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Climate Change 2014

Minh Ha-Duong

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ipcc
INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014

Mitigation of Climate Change

USTH scientific seminar
30/03/2015

Dr. Ha-Duong Minh
CleanED lab

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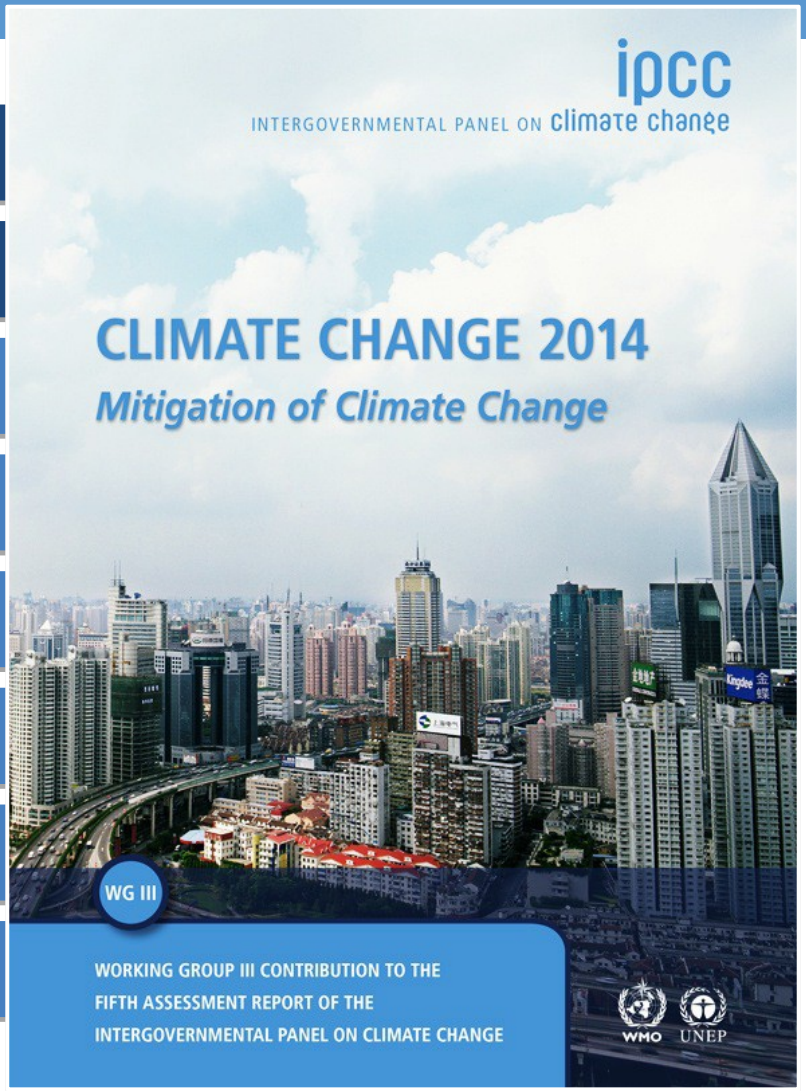
Working Group III contribution to the
IPCC Fifth Assessment Report

WMO UNEP

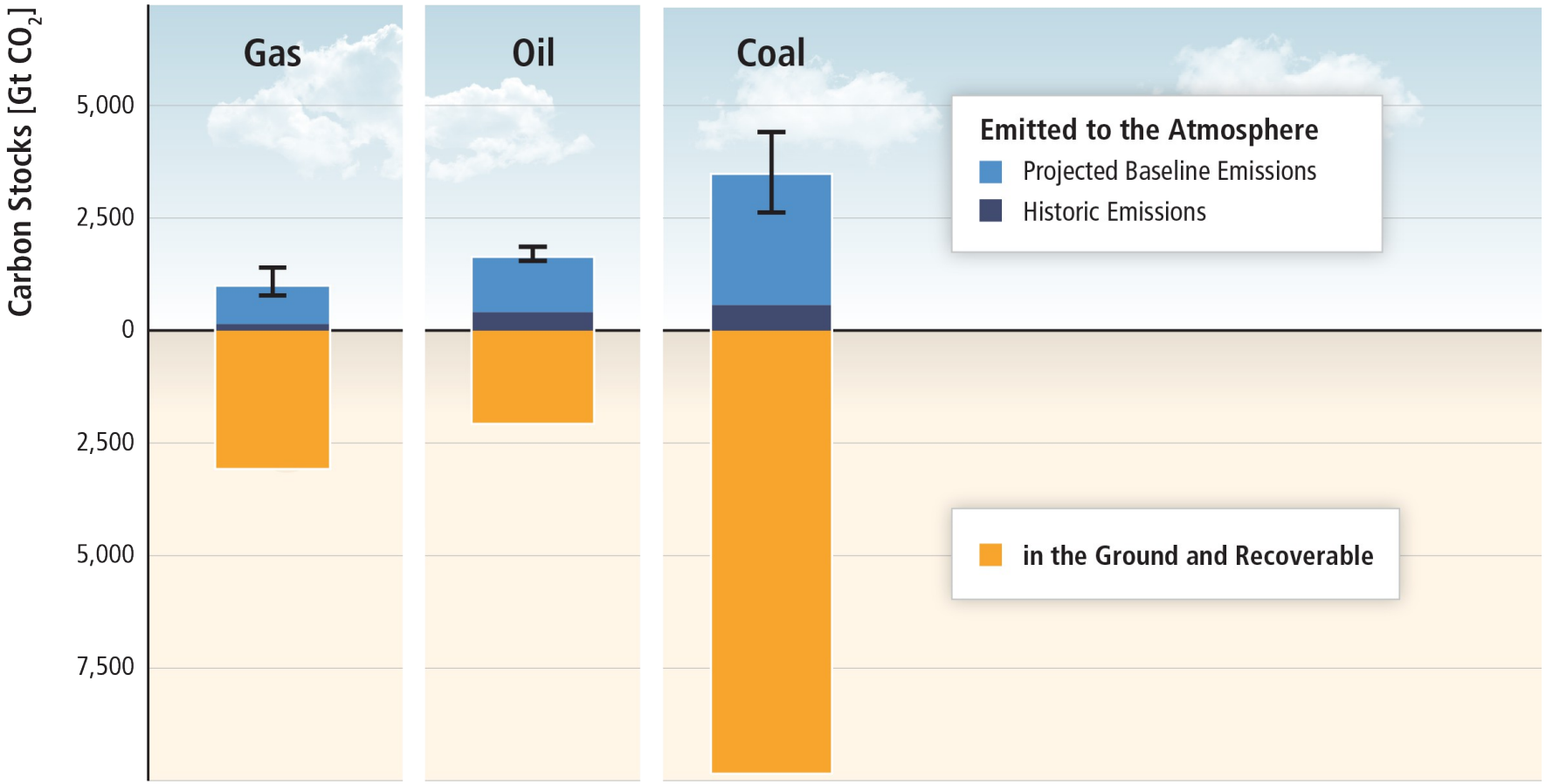
IPCC reports are the result of extensive work of many scientists from around the world.

- 1 Summary for Policymakers
- 1 Technical Summary
- 16 Chapters
- 235 Authors
- 800+ Reviewers
- Close to 1500 pages
- Close to 10,000 references
- More than 38,000 comments



Climate change is a global commons problem.
© ESA/NASA

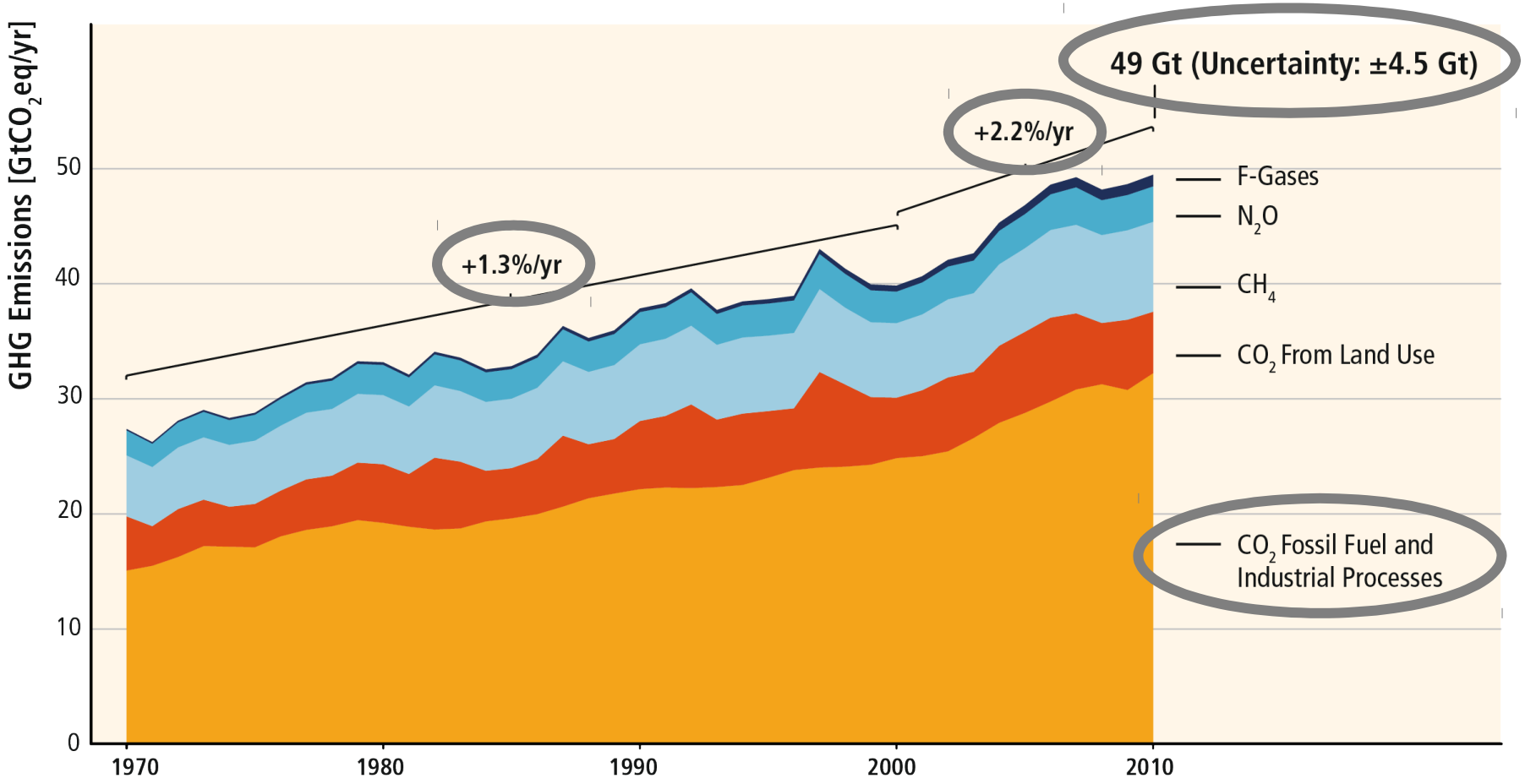
There is far more carbon in the ground than emitted in any baseline scenario.



Based on SRREN Figure 1.7

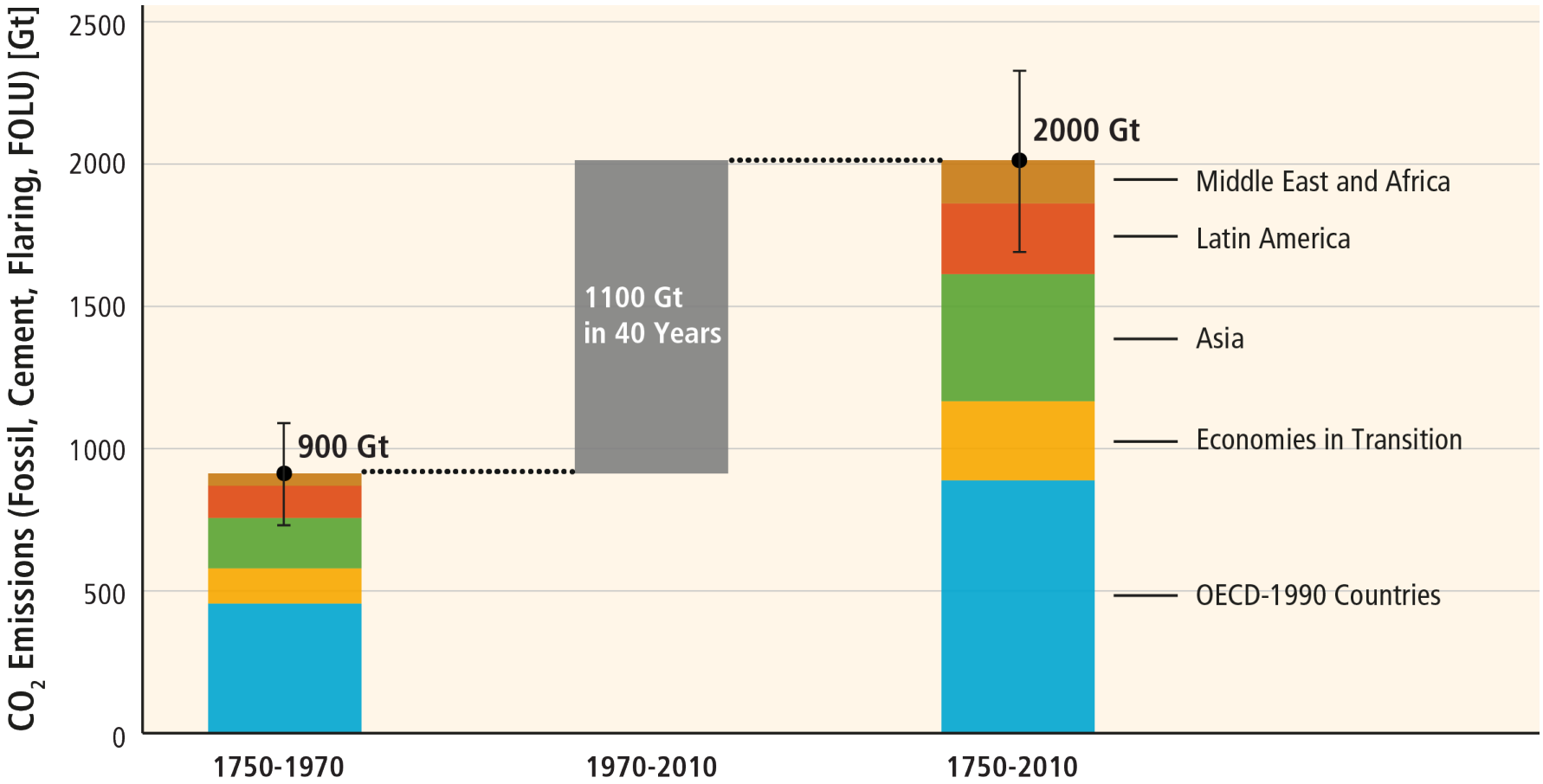
GHG emissions growth has accelerated despite reduction efforts.

