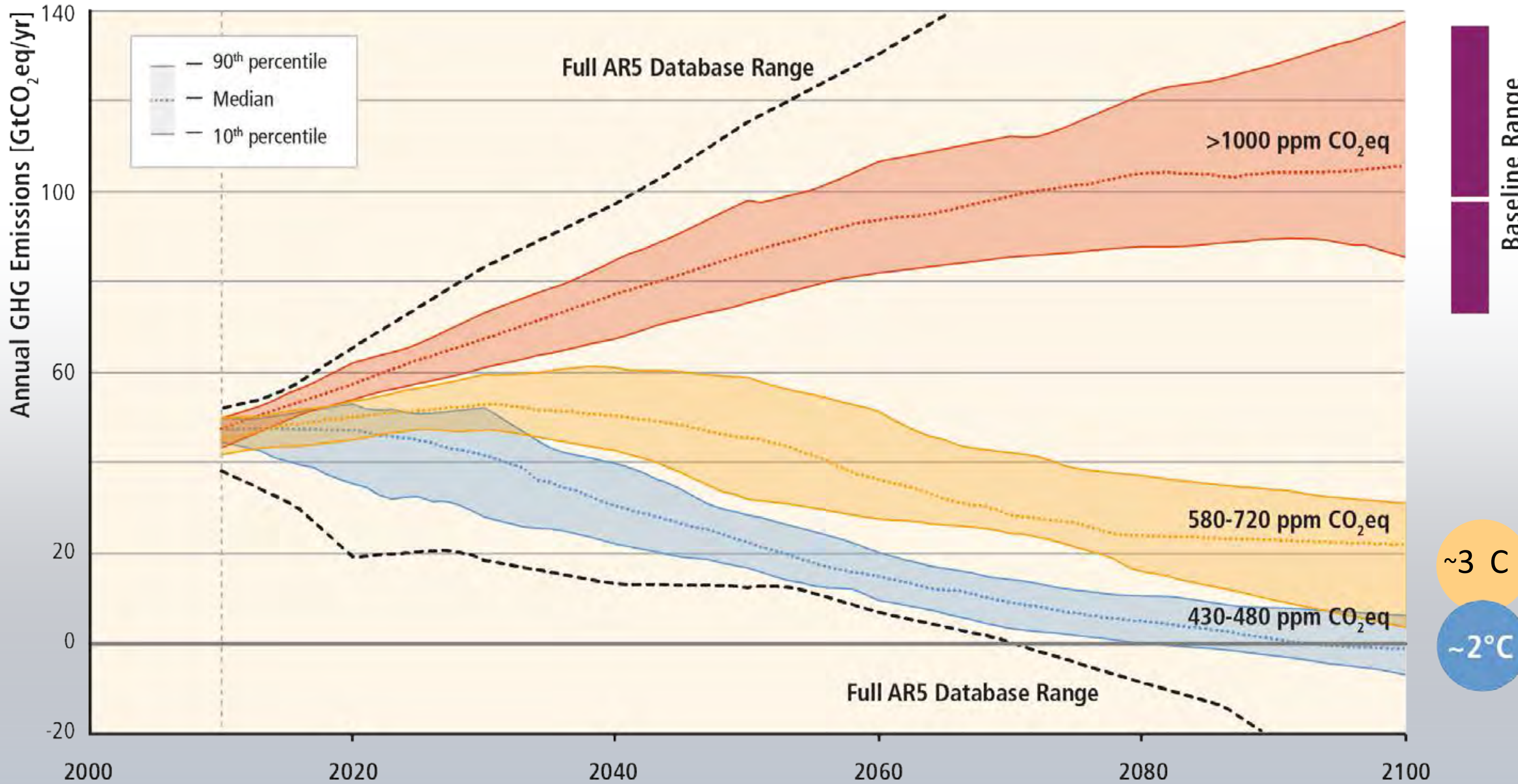
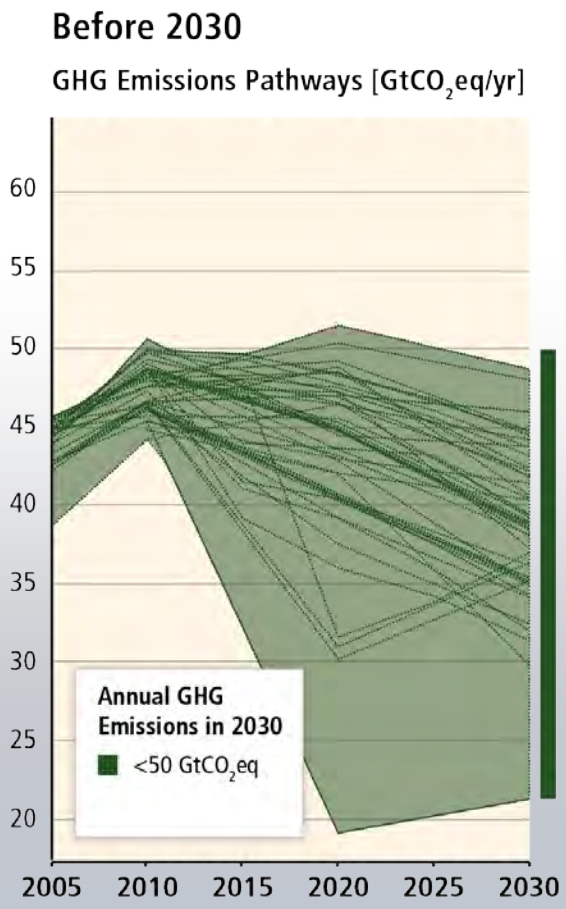


Based on Figure 6.7

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

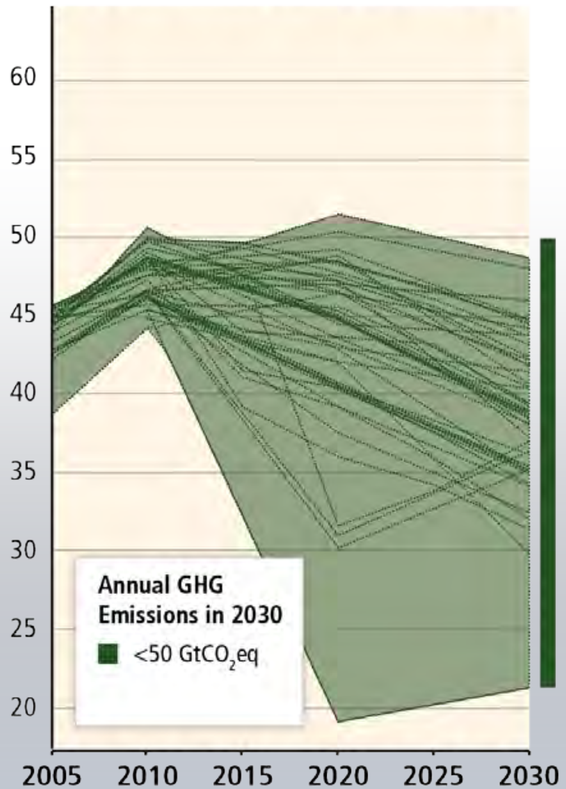


„immediate action“

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

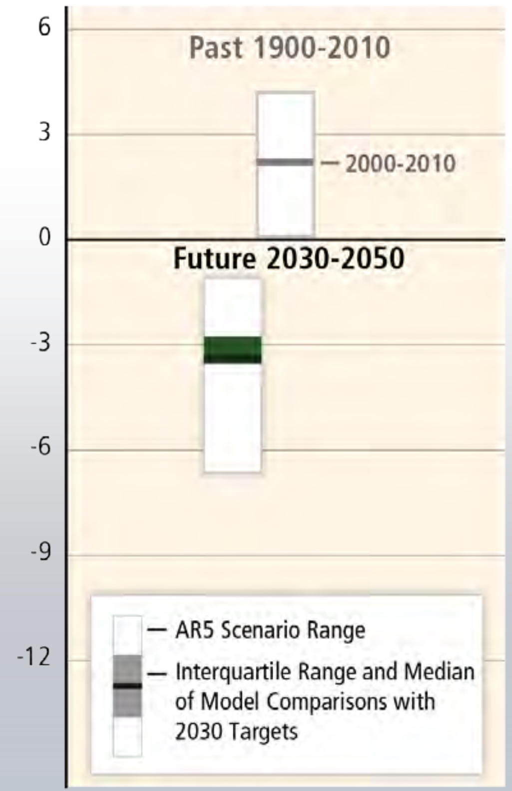
Before 2030

GHG Emissions Pathways [$GtCO_2eq/yr$]



After 2030

Rate of CO_2 Emission Change [%/yr]



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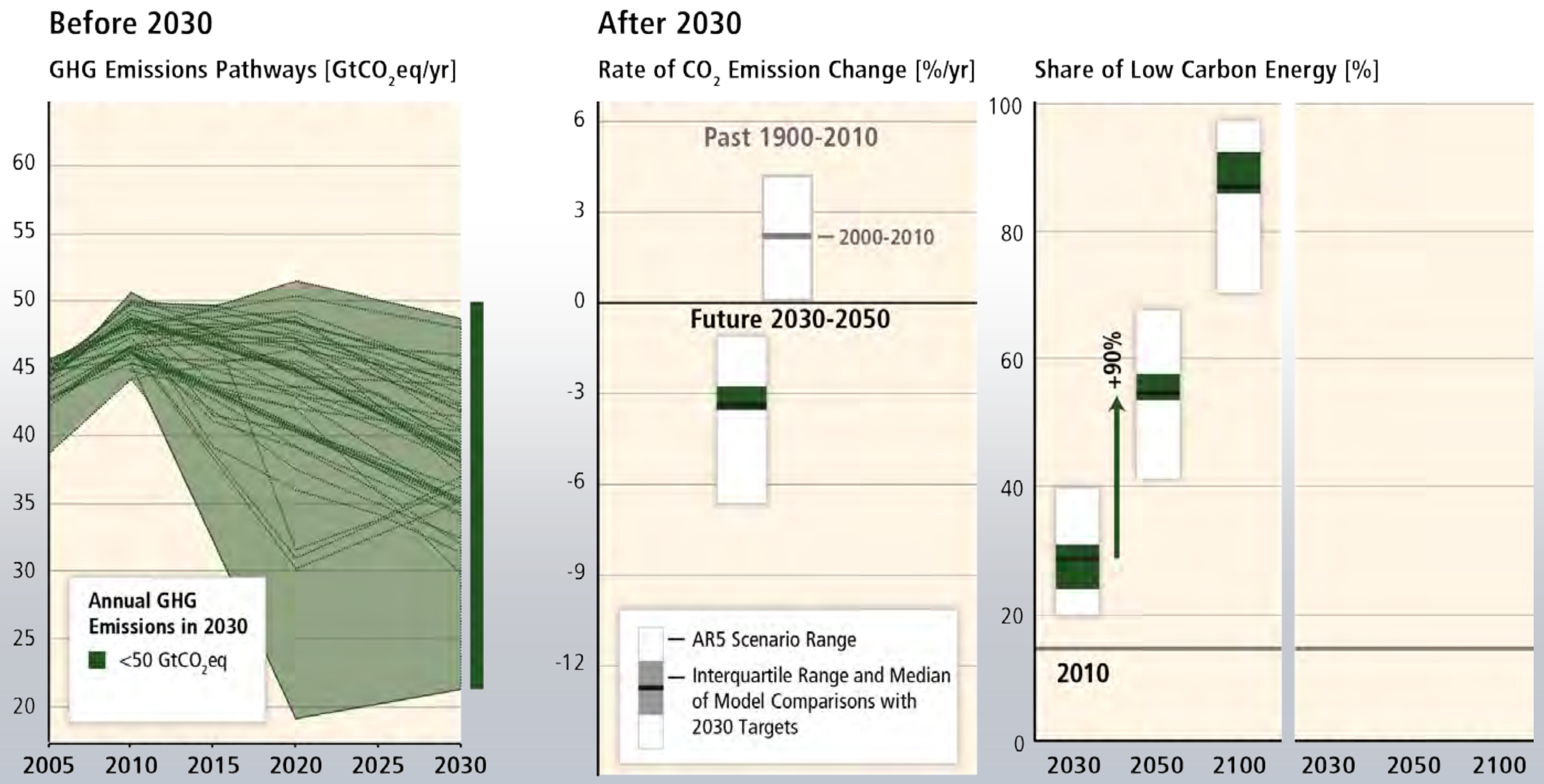
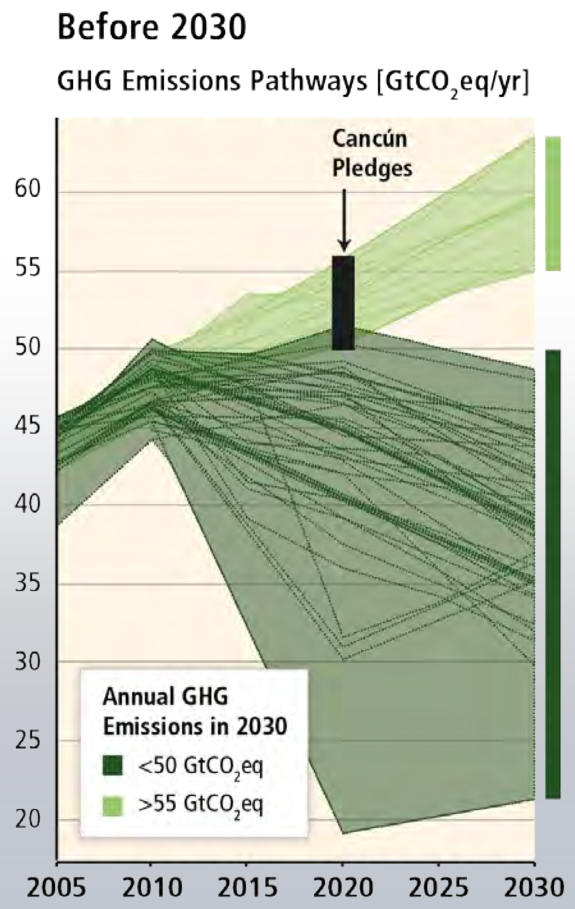


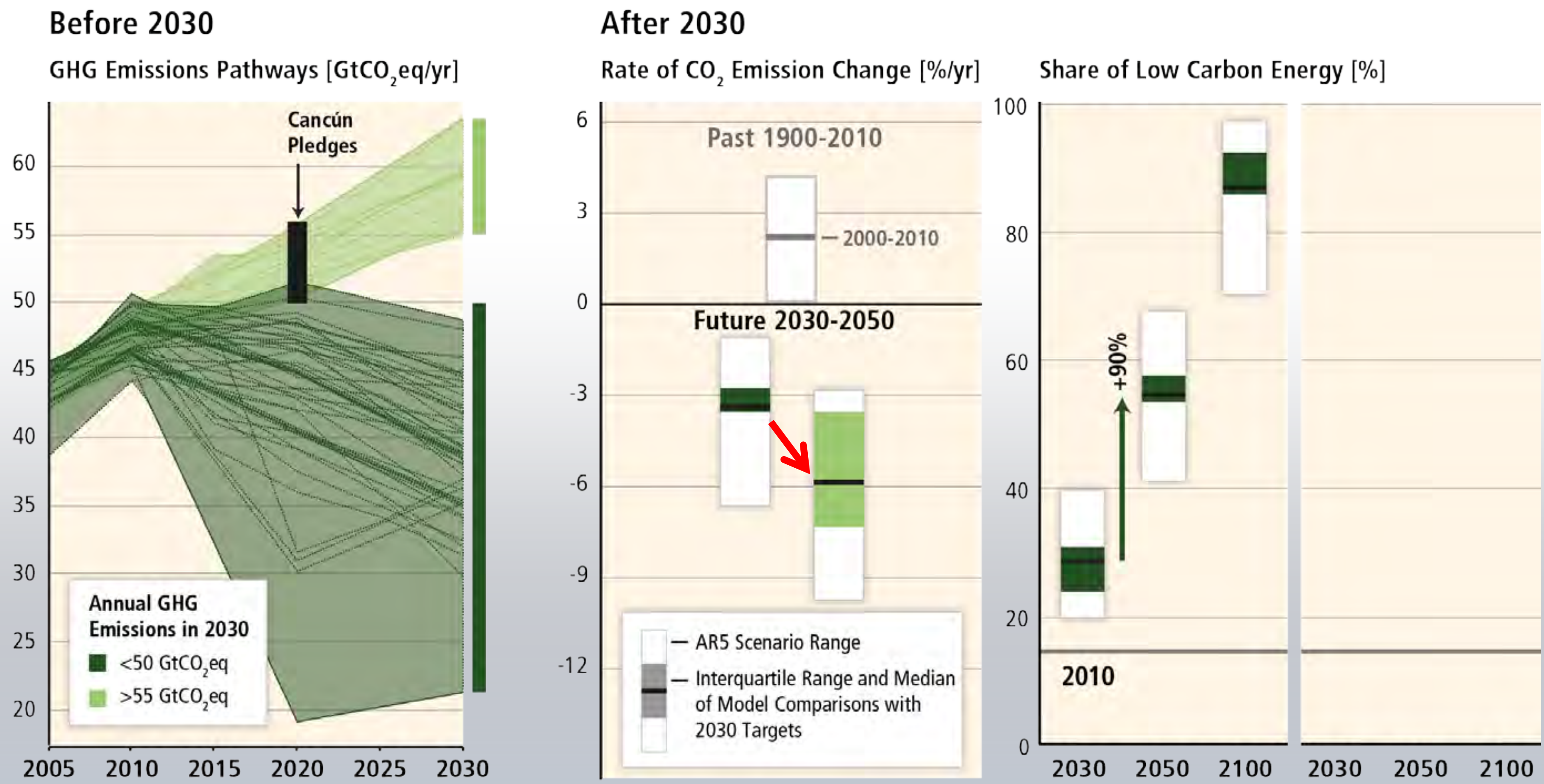
Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.



„delayed mitigation“

„immediate action“

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



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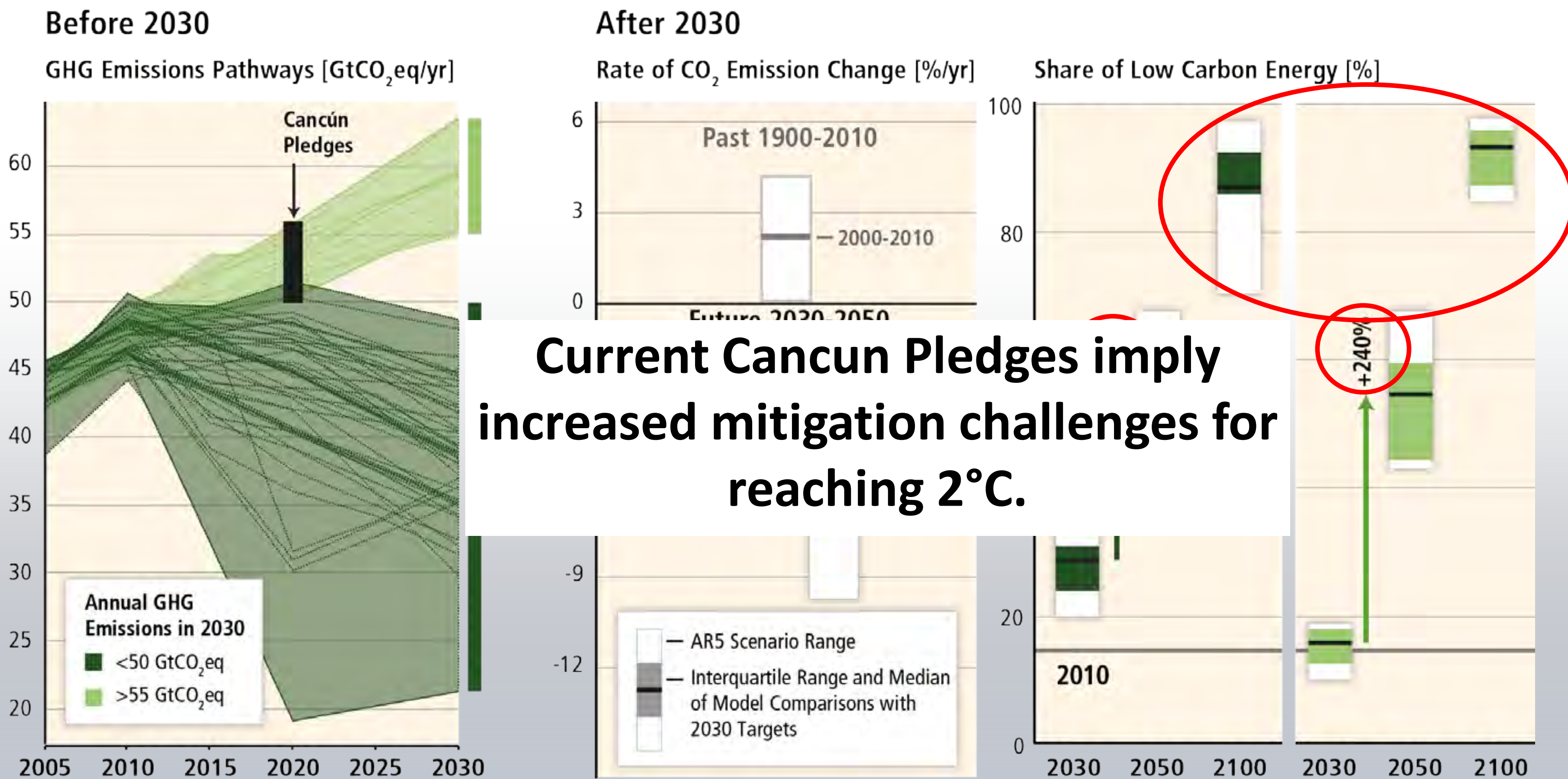
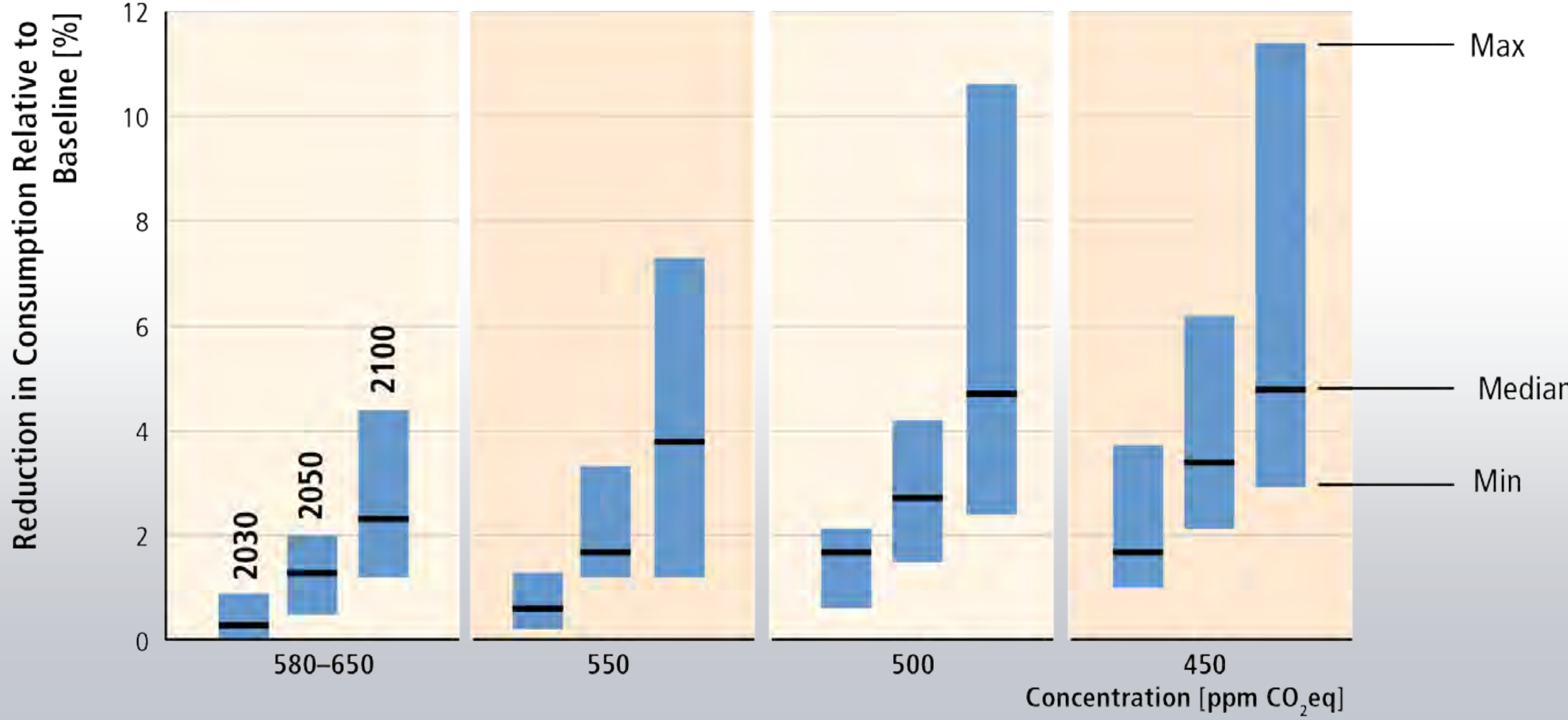