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



Based on Figure 1.3

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



Based on Figure 5.3

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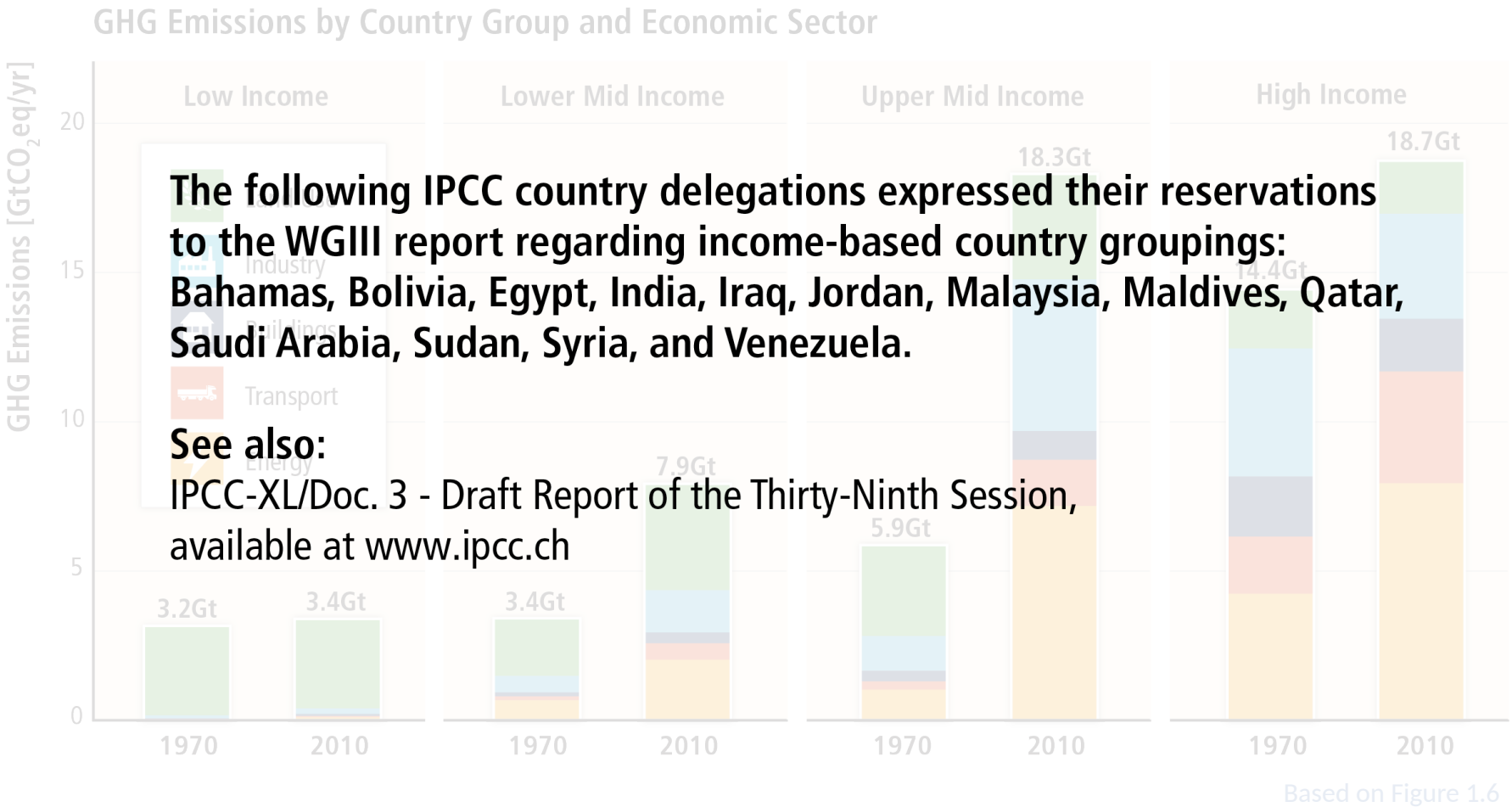
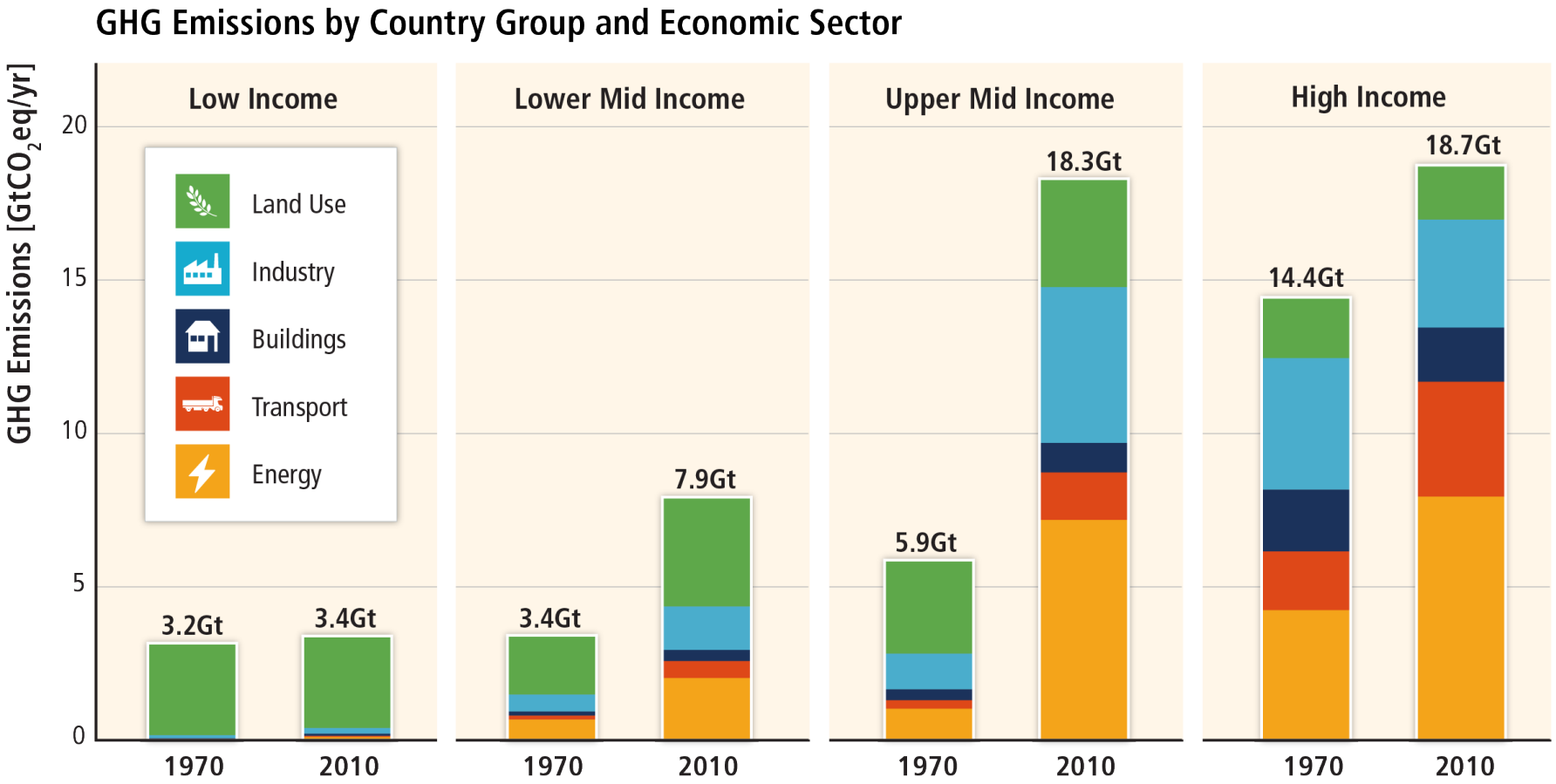
Regional patterns of GHG emissions are shifting along with changes in the world economy.



The following IPCC country delegations expressed their reservations to the WGIII report regarding income-based country groupings: Bahamas, Bolivia, Egypt, India, Iraq, Jordan, Malaysia, Maldives, Qatar, Saudi Arabia, Sudan, Syria, and Venezuela.

See also:
IPCC-XL/Doc. 3 - Draft Report of the Thirty-Ninth Session, available at www.ipcc.ch

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



Based on Figure 1.6

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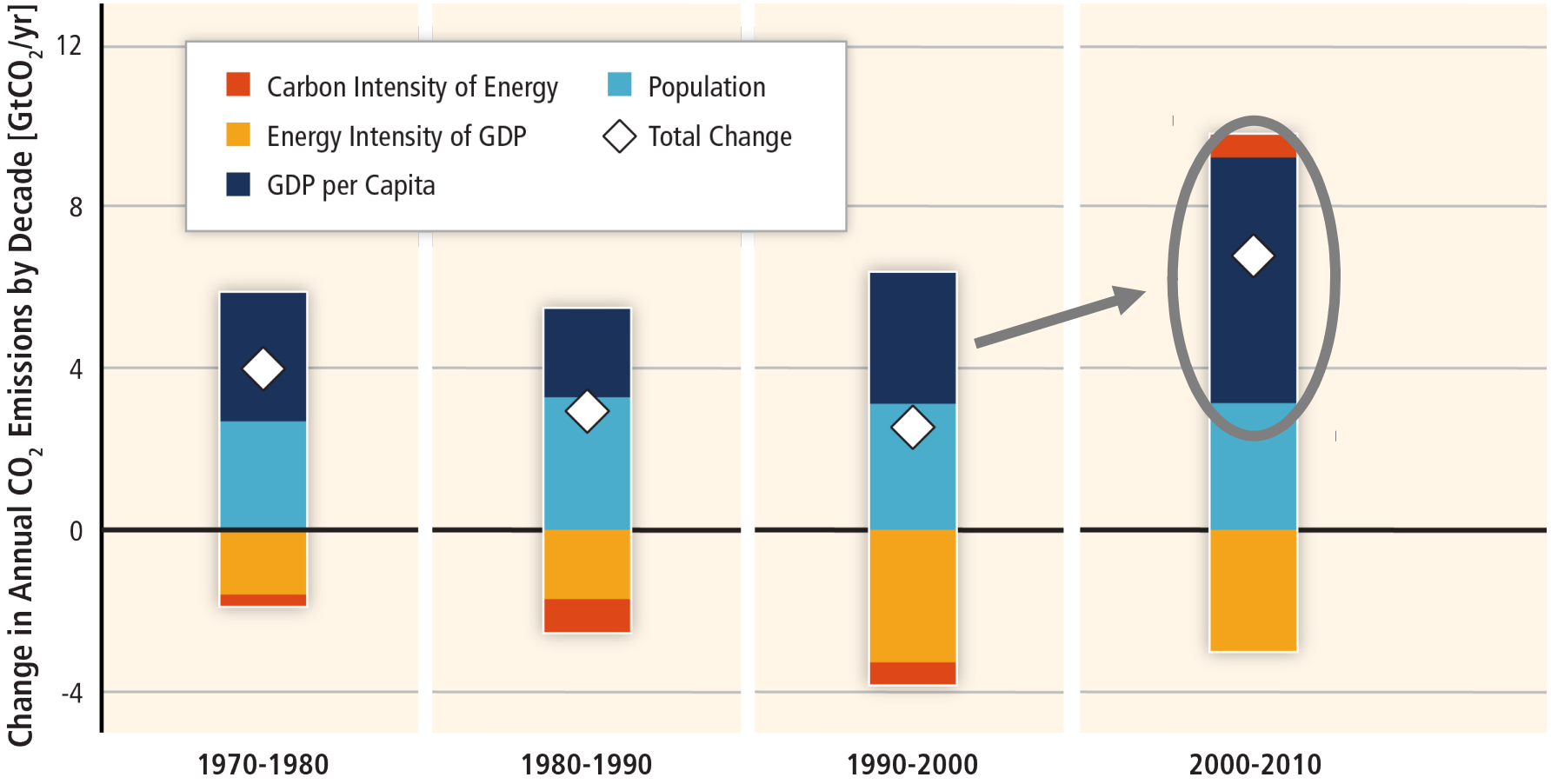
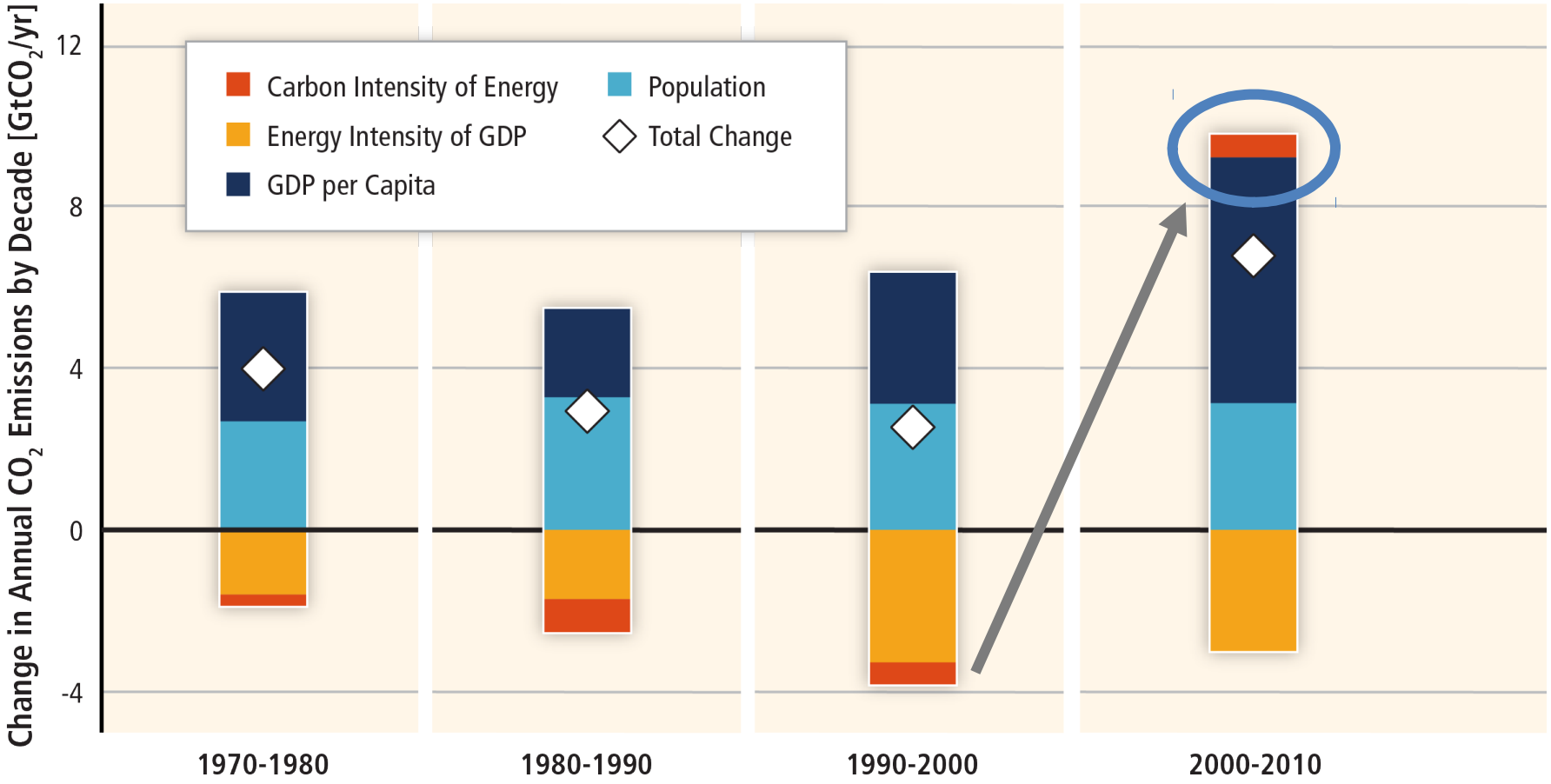
GHG emissions rise with growth in GDP and population.



Based on Figure 1.7

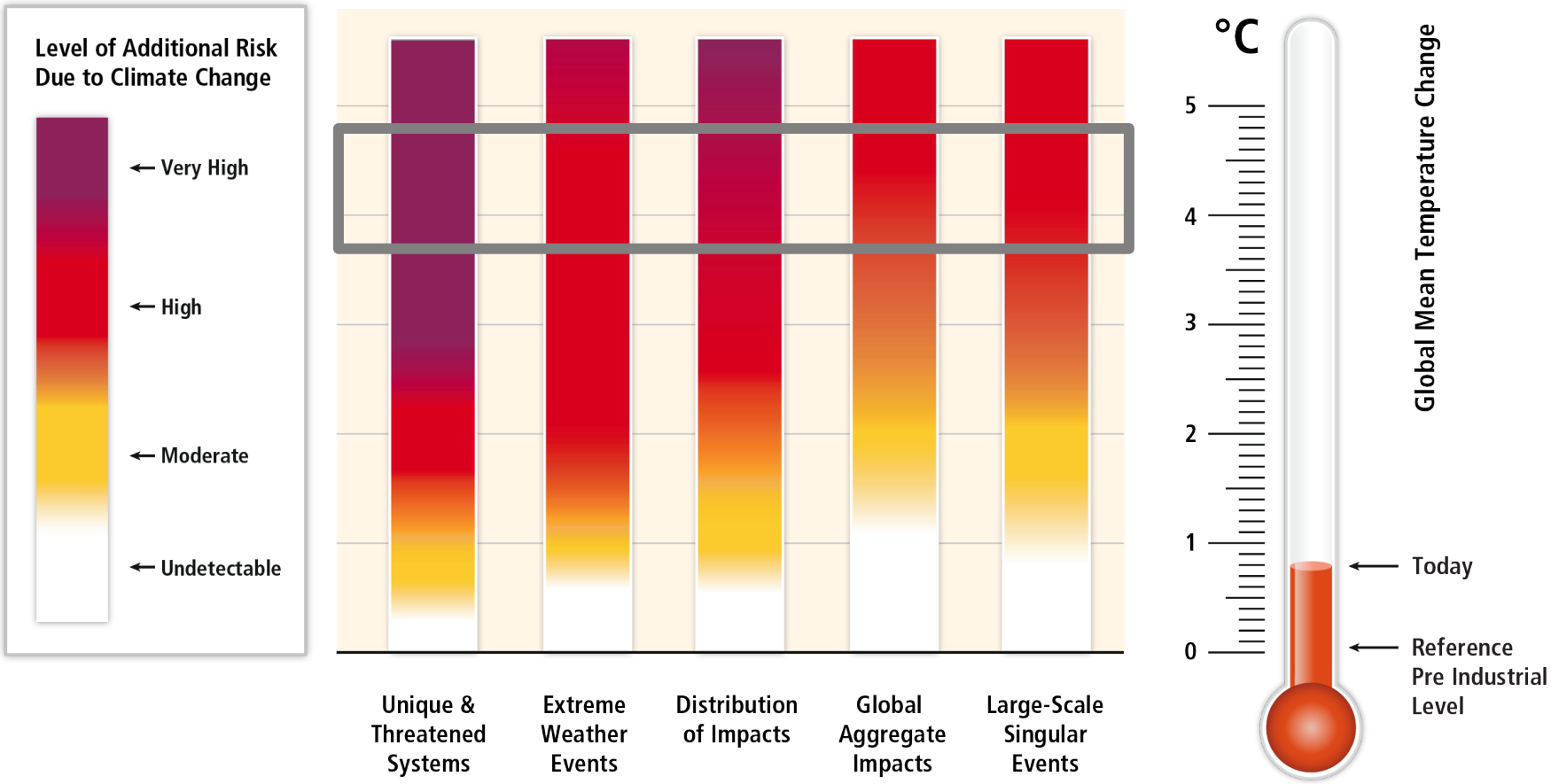
The long-standing trend of decarbonization has reversed.