Current Cancun Pledges imply increased mitigation challenges for reaching 2°C.

Based on Figures 6.32 and 7.16

Mitigation cost estimates vary, but do not strongly affect global GDP growth.

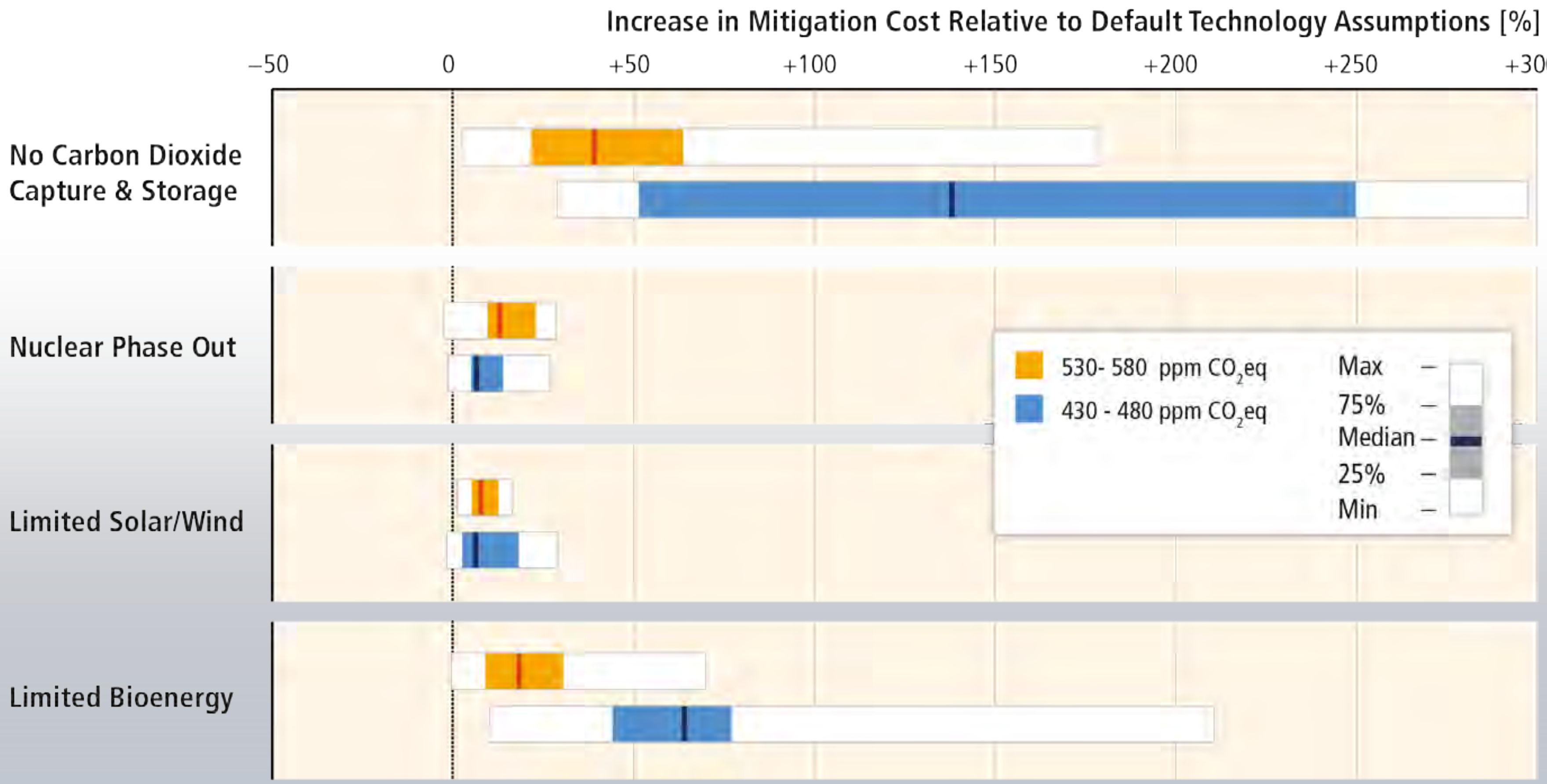
Global costs rise with the ambition of the mitigation goal.



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

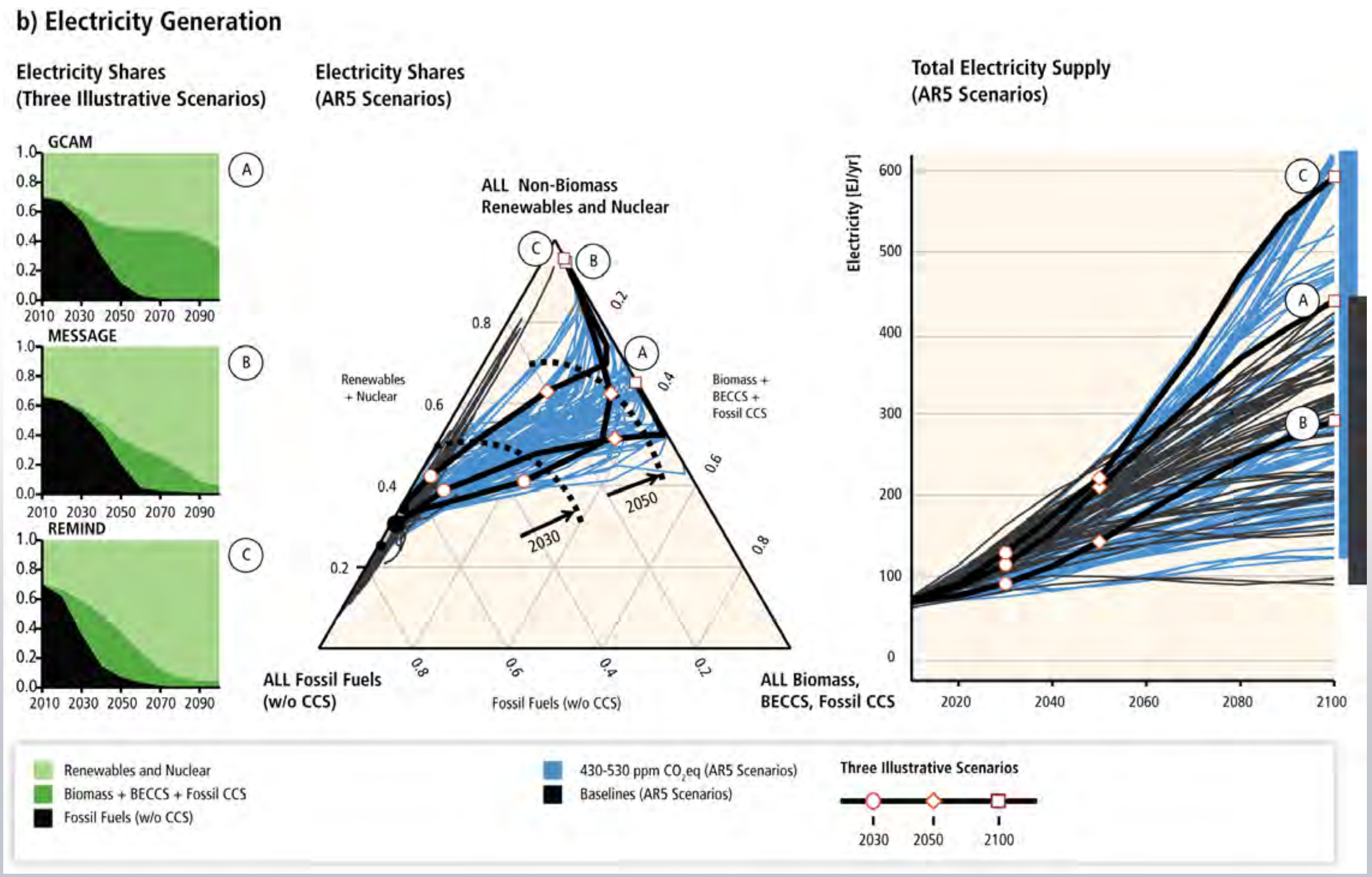
Availability of technology can greatly influence mitigation costs.