Based on Figure 1.7

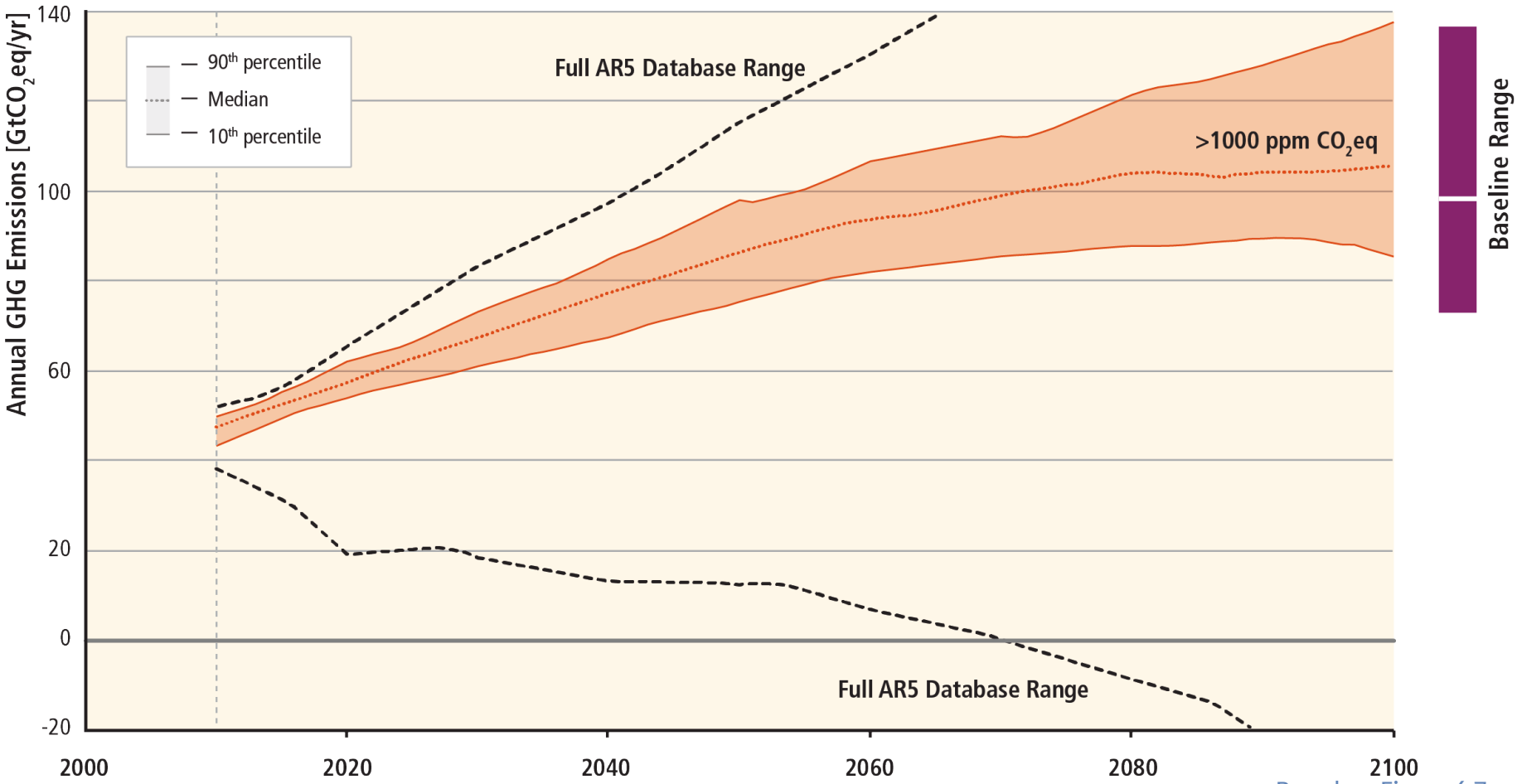
Limiting warming involves substantial technological, economic and institutional challenges.

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



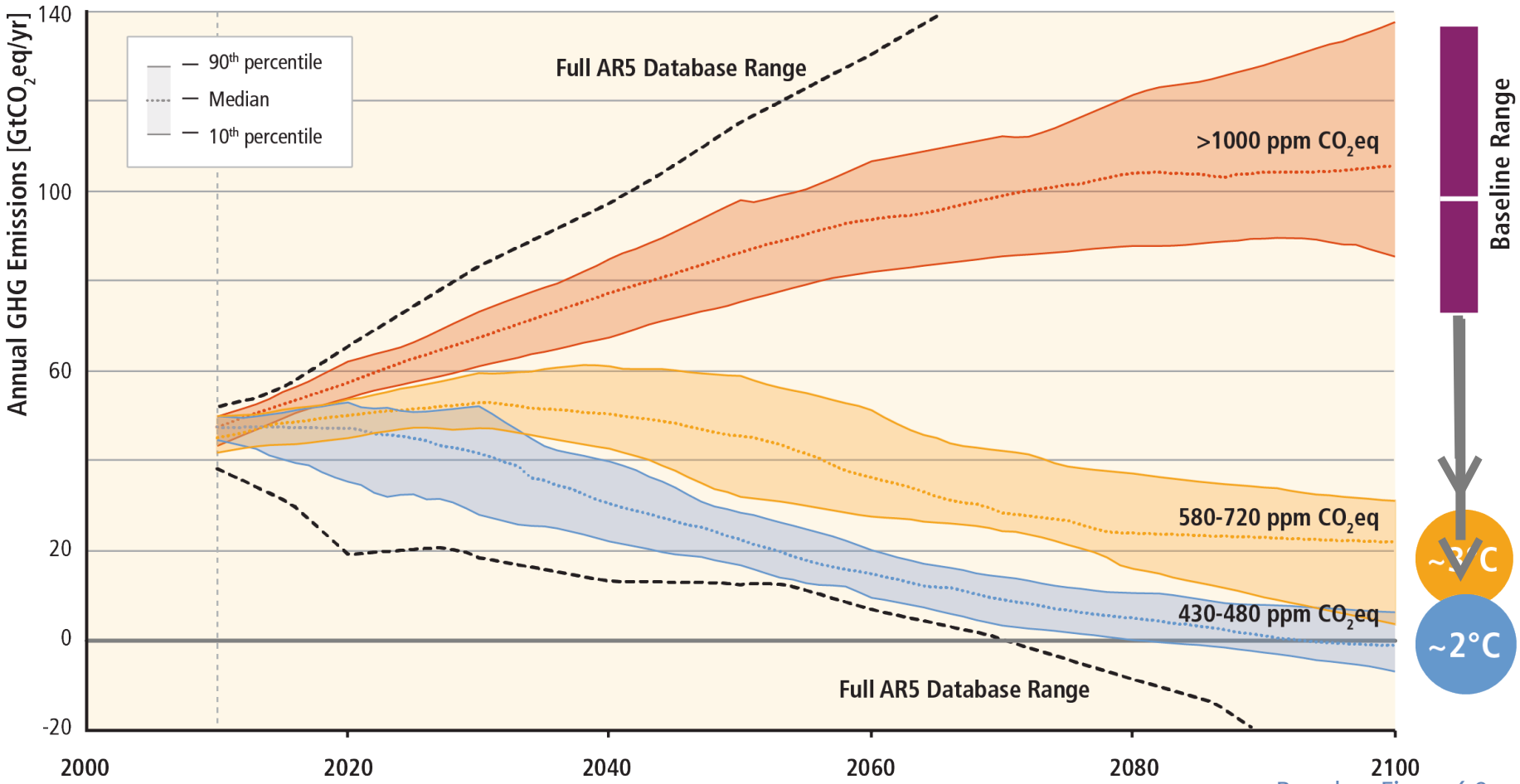
Based on WGII AR5 Figure 19.4

Stabilization of atmospheric GHG concentrations requires moving away from business as usual.



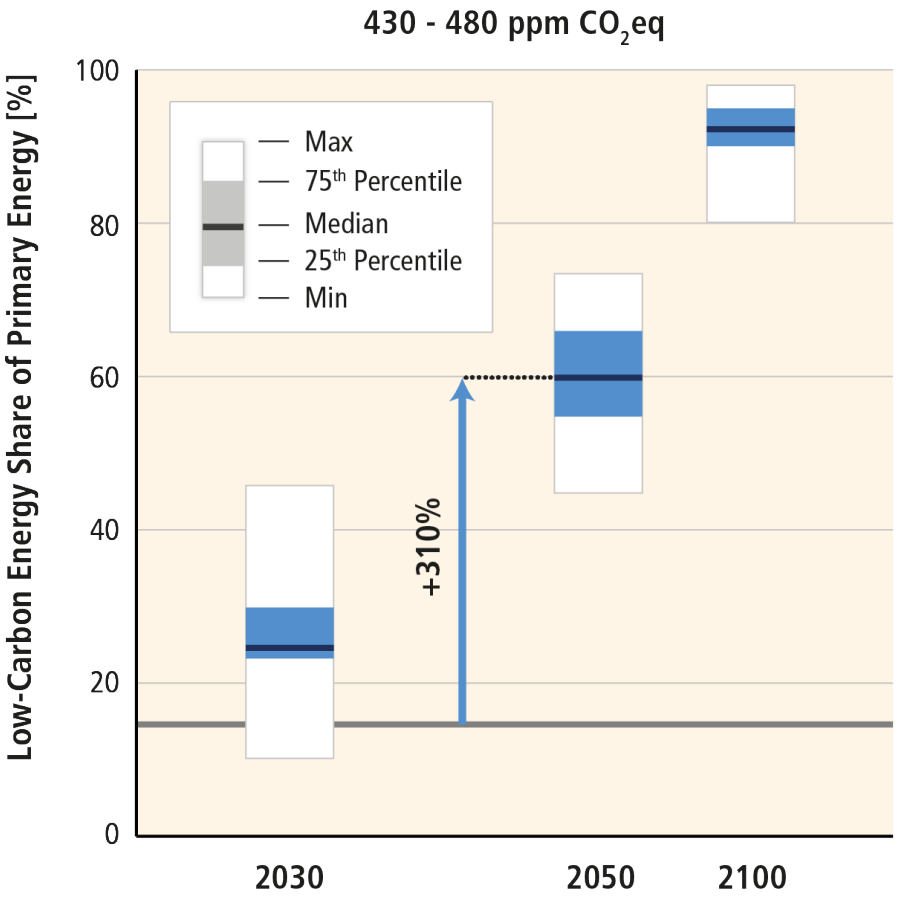
Based on Figure 6.7

Lower ambition mitigation goals require similar reductions of GHG emissions.



Based on Figure 6.9

Mitigation involves substantial upscaling of low-carbon energy.



Based on Figure 7.16

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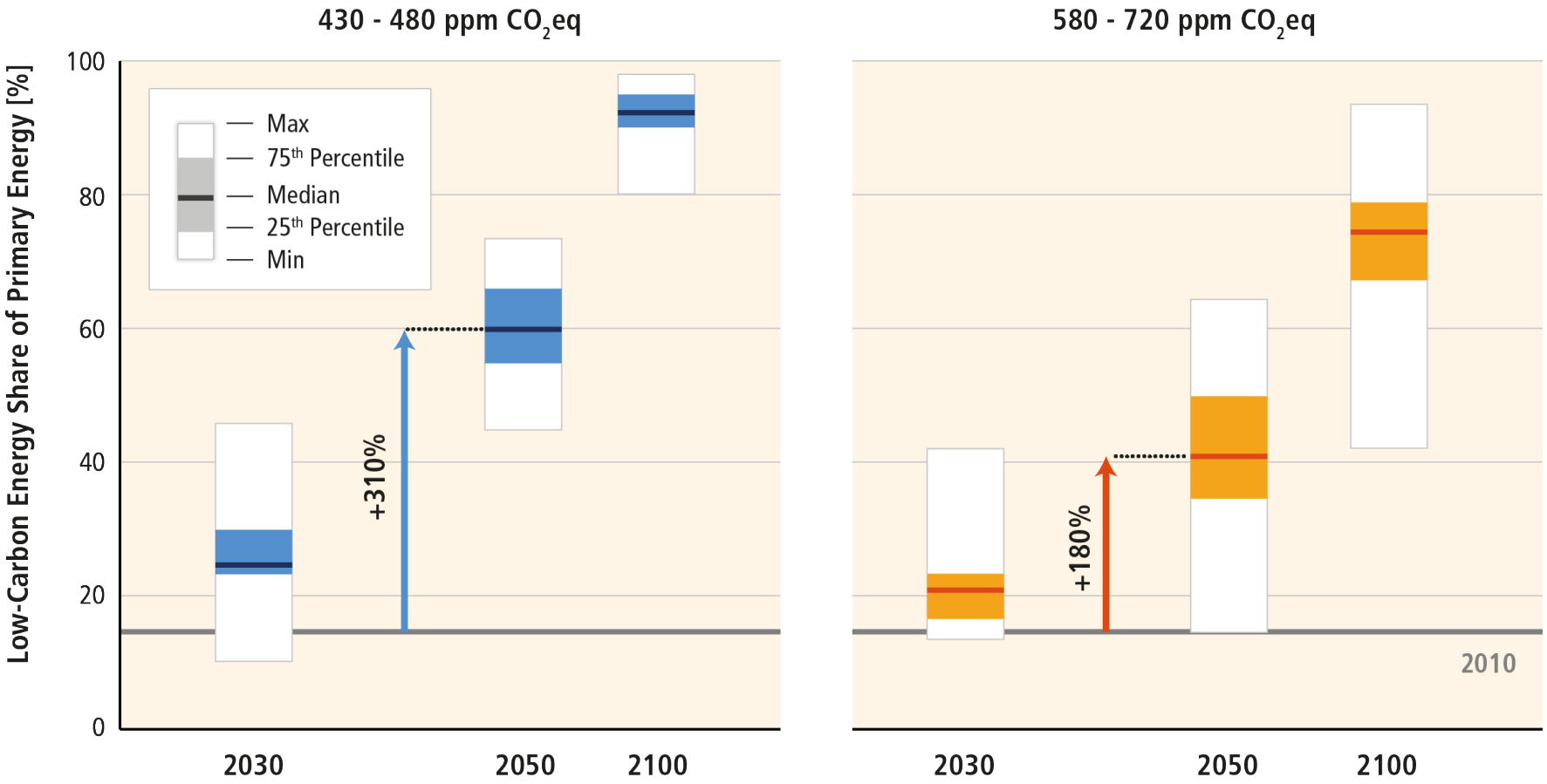
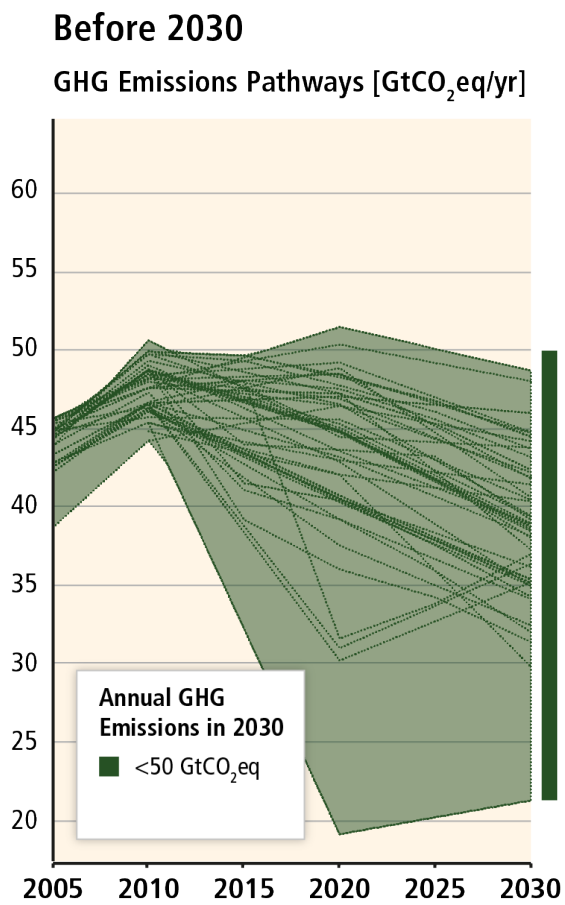
Mitigation involves substantial upscaling of low-carbon energy.



Based on Figure 7.16

ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

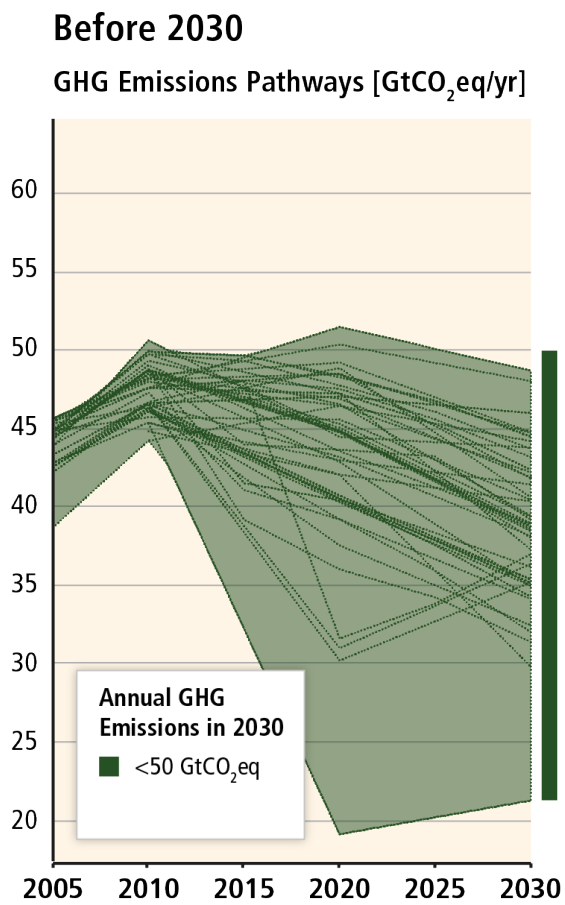
Many scenarios make it at least *about as likely as not* that warming will remain below 2°C relative to pre-industrial levels.

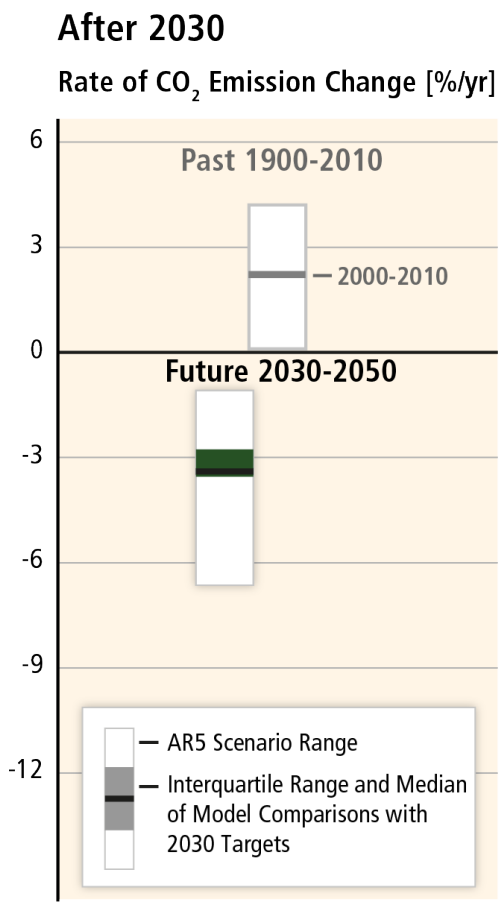


"Immediate Action"

Based on Figures 6.32 and 7.16

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





Based on Figures 6.32 and 7.16

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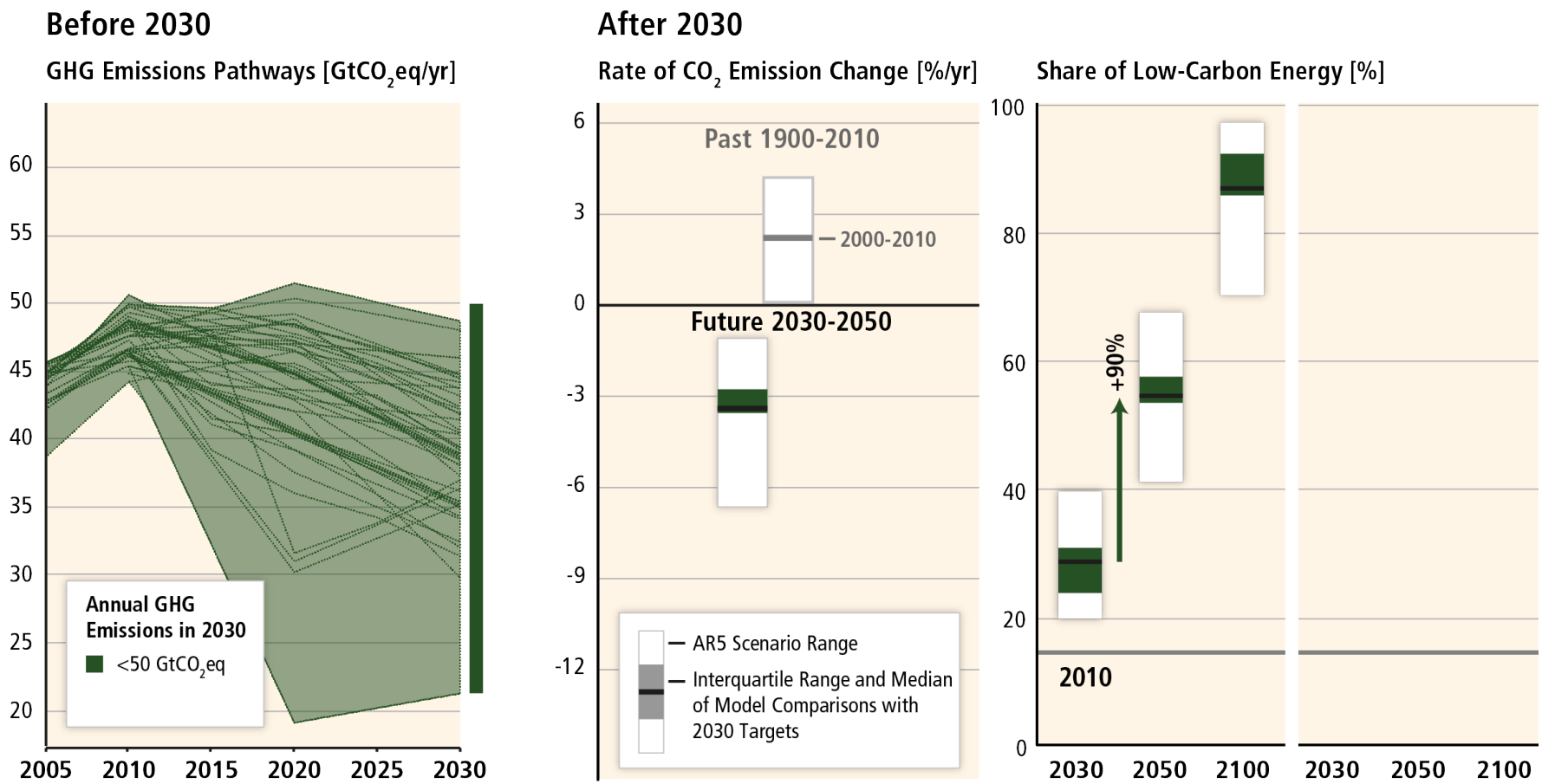
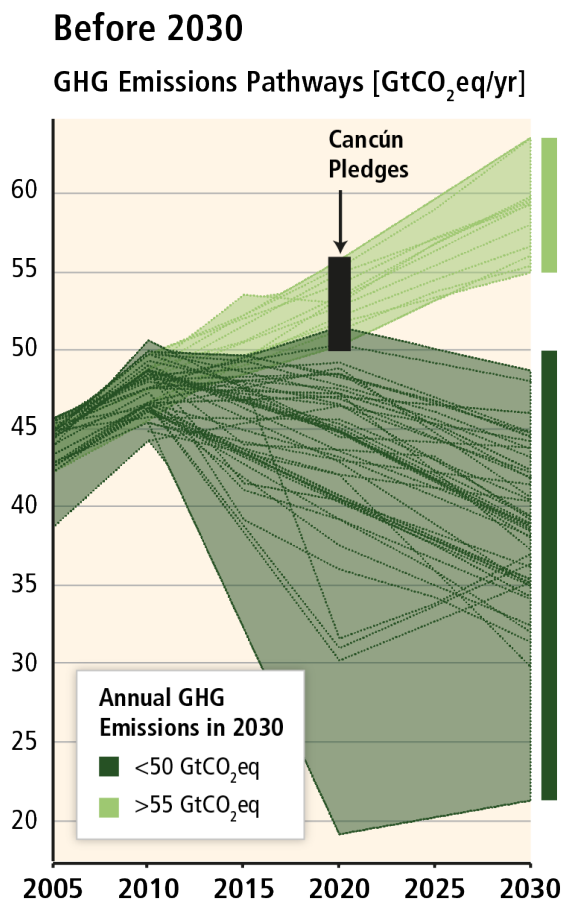
...implying a rapid scale-up of low-carbon energy.



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

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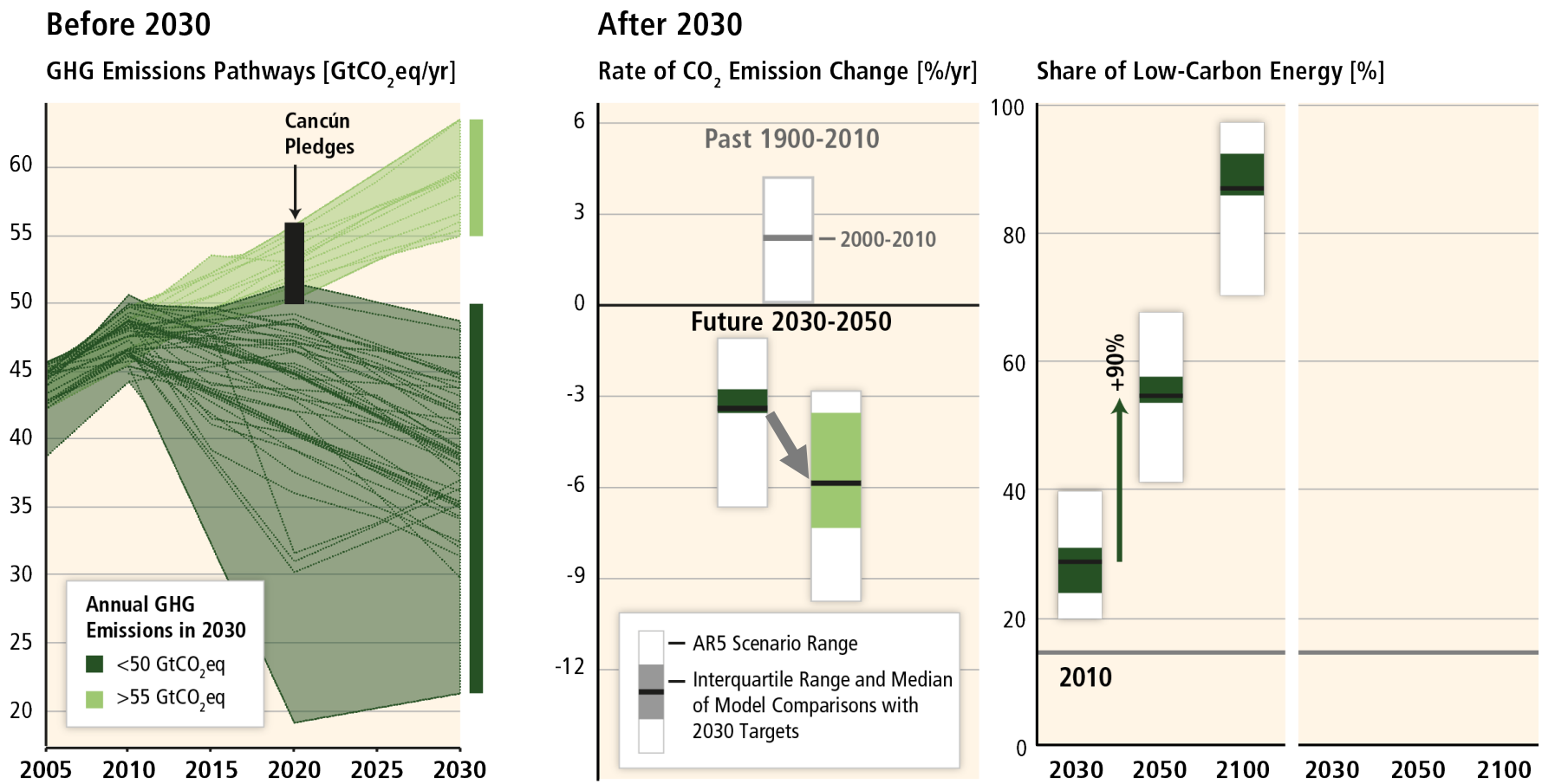
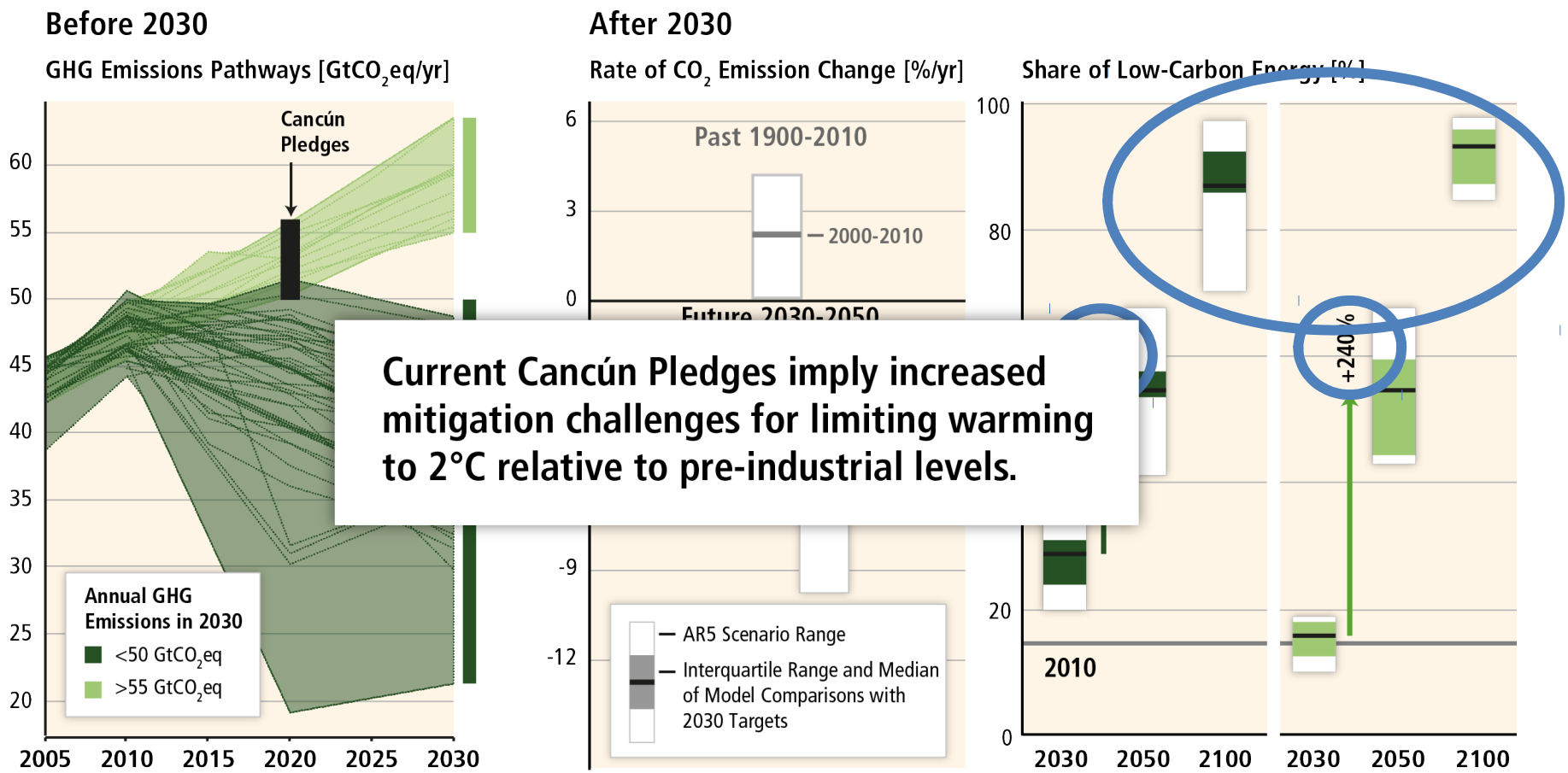
Delaying emissions reductions increases the difficulty and narrows the options for mitigation.



Based on Figures 6.32 and 7.16

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

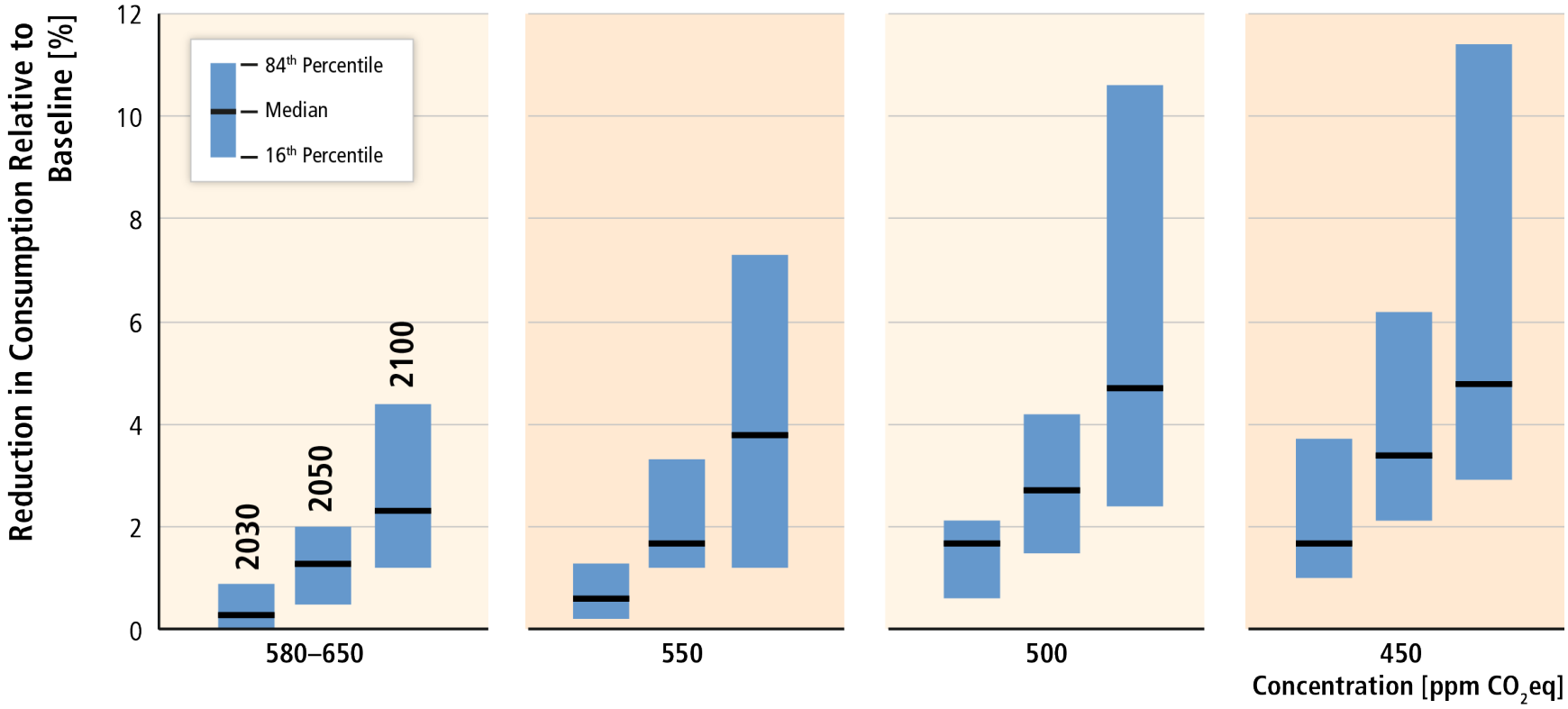


Current Cancún Pledges imply increased mitigation challenges for limiting warming to 2°C relative to pre-industrial levels.