Based on Figure 6.24

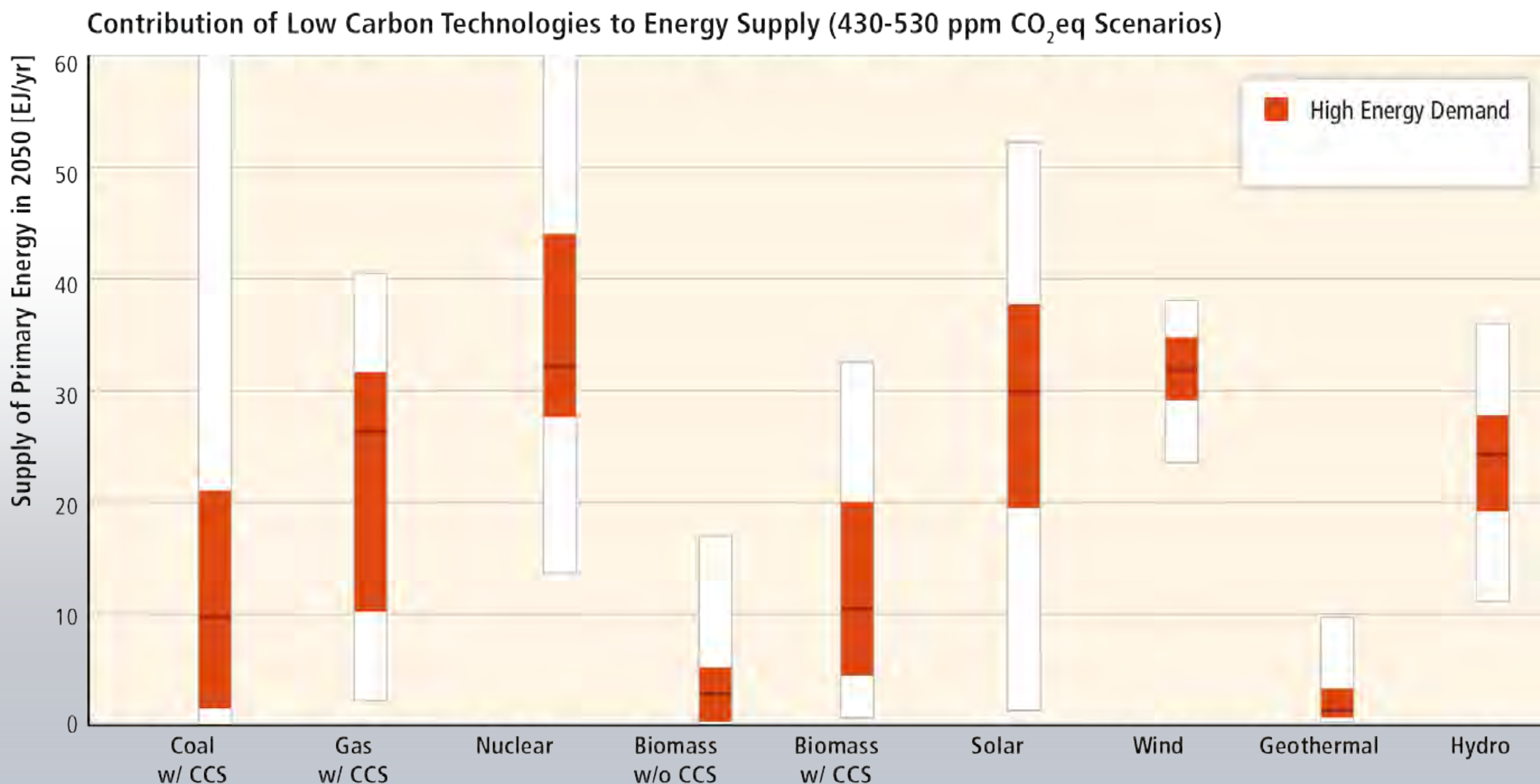

Low stabilization scenarios are dependent upon a full decarbonization of energy supply in the long term.