Based on Figures 6.32 and 7.16

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

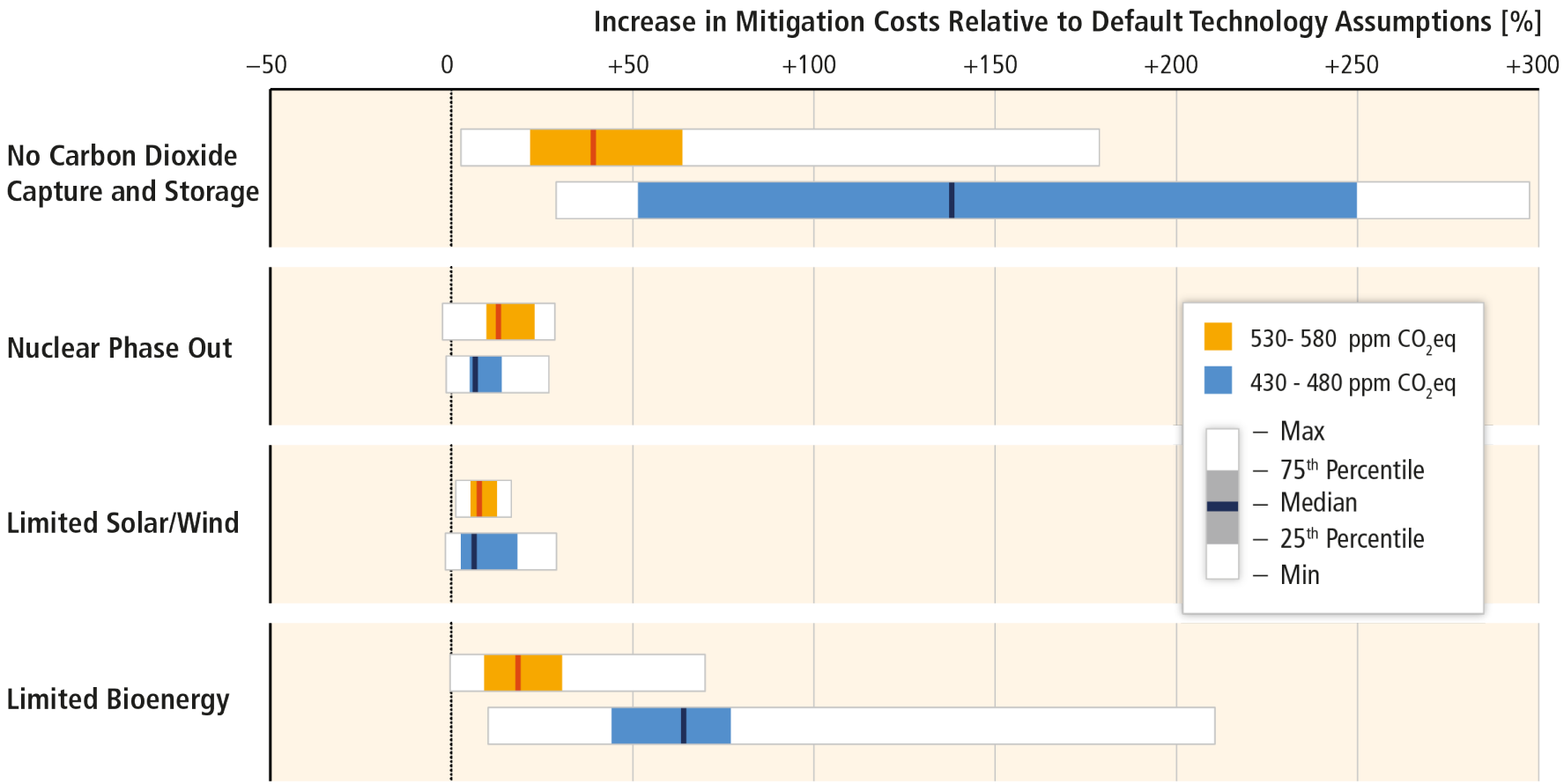
Global costs rise with the ambition of the mitigation goal.



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

Technological limitations can increase mitigation costs.



Based on Figure 6.24

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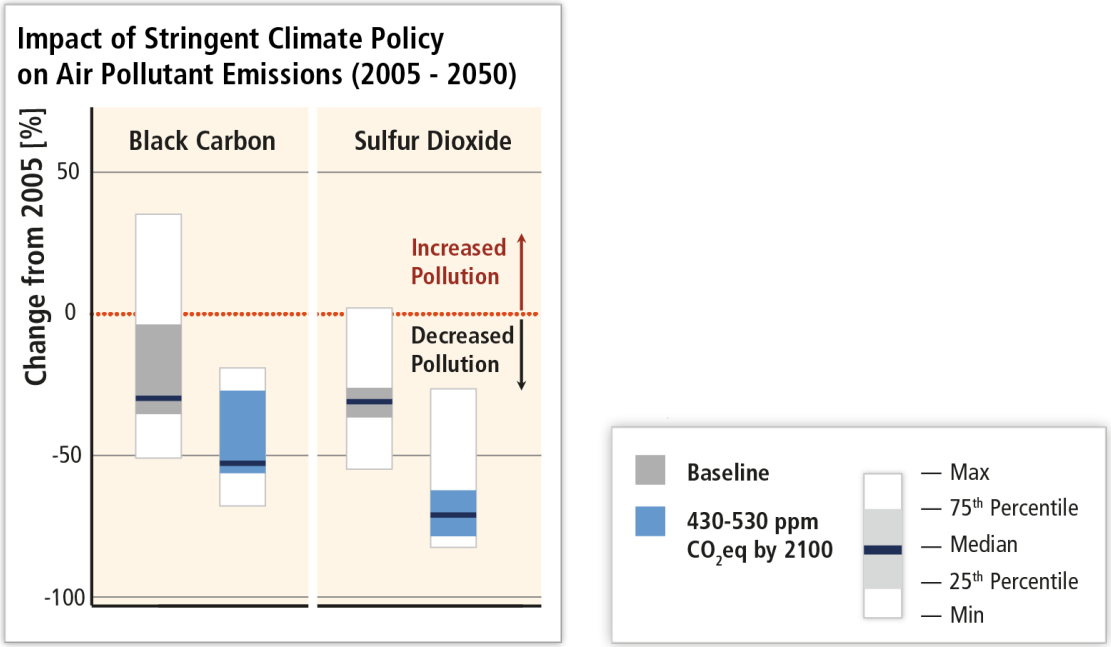
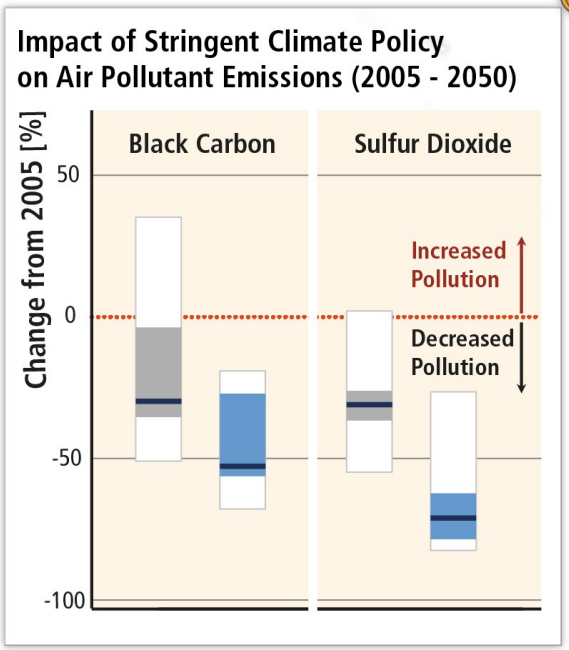
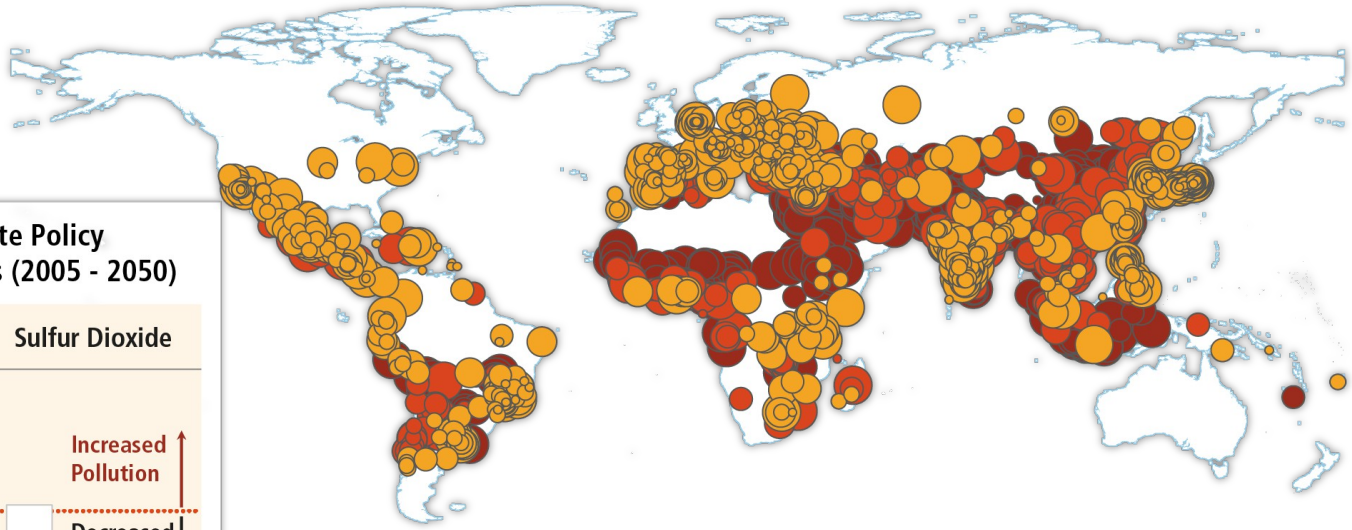
Mitigation can result in co-benefits for human health and other societal goals.

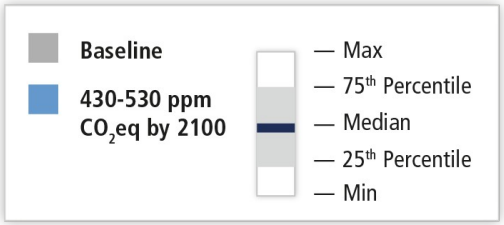


Based on Figures 6.33 and 12.23

Climate change mitigation can result in co-benefits for human health and other societal goals.







Based on Figures 6.33 and 12.23

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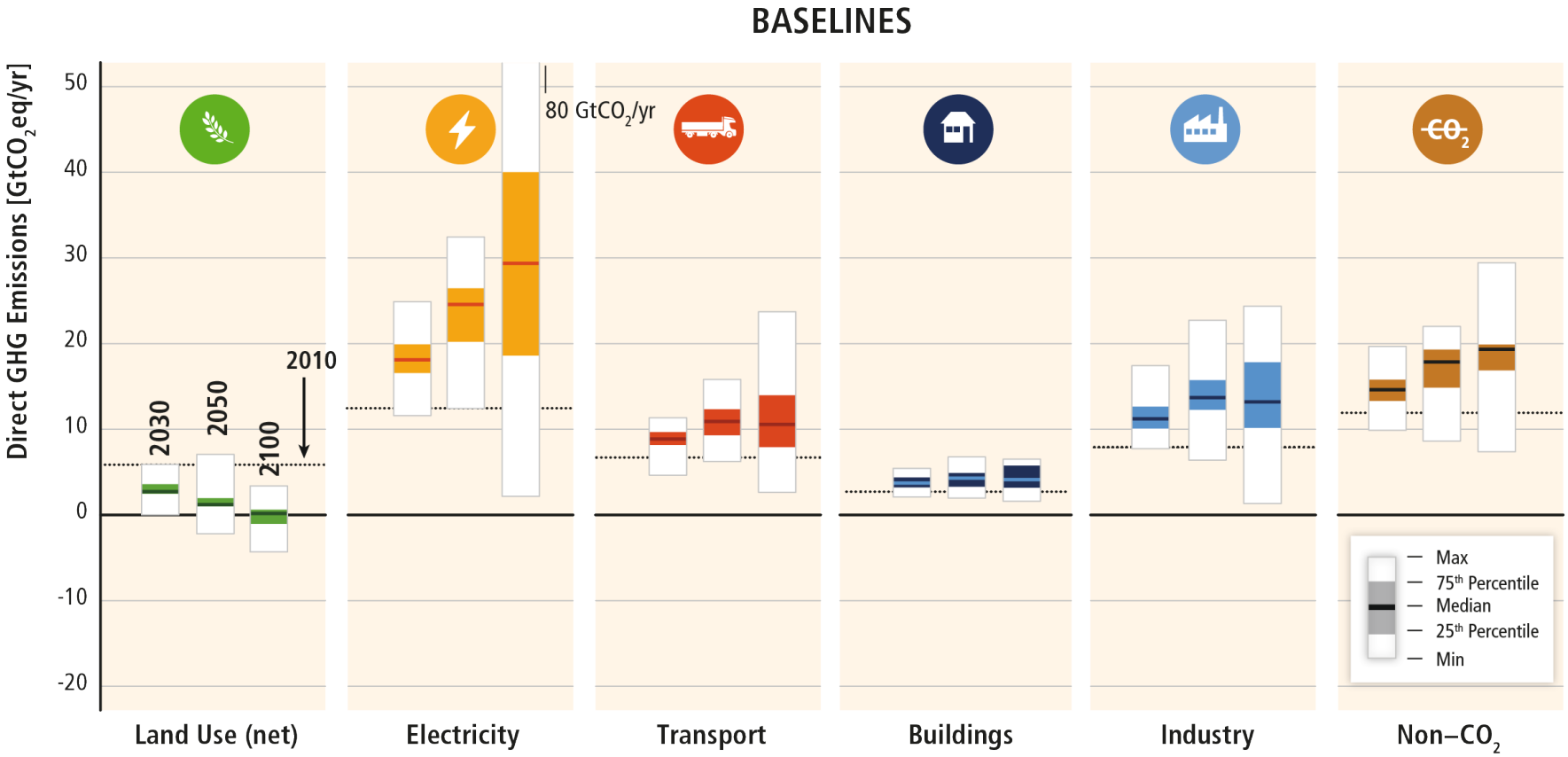
Low stabilization scenarios depend on a full decarbonization of energy supply.