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



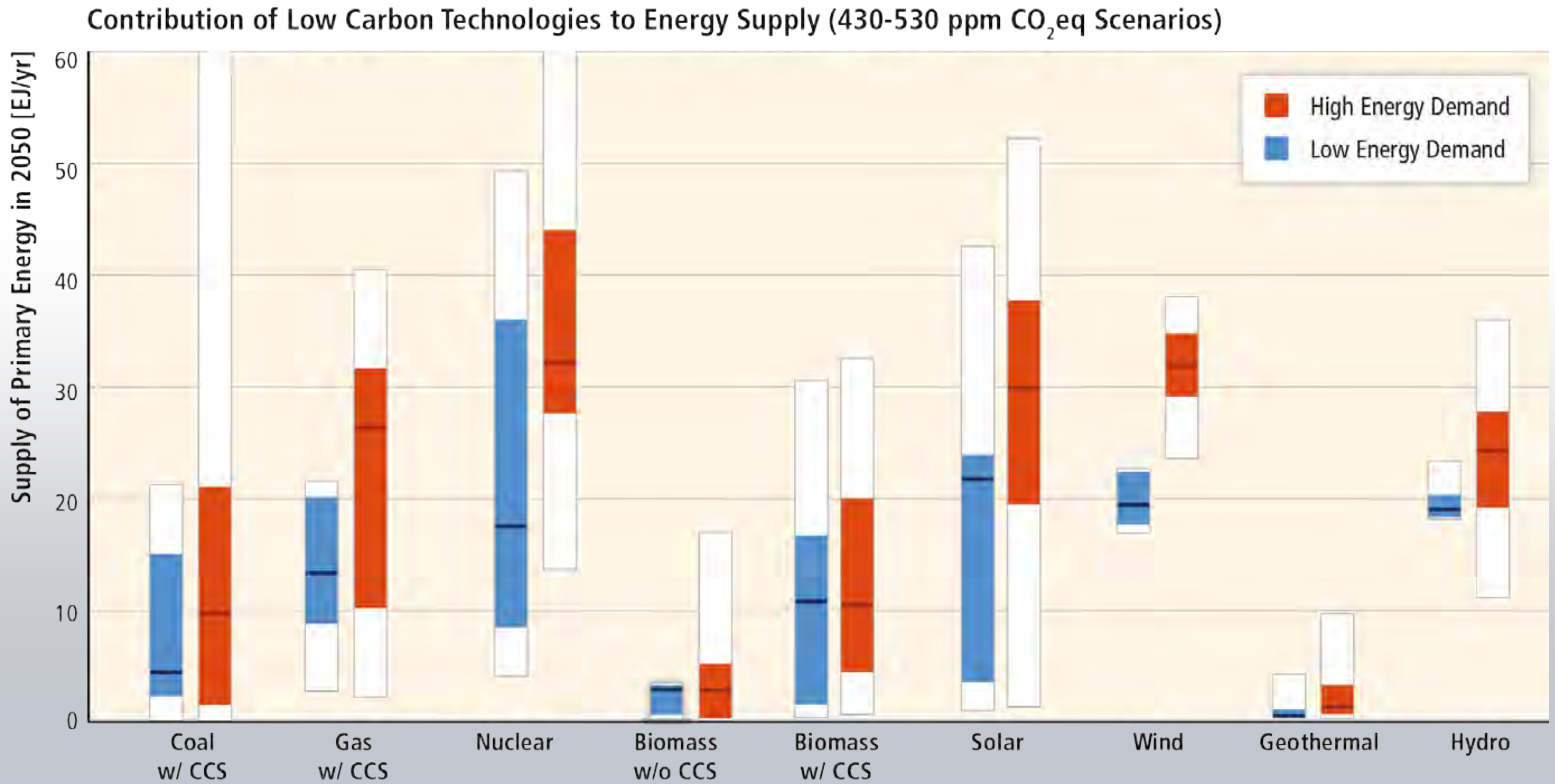
Based on Figure 7.15b

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



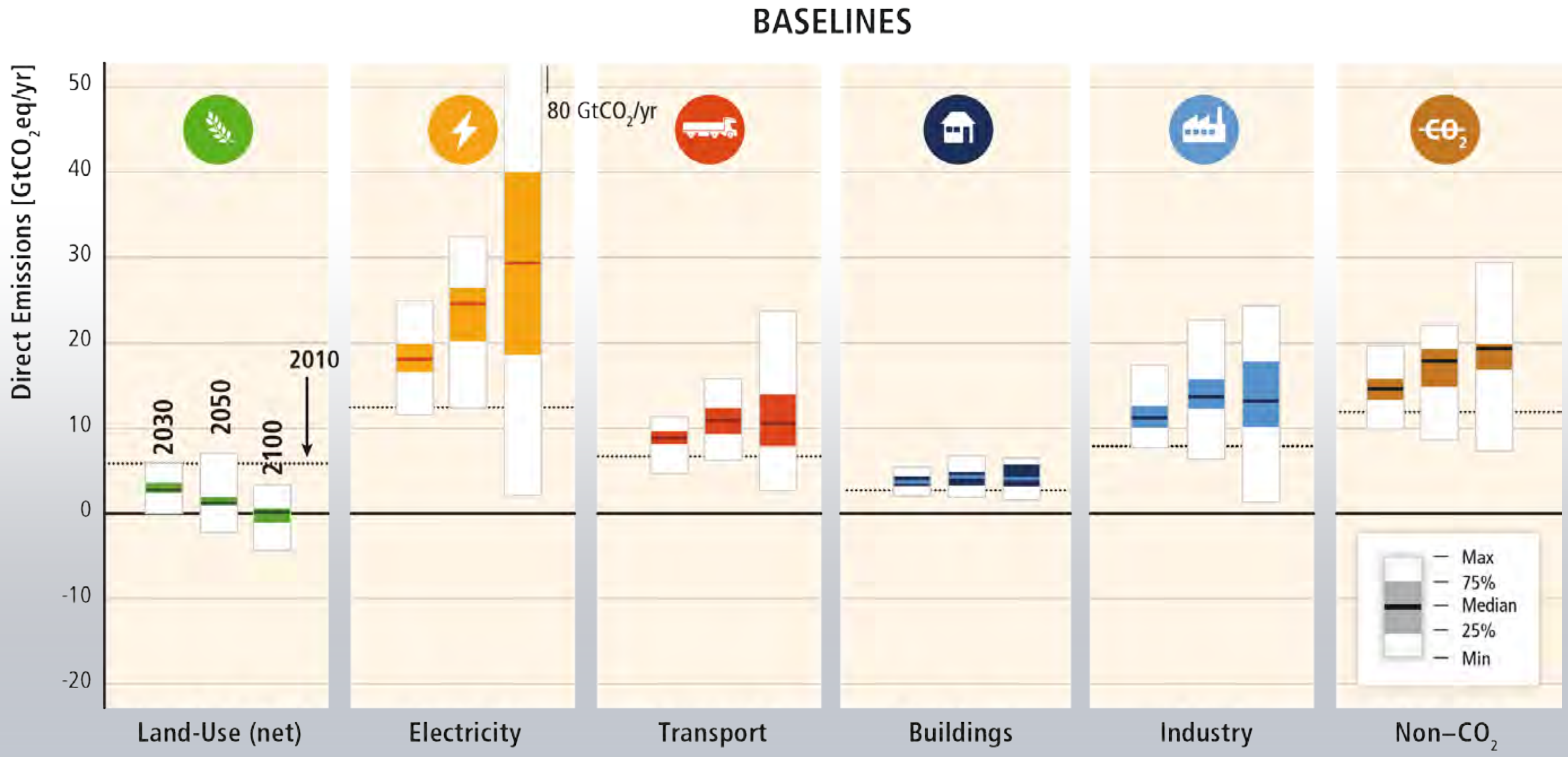
Based on Figure 7.11

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



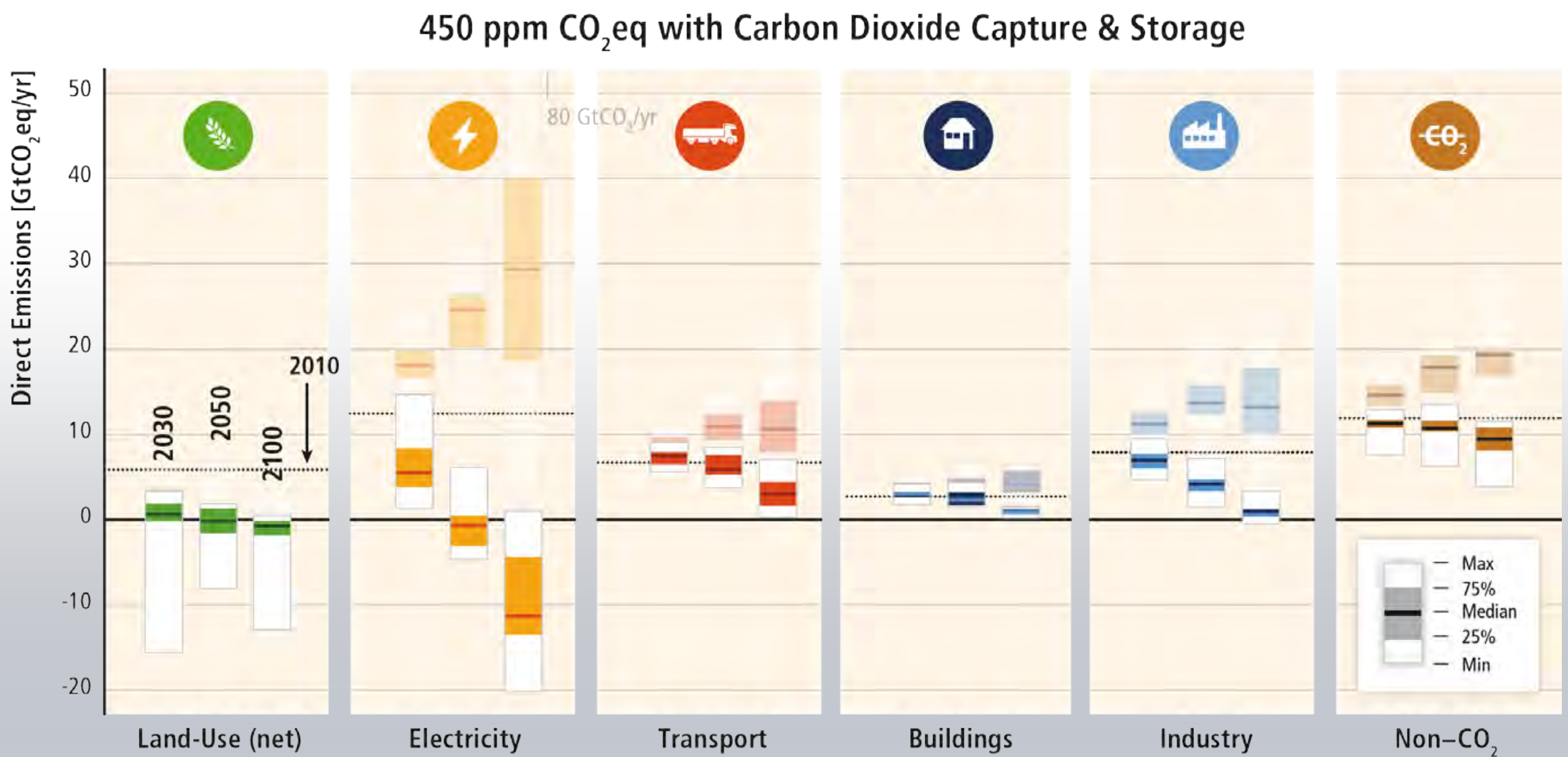
Based on Figure 7.11

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



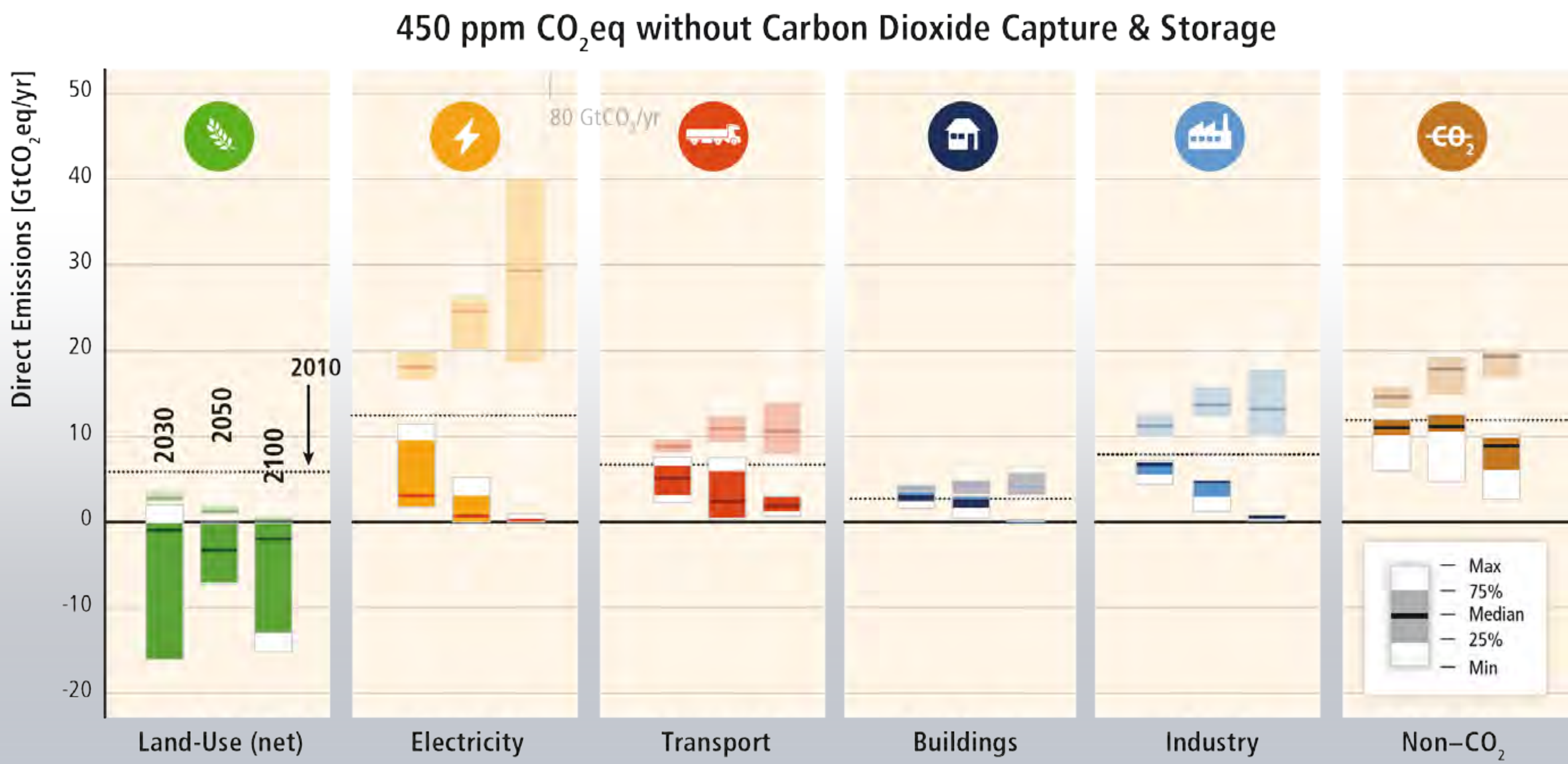
Based on Figure TS.17

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



Based on Figure TS.17

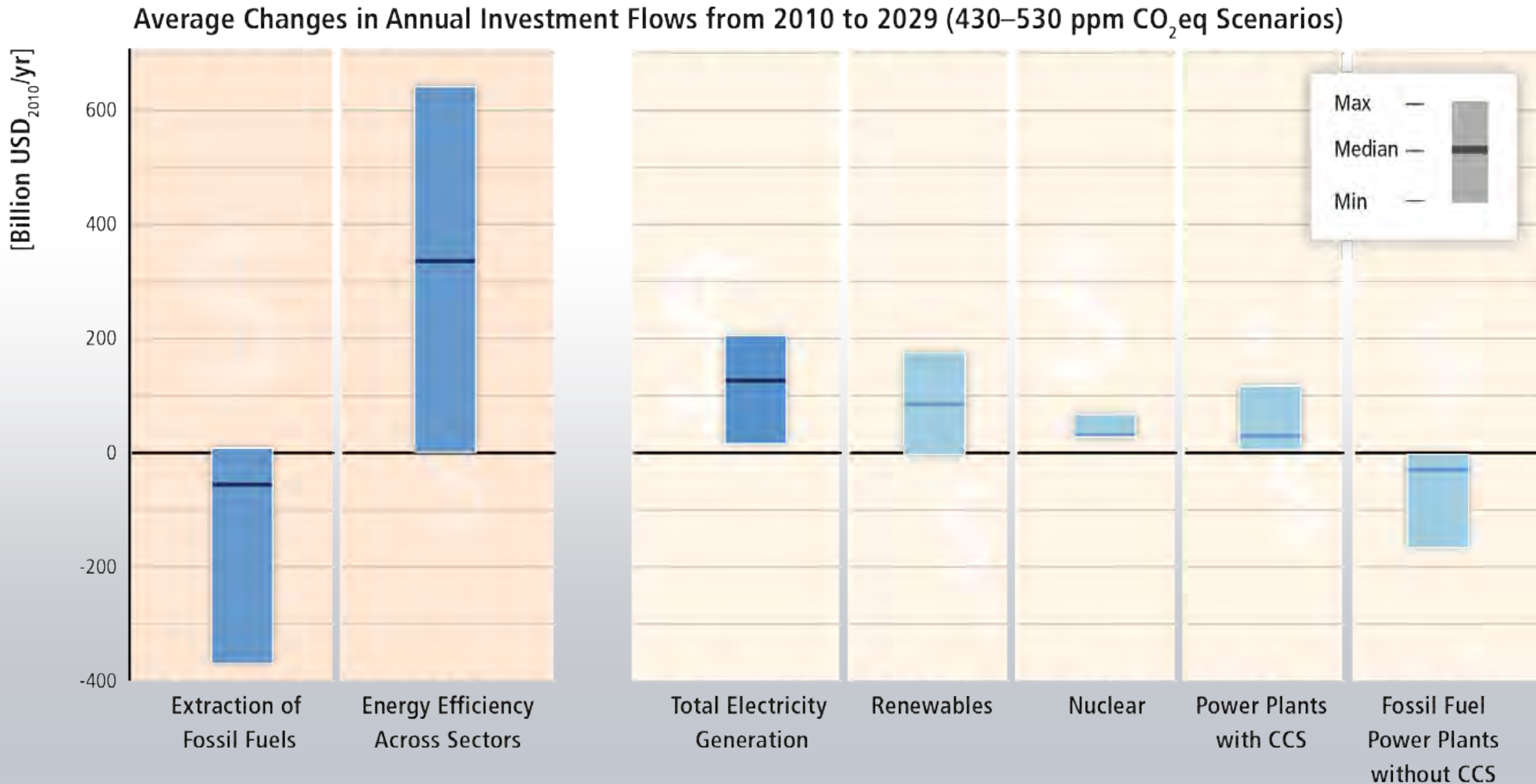
Mitigation efforts in one sector determine efforts in others.



Based on Figure TS.17


Effective mitigation will not be achieved if individual agents advance their own interests independently.

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

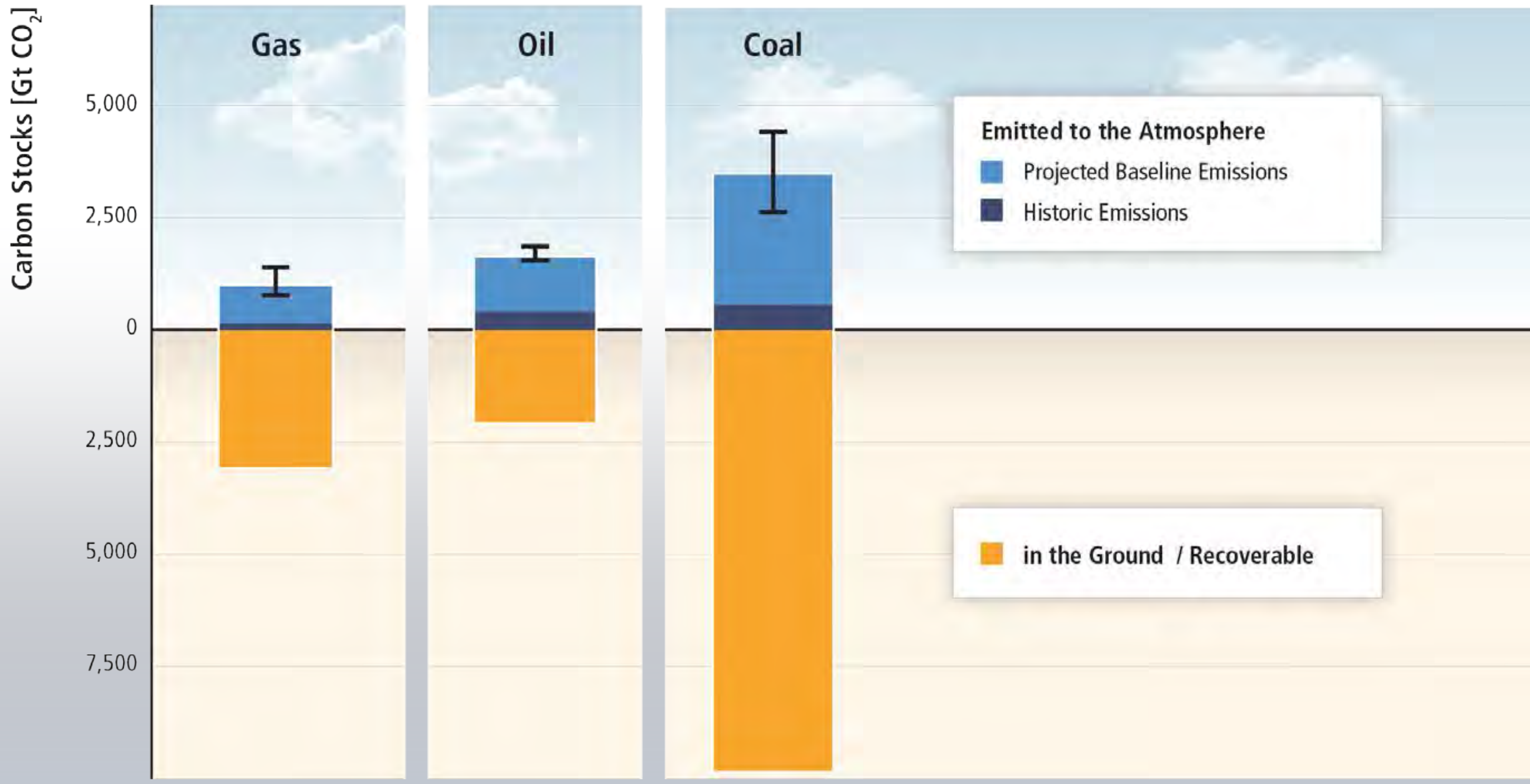


Based on Figure 16.3

… what does this imply for European climate and energy policy?

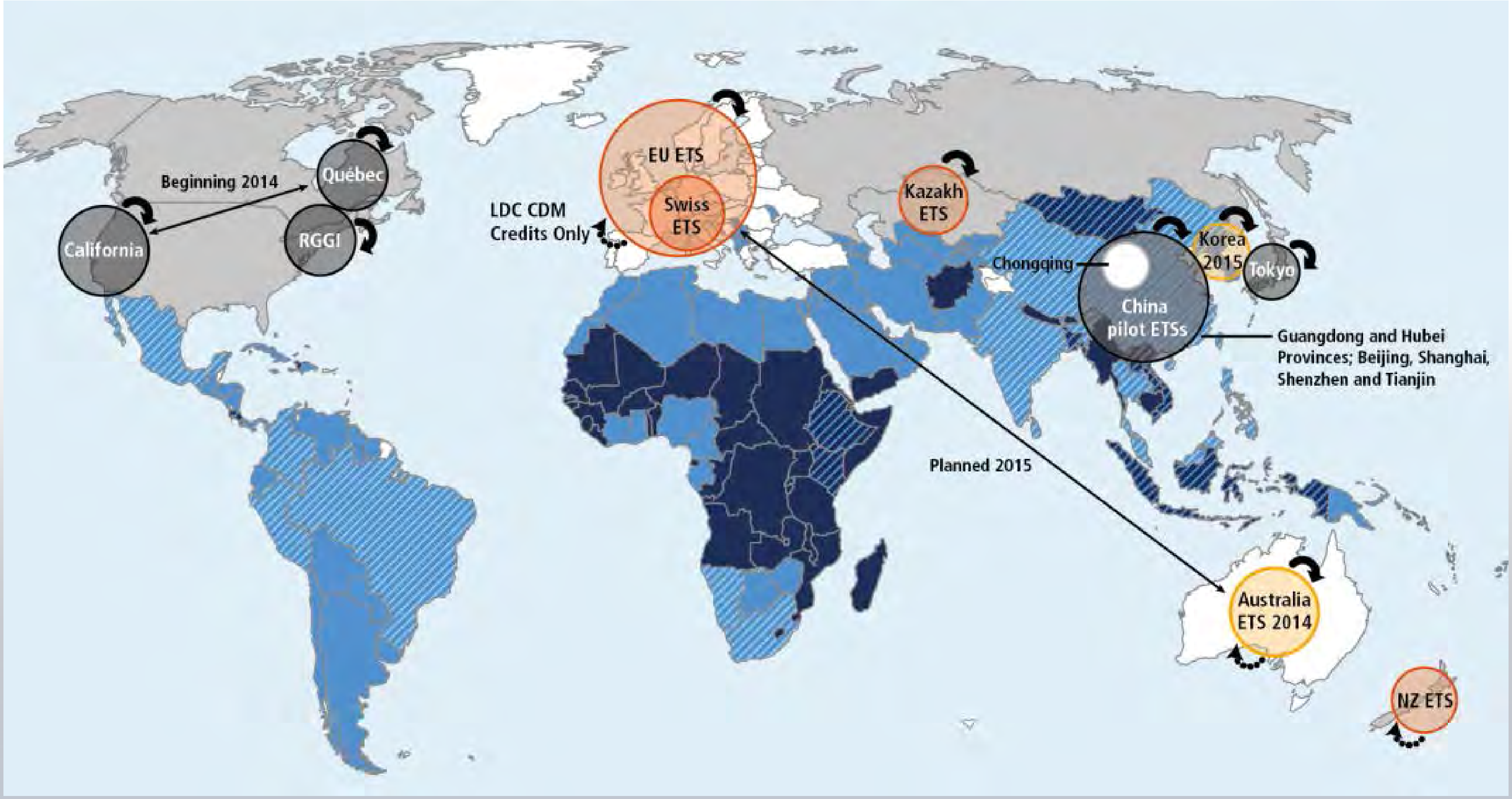
- Own thoughts -

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



Based on SRREN Figure 1.7

Are emission trading schemes part of the solution?



IPCC, siehe Abbildung 13.4

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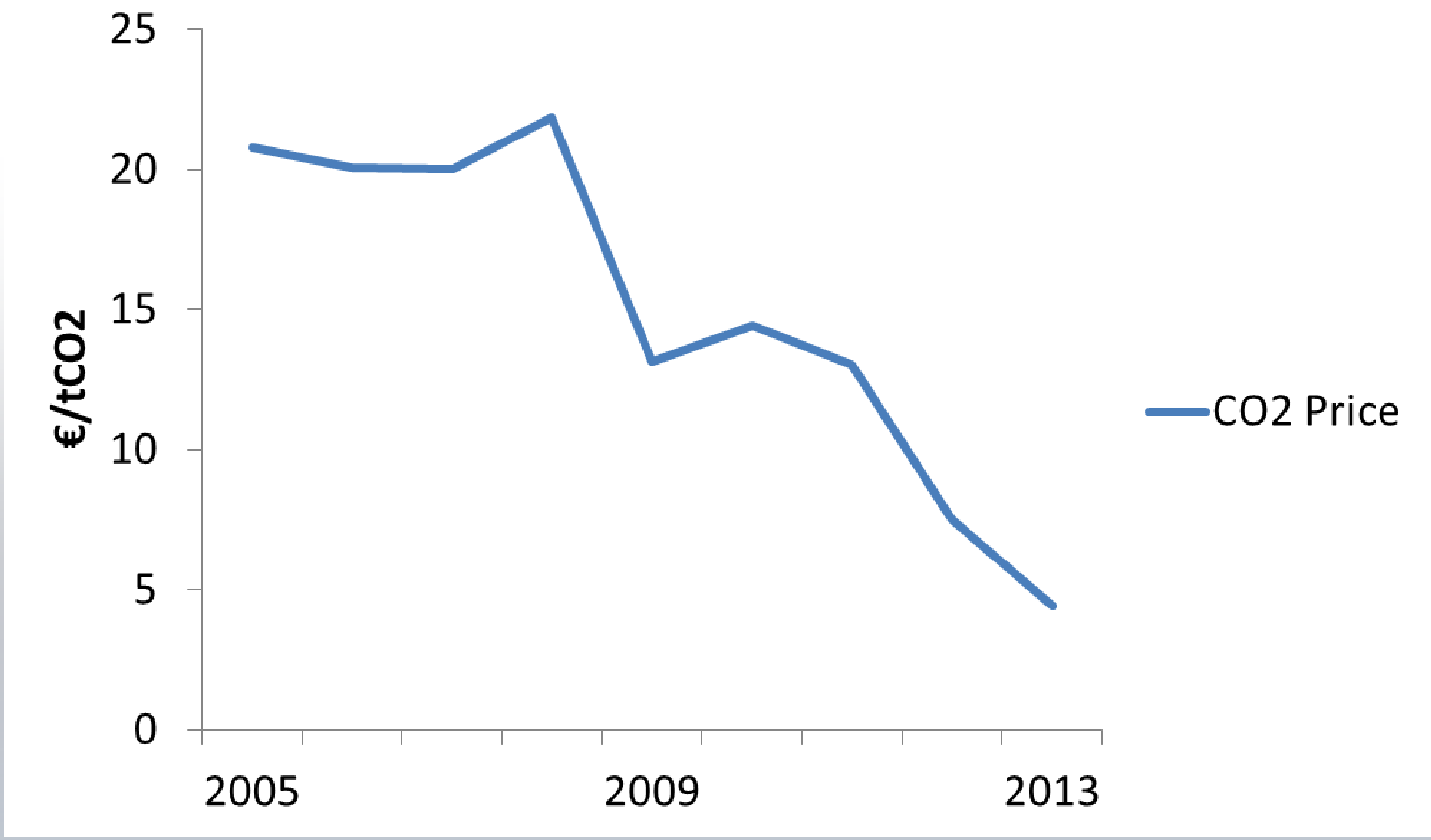
The EU ETS: ex-post analysis

- Strong decline of CO_2 price



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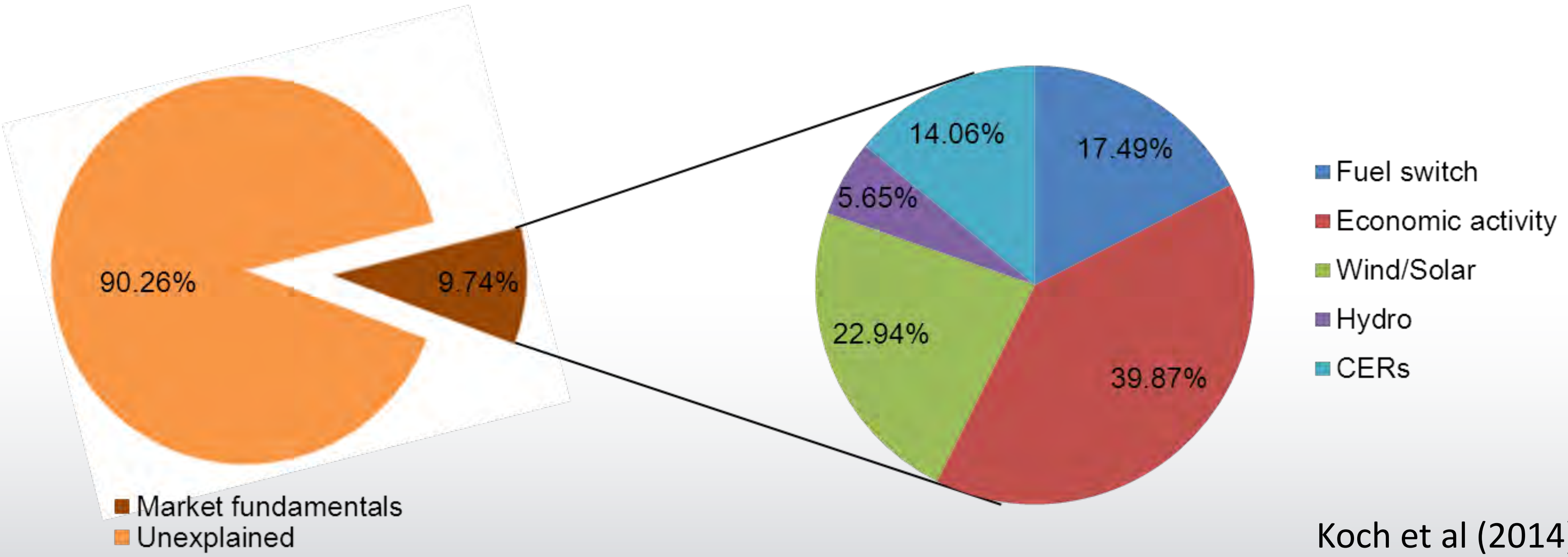
Empirical evaluation of price drivers of EU emission allowances