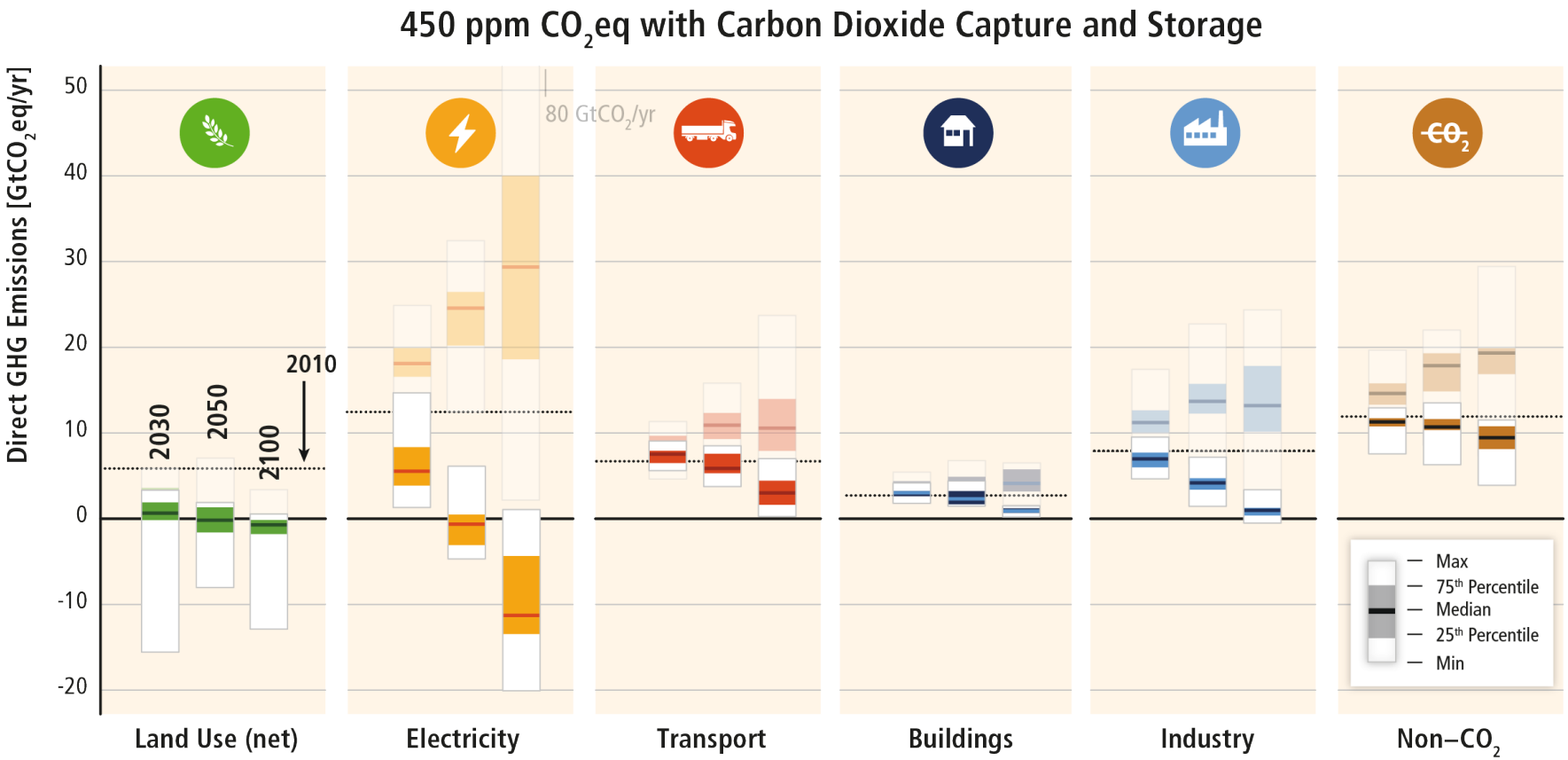
Baseline scenarios suggest rising GHG emissions in all sectors, except for CO_2 emissions from the land use sector.



Based on Figure TS.15

ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

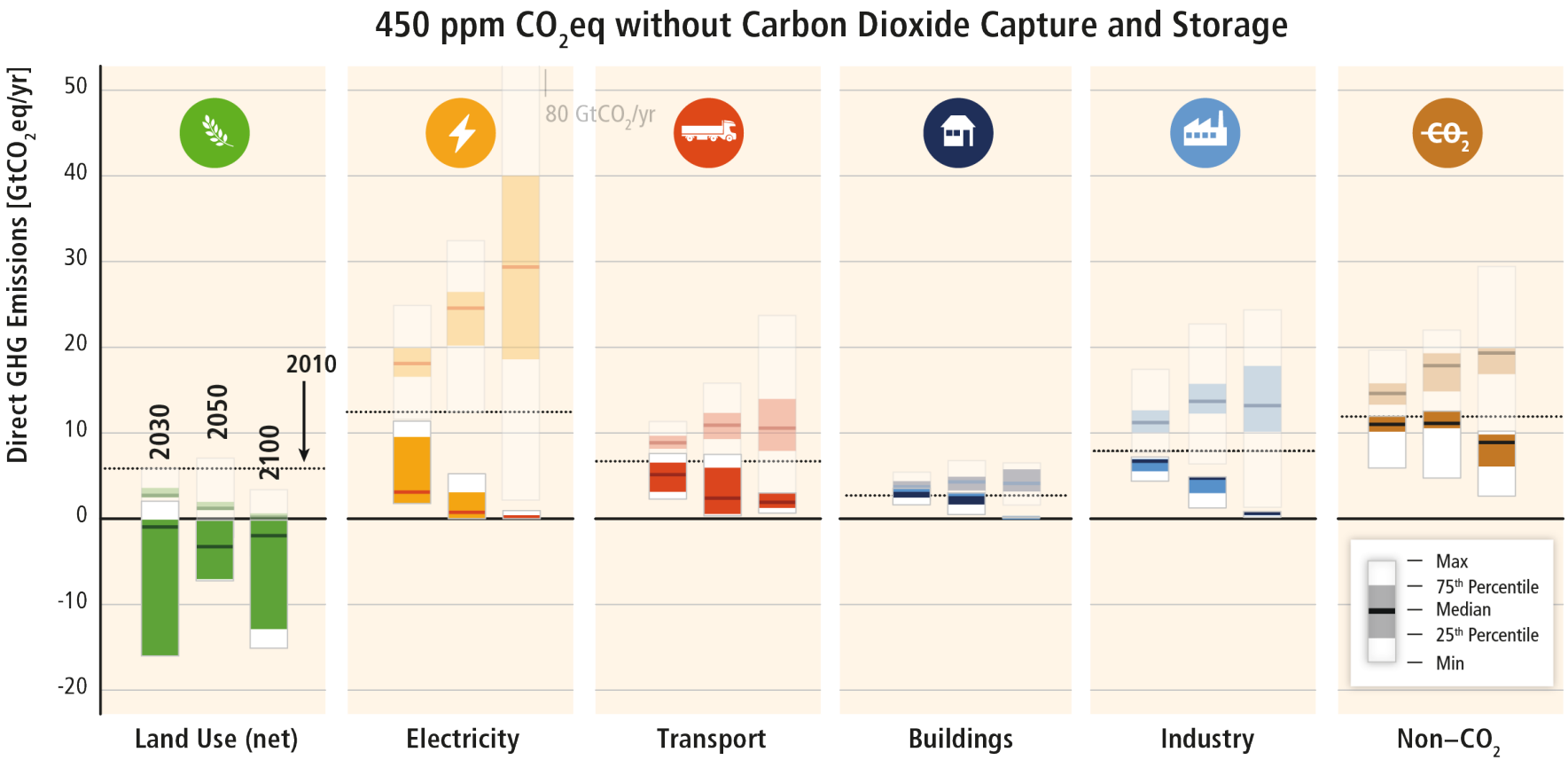
Mitigation requires changes throughout the economy. Systemic approaches are expected to be most effective.



Based on Figure TS.17

ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

Mitigation efforts in one sector determine efforts in others.



Based on Figure TS.17

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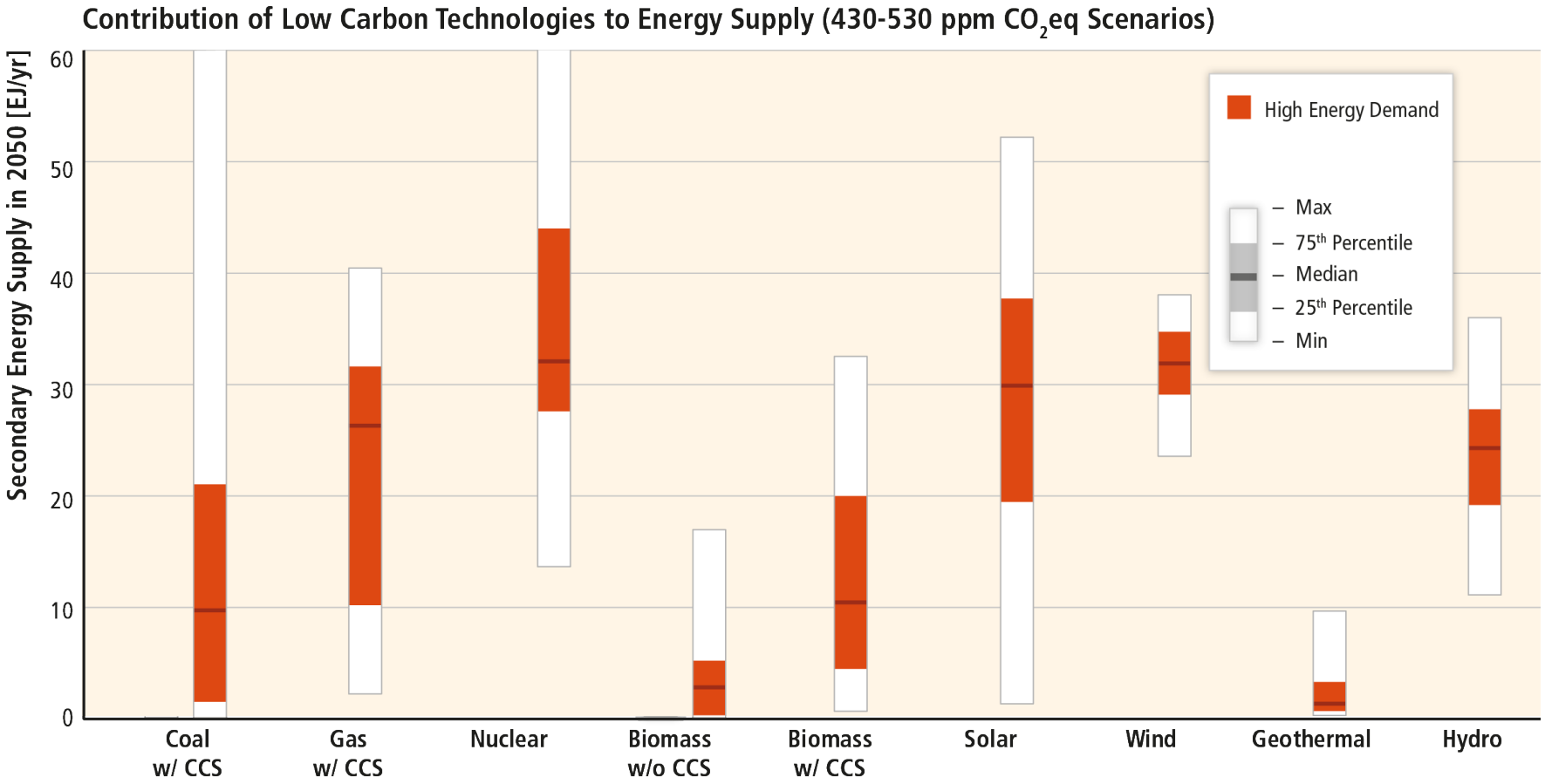
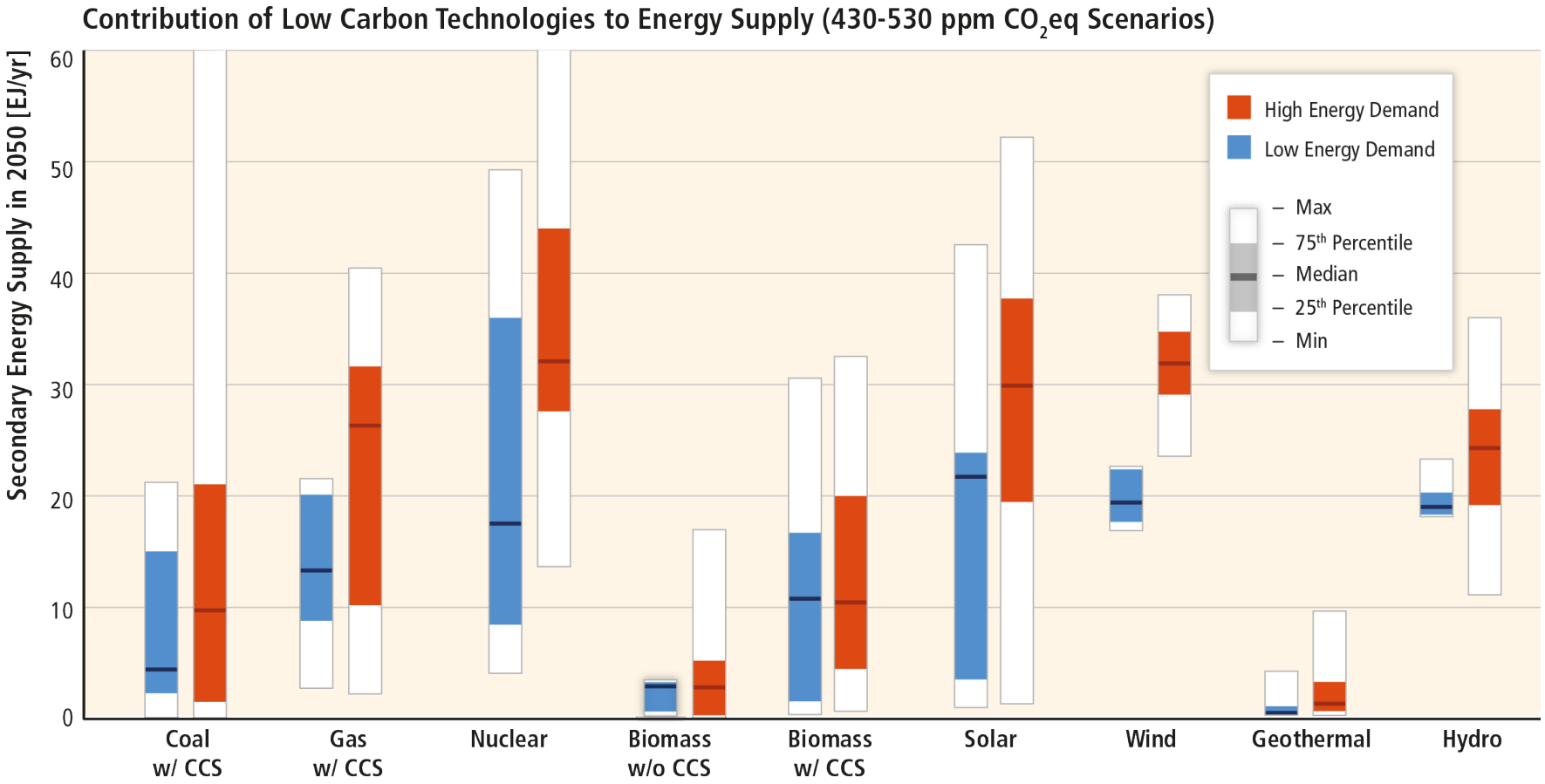
Decarbonization of energy supply is a key requirement for limiting warming to 2°C.



Based on Figure 7.11

ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

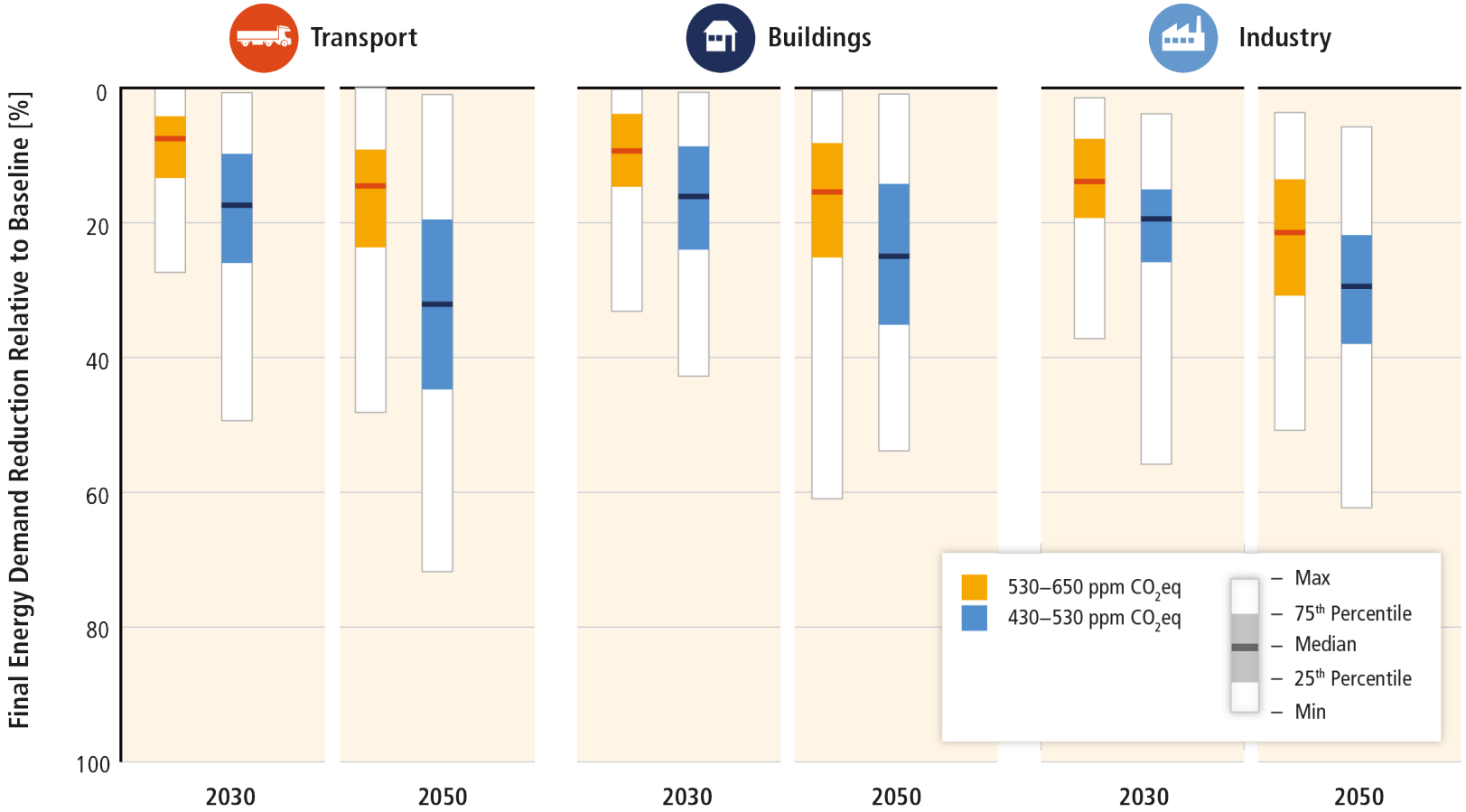
Energy demand reductions can provide flexibility, hedge against risks, avoid lock-in and provide co-benefits.