Koch et al (2014)

- Only 10% of price formation can be explained by market fundamentals (renewable deployment, economic crisis, CDM, …)
- But when taking into consideration policy events dummies (e.g. backloading vote) explanatory power jumps from 10% to 44%.
- In the situtation with the non-binding cap, the standard price formation does not work

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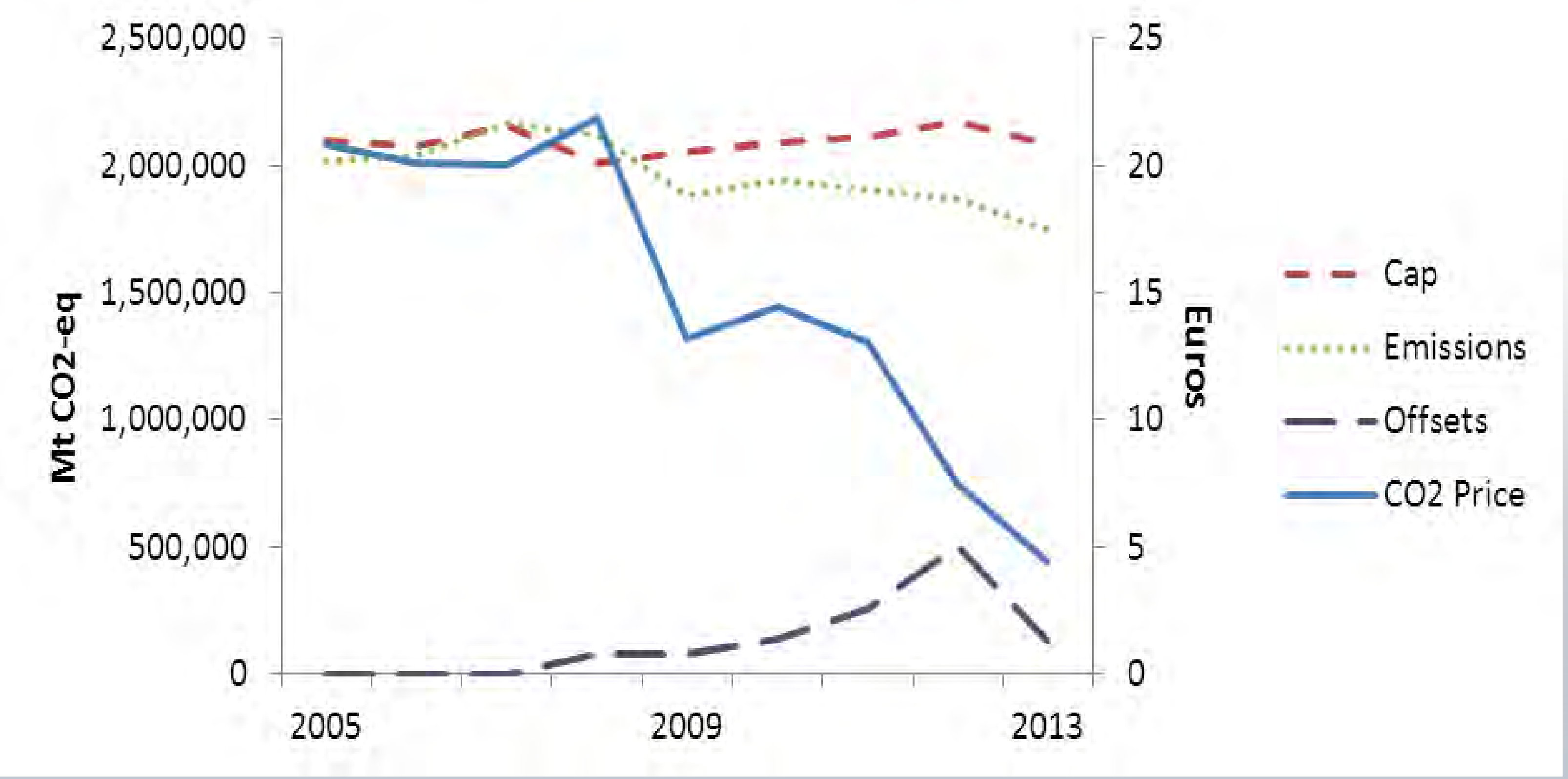
Evaluation of the environmental effectiveness

- Emission cap was legally binding. But is has not been physically binding as emissions stayed below the cap.



Grosjean et al. 2014

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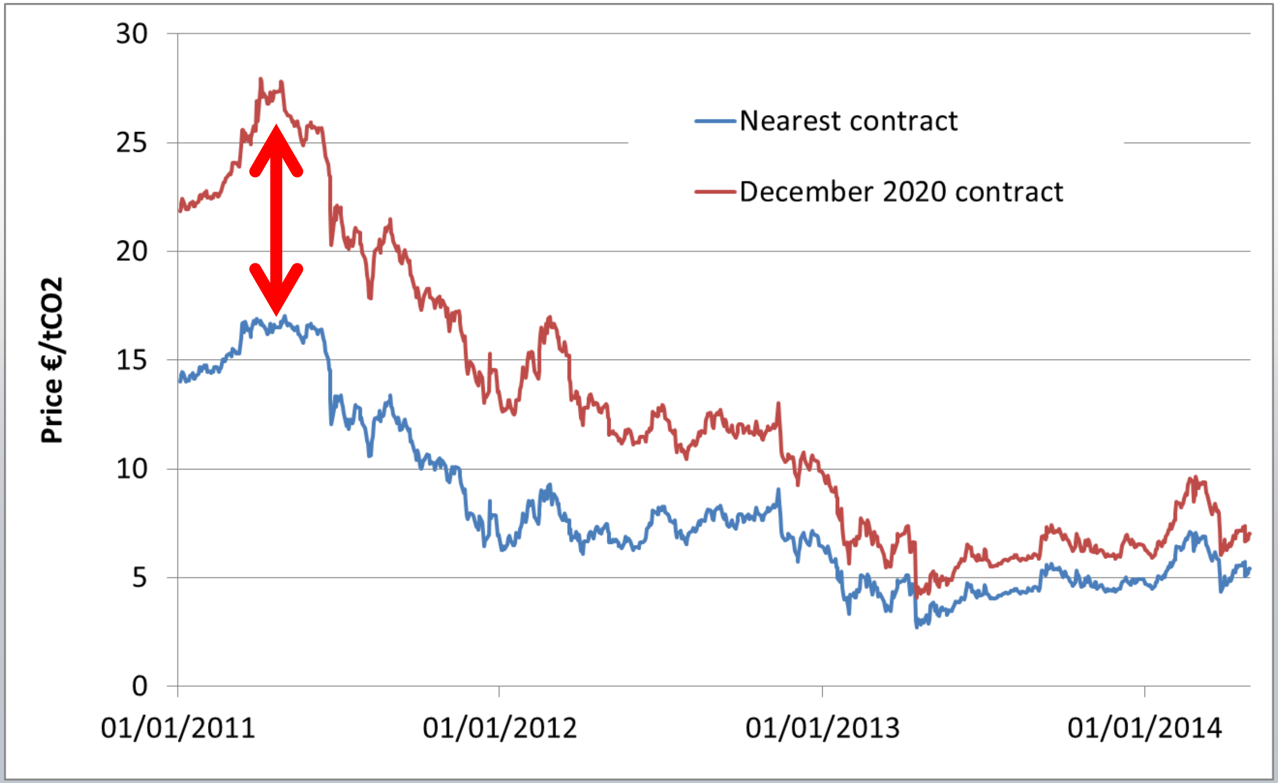
Dynamic cost-effectiveness of ETS is lacking

- Declining CO_2 price
- Currently , no substantial price increase expected for 2020 (only little spread between nearest contract and future contract for 2020)

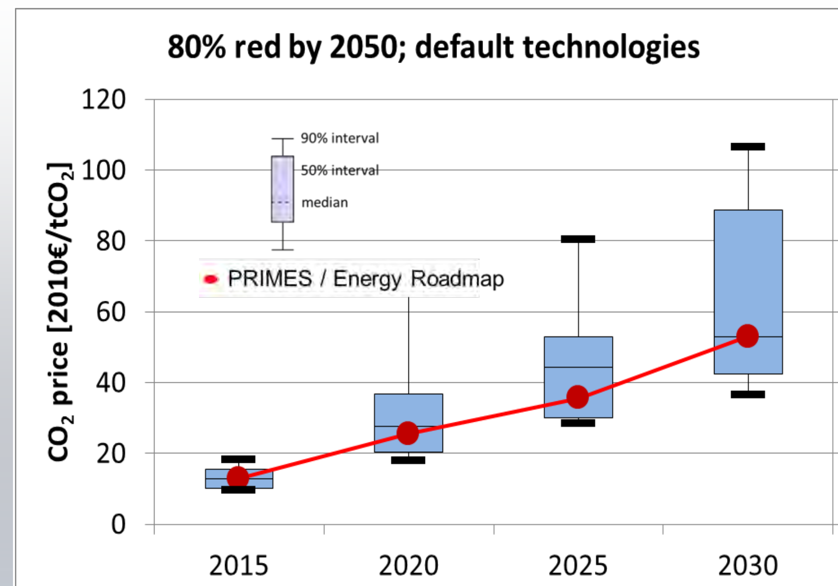


Dynamic cost-effectiveness of ETS is lacking

- Consider the price in 2020 as a benchmark for evaluating dynamic cost-effectiveness of the ETS
- There is a gap between expectations and models that suggest a cost-effective price higher than 20€ / tCO_2 in 2020

EUA nearest contract and Futures 2020

Cost-effective CO_2 price from modeling



Knopf et al. (2013)

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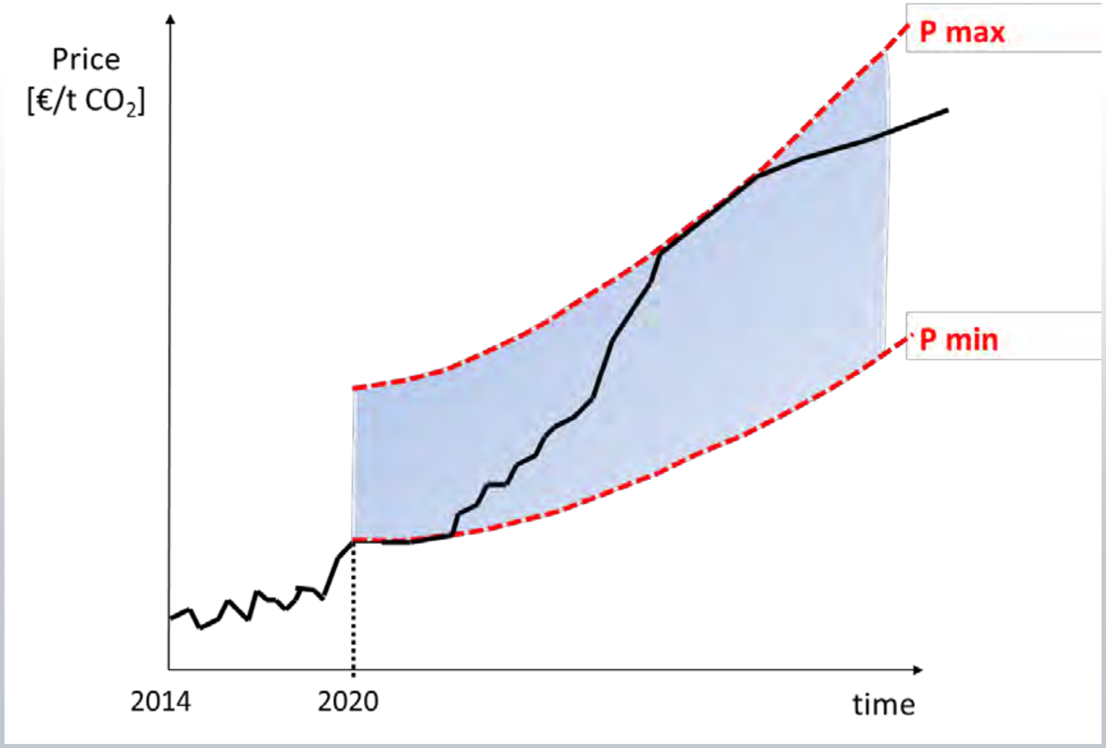
Setting a price collar

- Gives reliable framework for investment decisions



Granted, international climate policy may not be effective enough, but do we need climate policy at all aren‘t there many more important problems?