Based on Figure 7.11

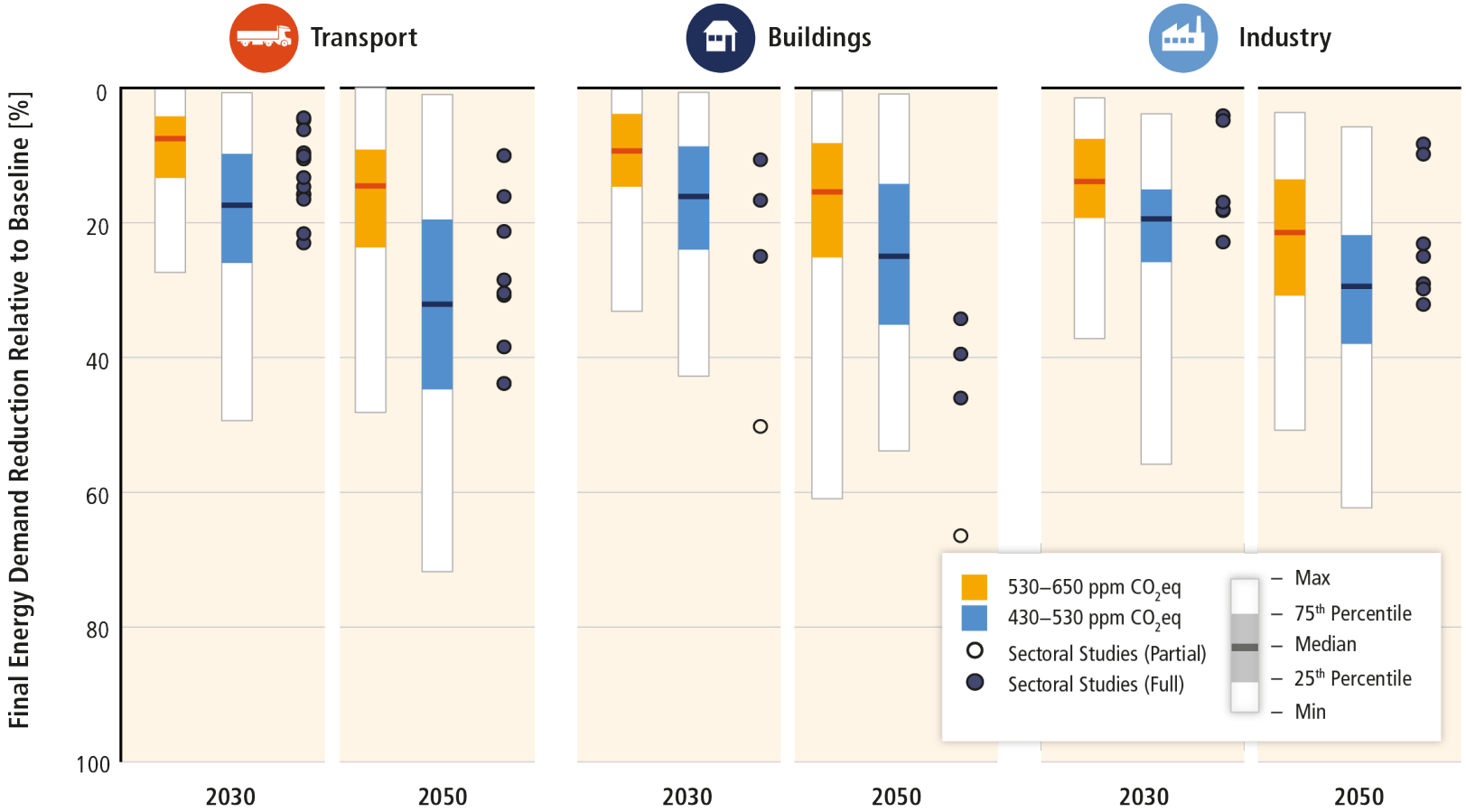
ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

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



Based on Figure 6.37

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



Based on Figure 6.37

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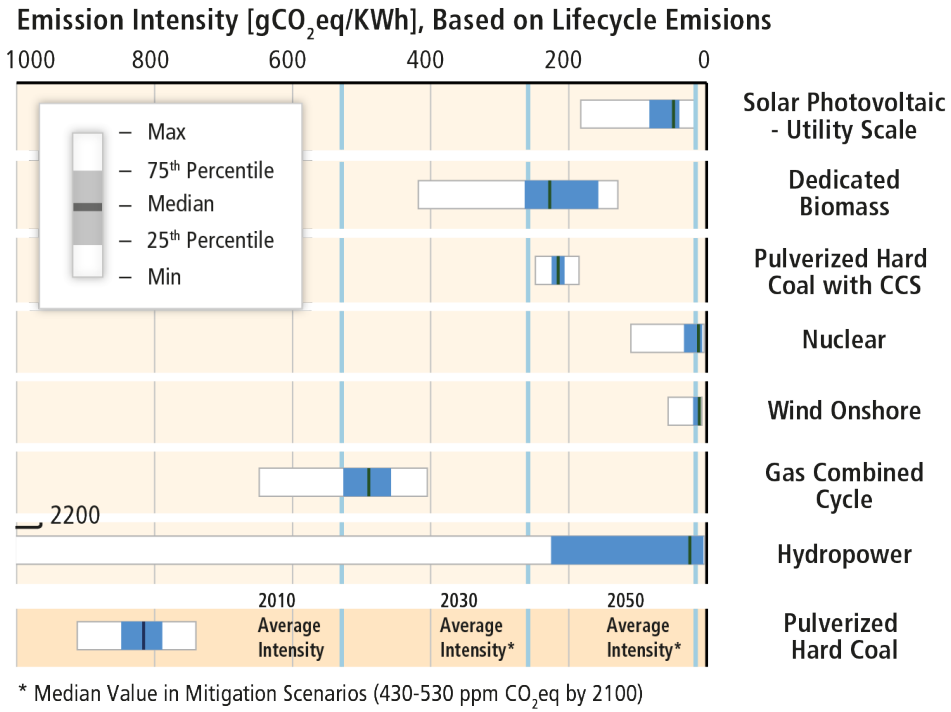
The wide-scale application of best-practice low-GHG technologies could lead to substantial emission reductions.

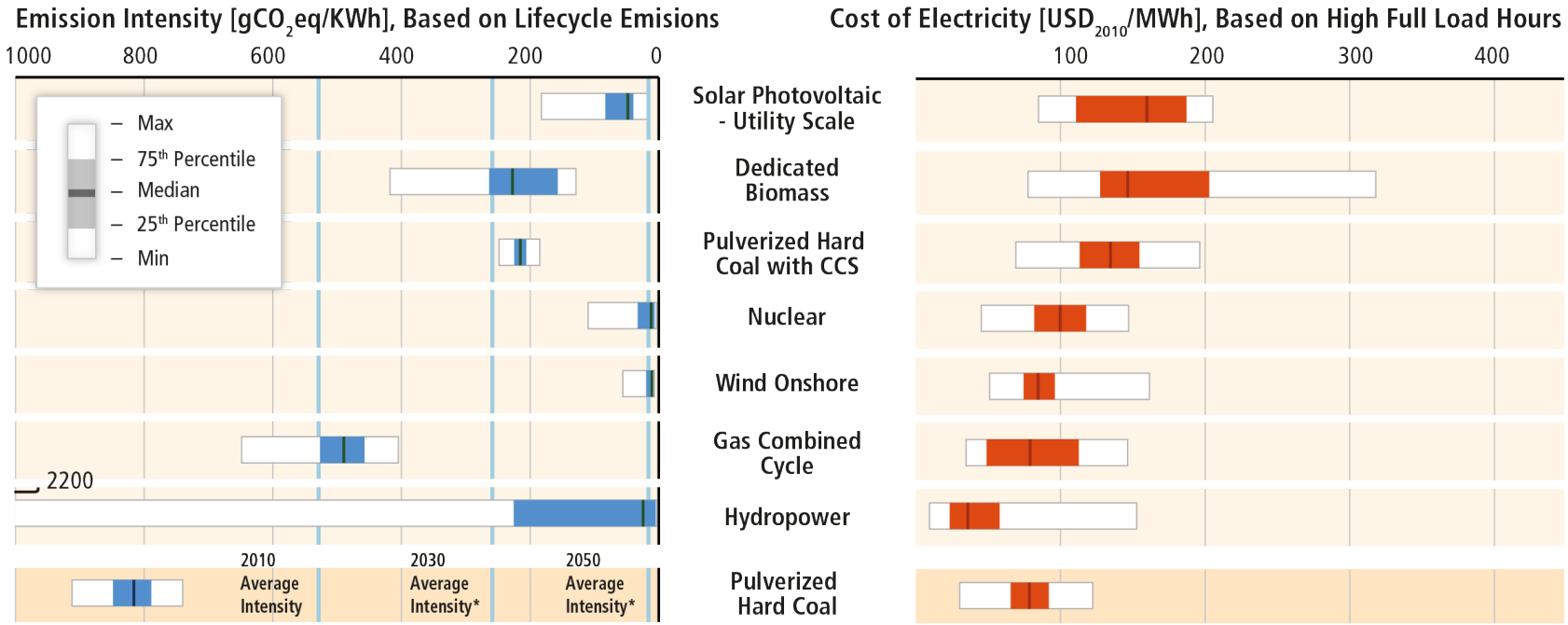
Examples from electricity generation: Low emission technologies exist, but emissions are reduced to different degrees.



* Median Value in Mitigation Scenarios (430-530 ppm CO_2eq by 2100)

Based on Figure 7.7

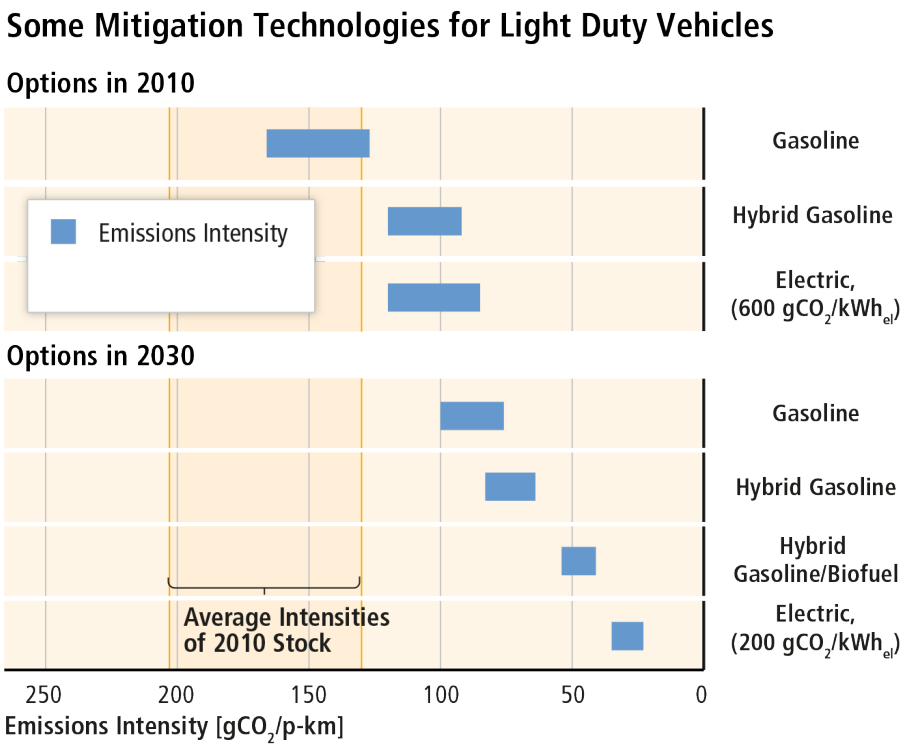
Due to cost decline, renewable energy technologies are becoming economical solutions in an increasing number of countries.



* Median Value in Mitigation Scenarios (430-530 ppm CO_2eq by 2100)

Based on Figure 7.7

Examples from transport: Several strategies exist to reduce emissions from transportation.



Based on Figure TS.21

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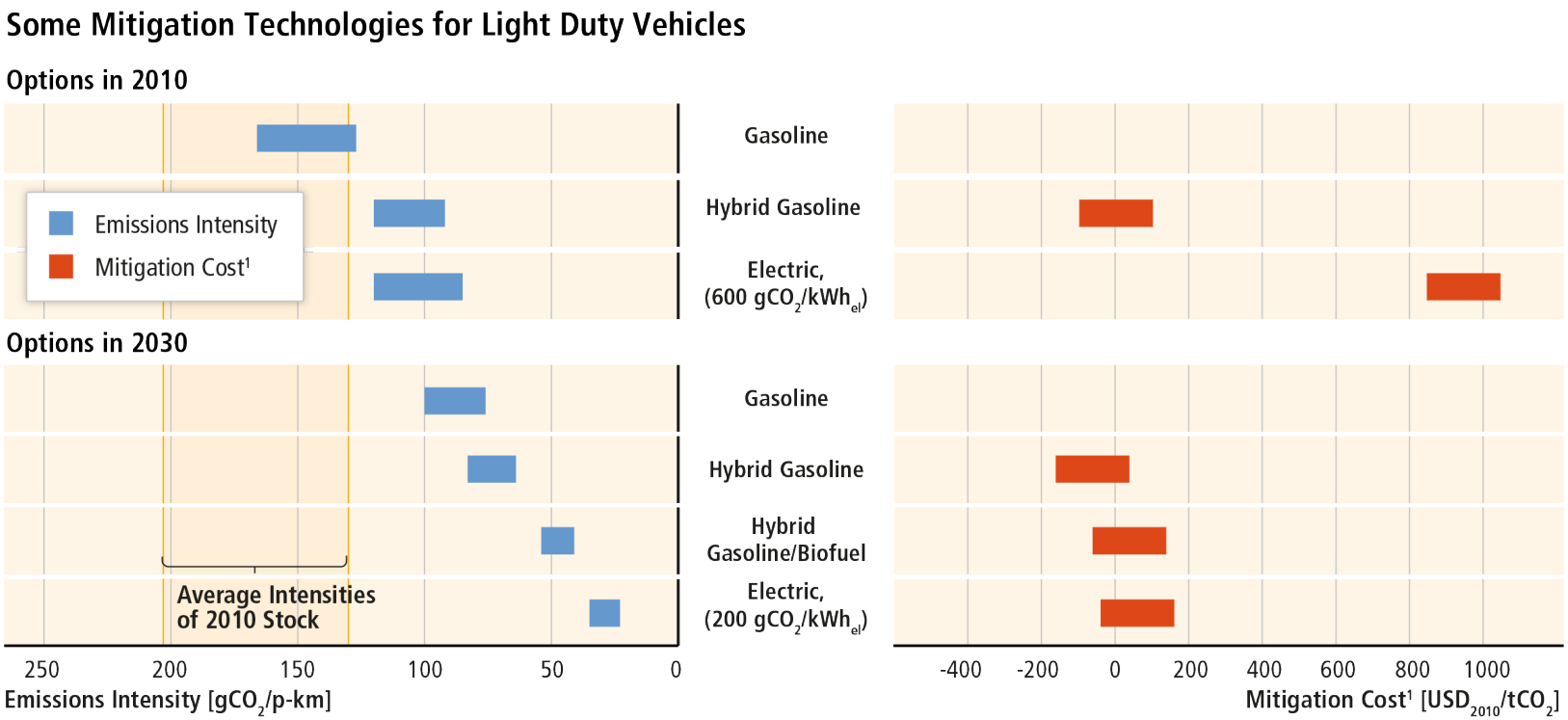
Private costs of reducing emissions in transport vary widely. Societal costs remain uncertain.



[1] Levelized cost of conserved carbon; calculated against 2010 new gasoline (2030 optimized gasoline) for 2010 (2030) options. Mitigation cost are based on point estimates ±100 USD_{2010}/tCO2 and are highly sensitive to assumptions.