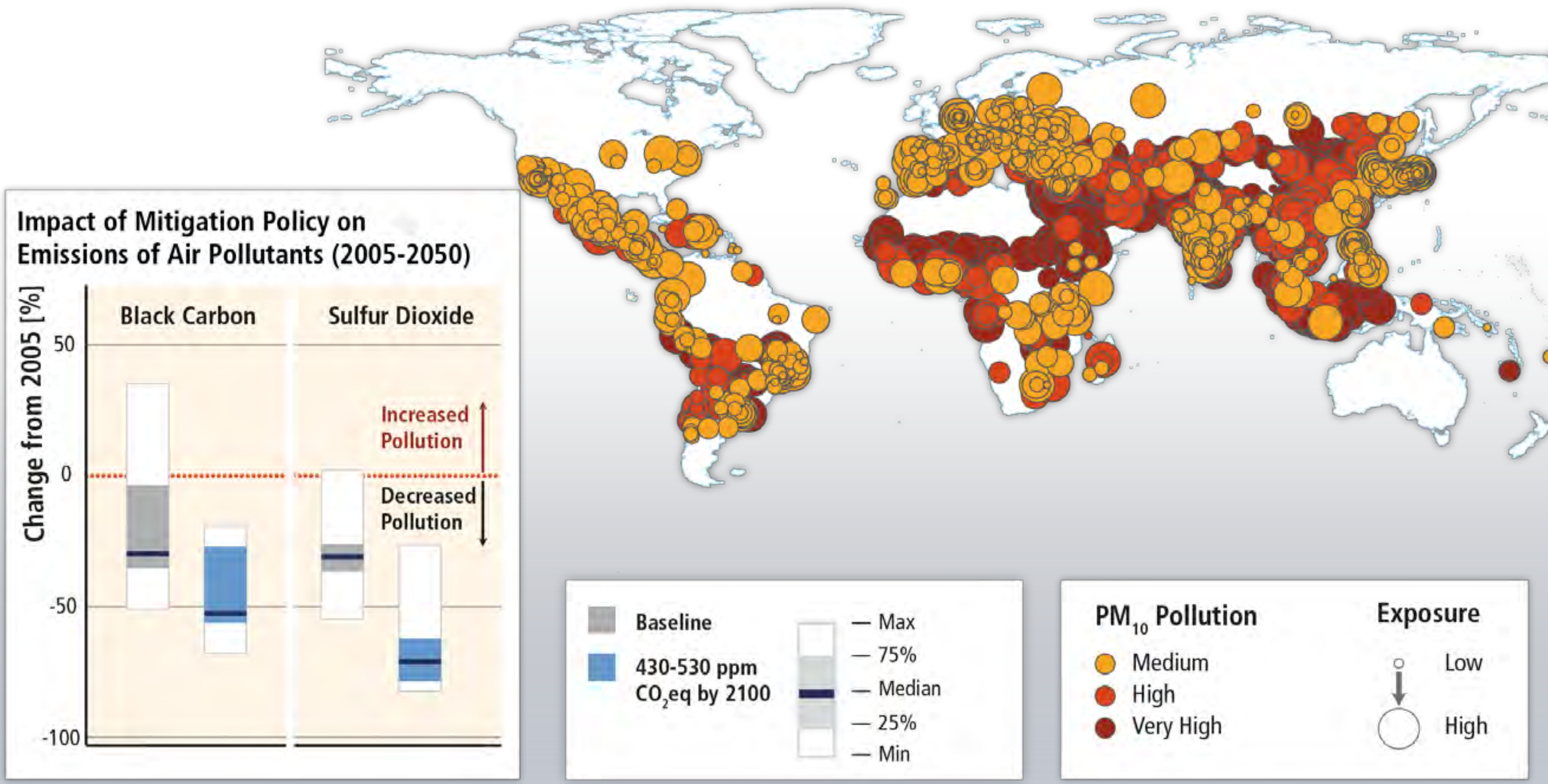
Massive infrastructure investments are needed globally.

- Telecommunication

- Access to electricity

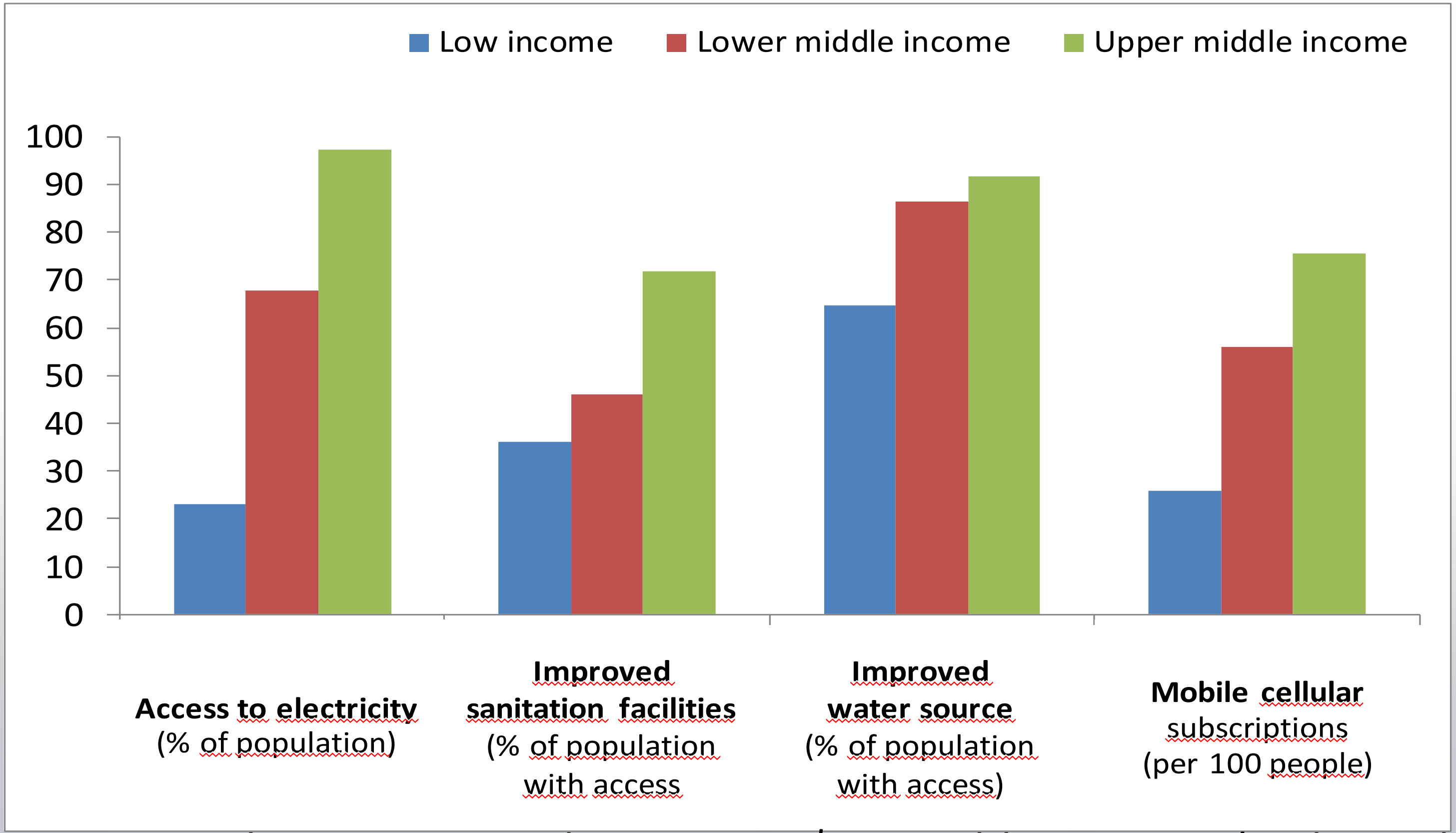
- Water availability

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



Based on Figures 6.33 and 12.23

Infrastructure investment

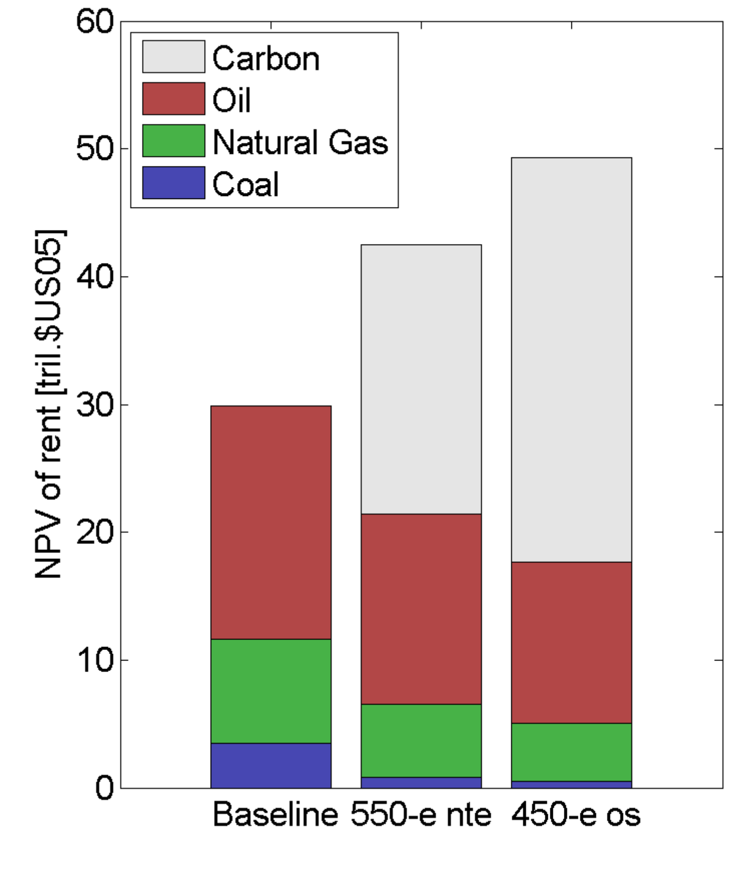


Jakob and Edenhofer, submitted

- Achieve universal energy access by 2030: US$ 36-41 bln per year (Riahi et al. 2012)
- "Great convergence" of global health standards by 2035: about US$ 40 bln per year (Jameson et al. 2013)

data from 2009, Source: WDI online

The carbon rent: Emission pricing revenues could overcompensate profit losses of fossil fuel owners.



- Fossil resource rents decrease with climate policy ambition
- For a globally optimal carbon price, over-compensation by carbon rent (=permit price or tax * emissions)
- Carbon rent appropriated domestically via auctioned permits or tax
- Receipts from a CO_2-tax or auctioning could be used to lower taxes, for investments in infrastructure or to reduce debts

Bauer et al. (2013)

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CLIMATE CHANGE 2014

Mitigation of Climate Change

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www.mitigation2014.org

Working Group III contribution to the
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