Based on Figure TS.21

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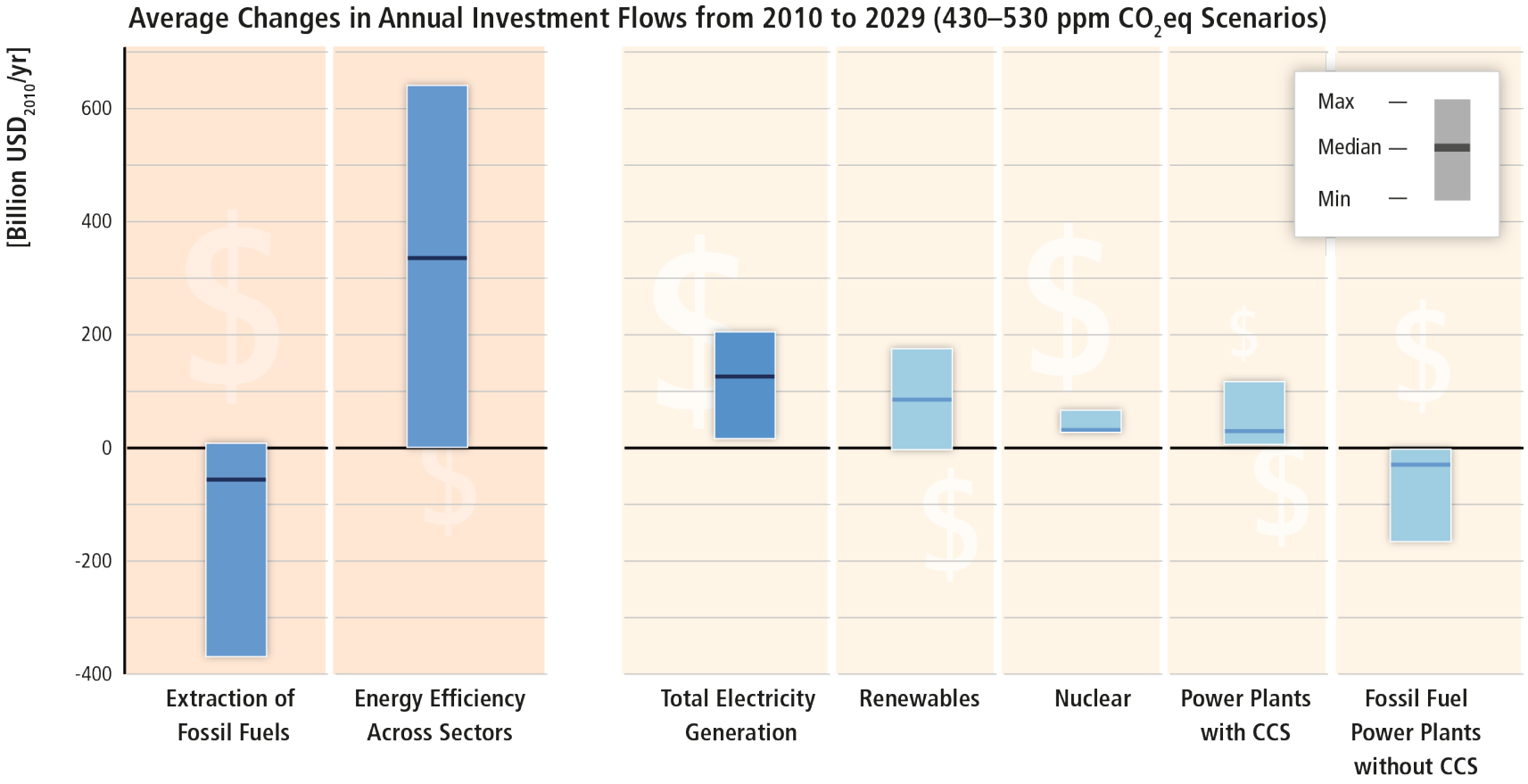
Effective mitigation will not be achieved if individual agents advance their own interests independently.

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



Based on Figure 16.3

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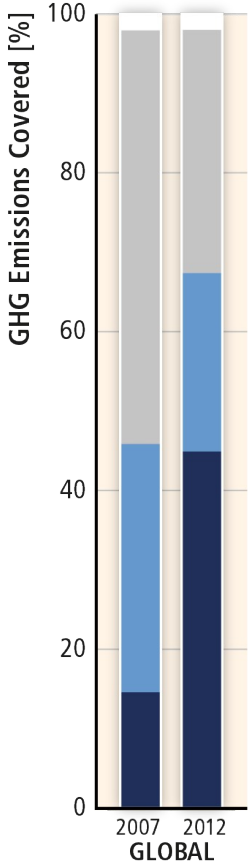
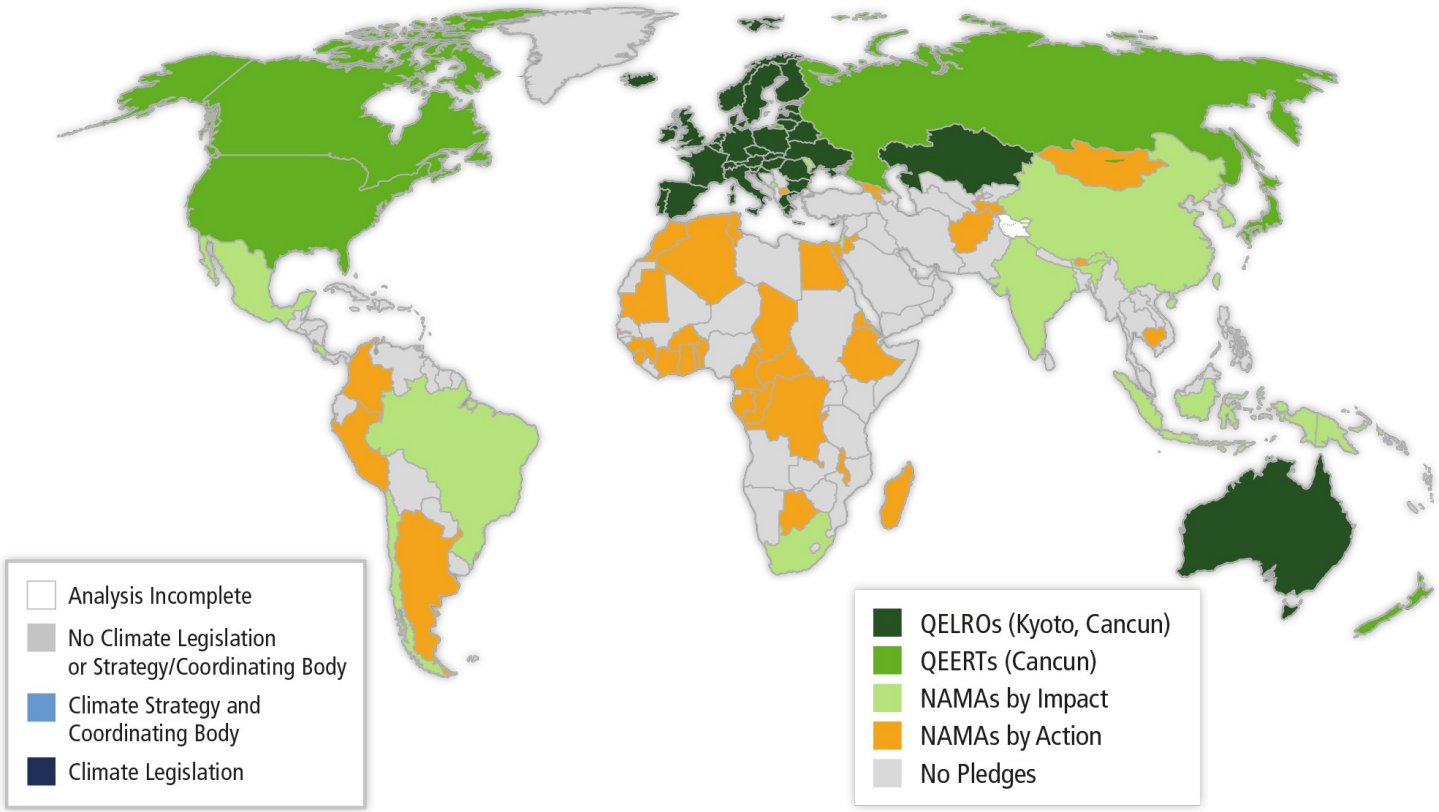
There has been a considerable increase in national and sub-national mitigation policies since AR4.





Based on Figures 15.1 and 13.3

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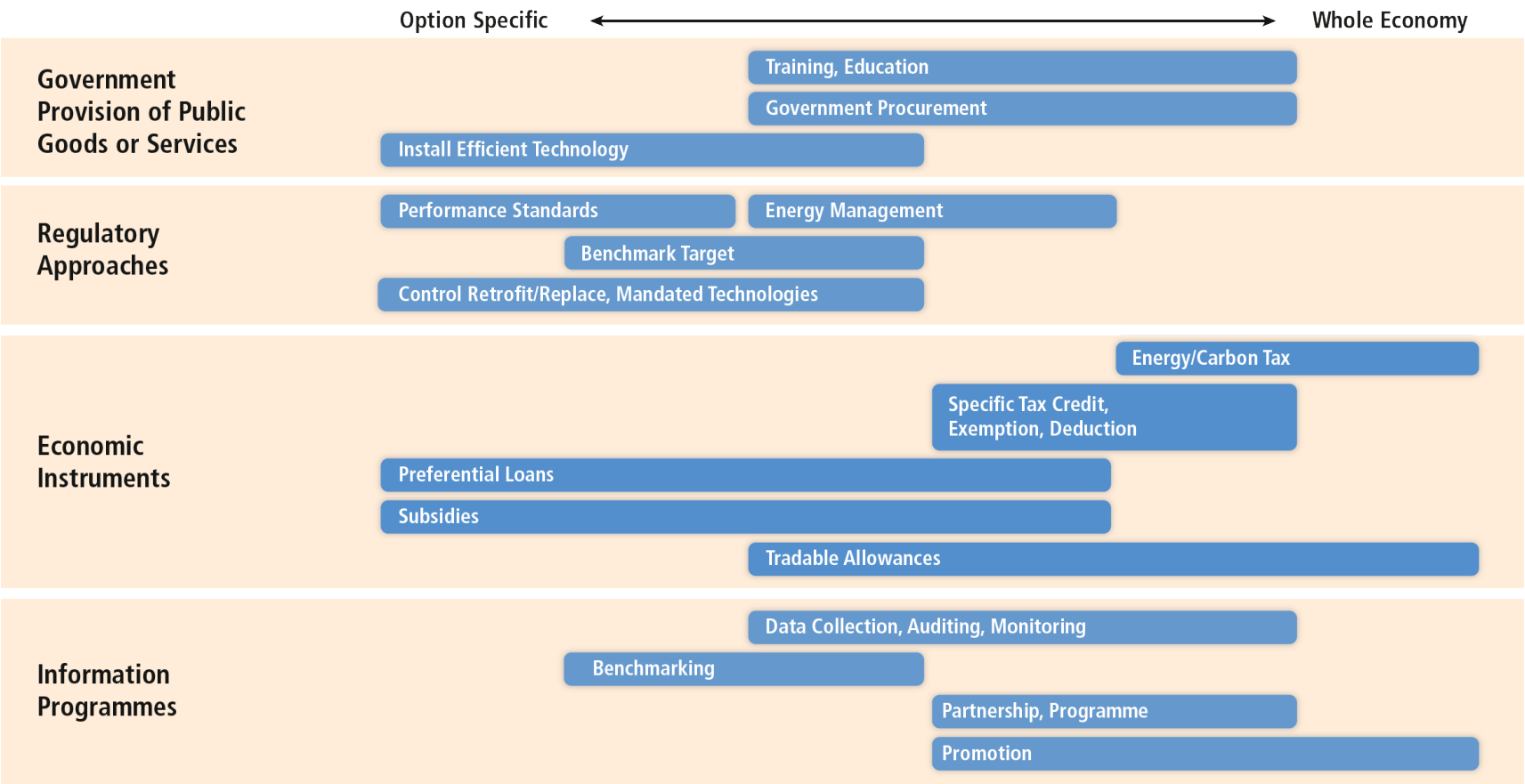
Sector-specific policies have been more widely used than economy-wide policies.



Based on Figure 10.15

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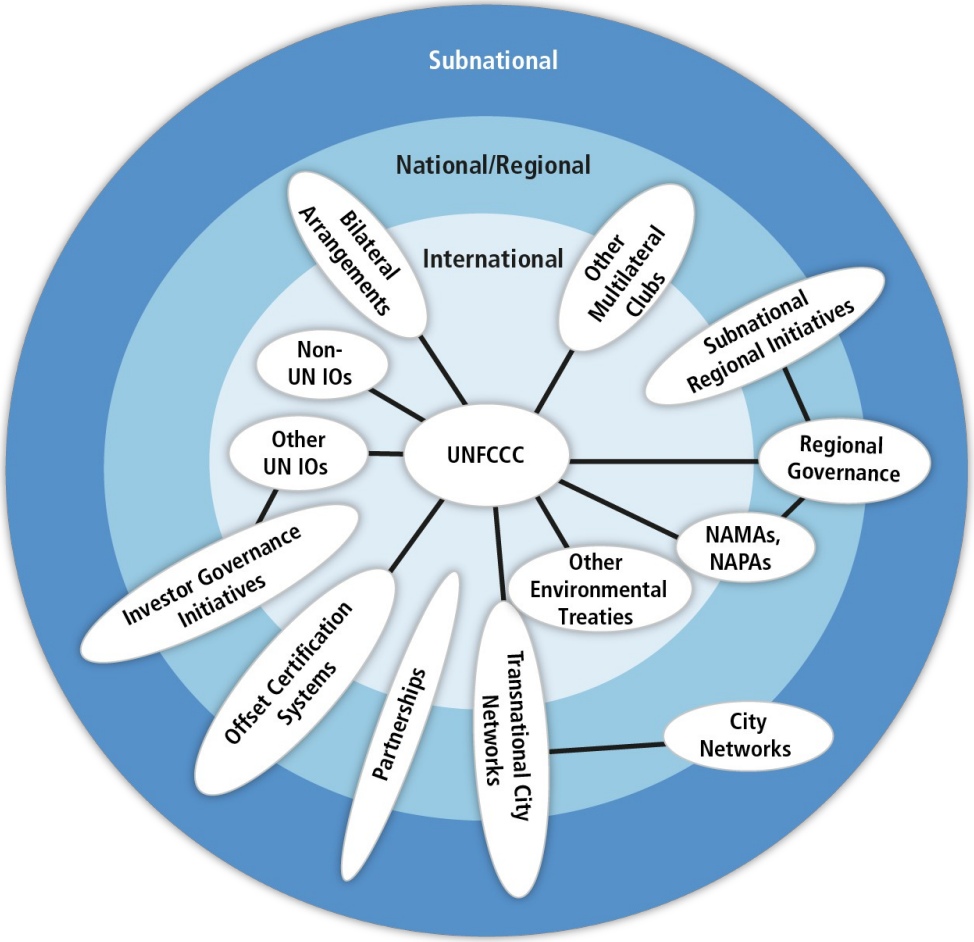
Climate change mitigation is a global commons problem that requires international cooperation across scales.



Based on Figure 13.1

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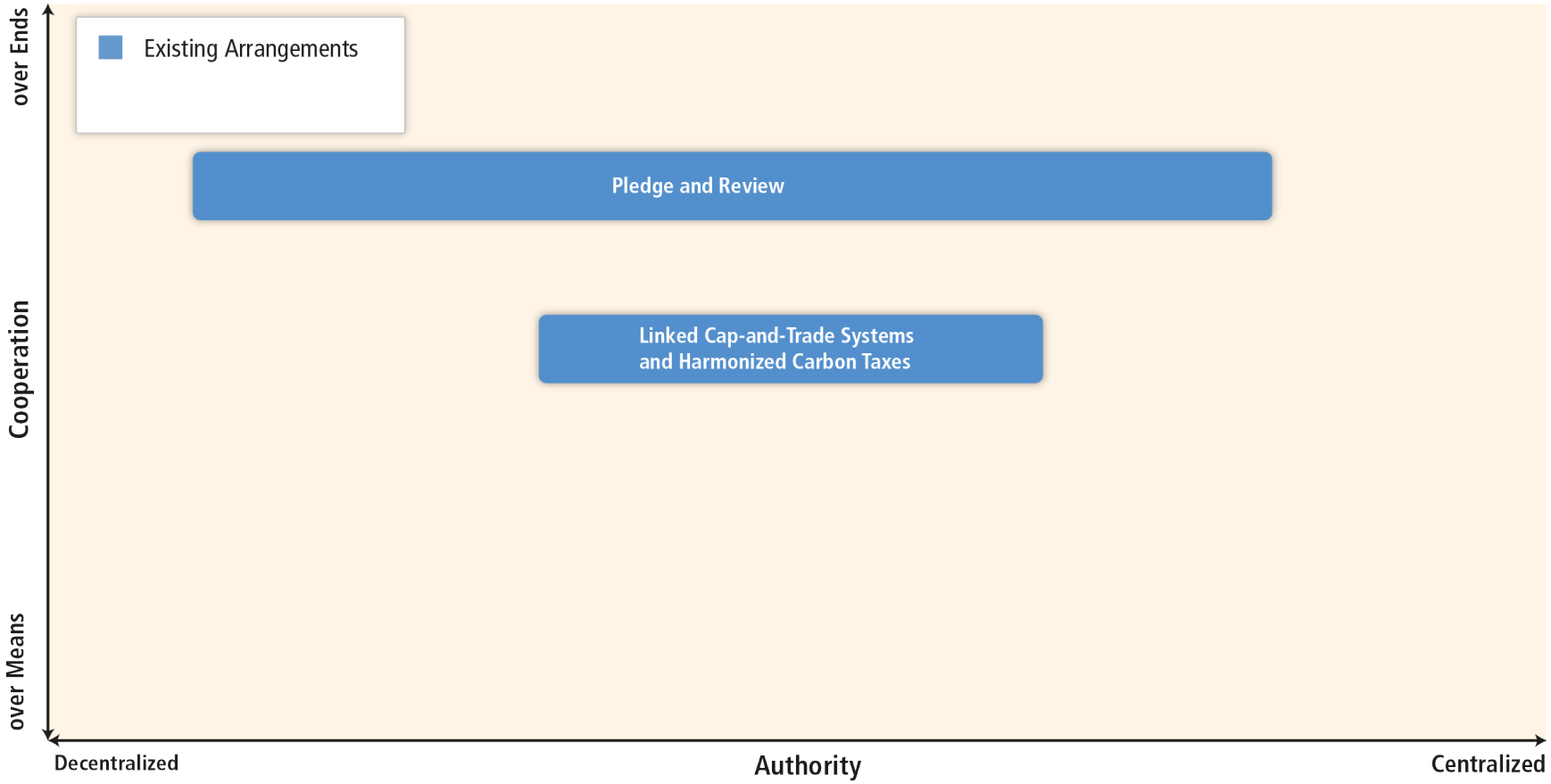
International cooperation can focus on the ends or means and vary in the degree of centralization.



Based on Figure 13.2

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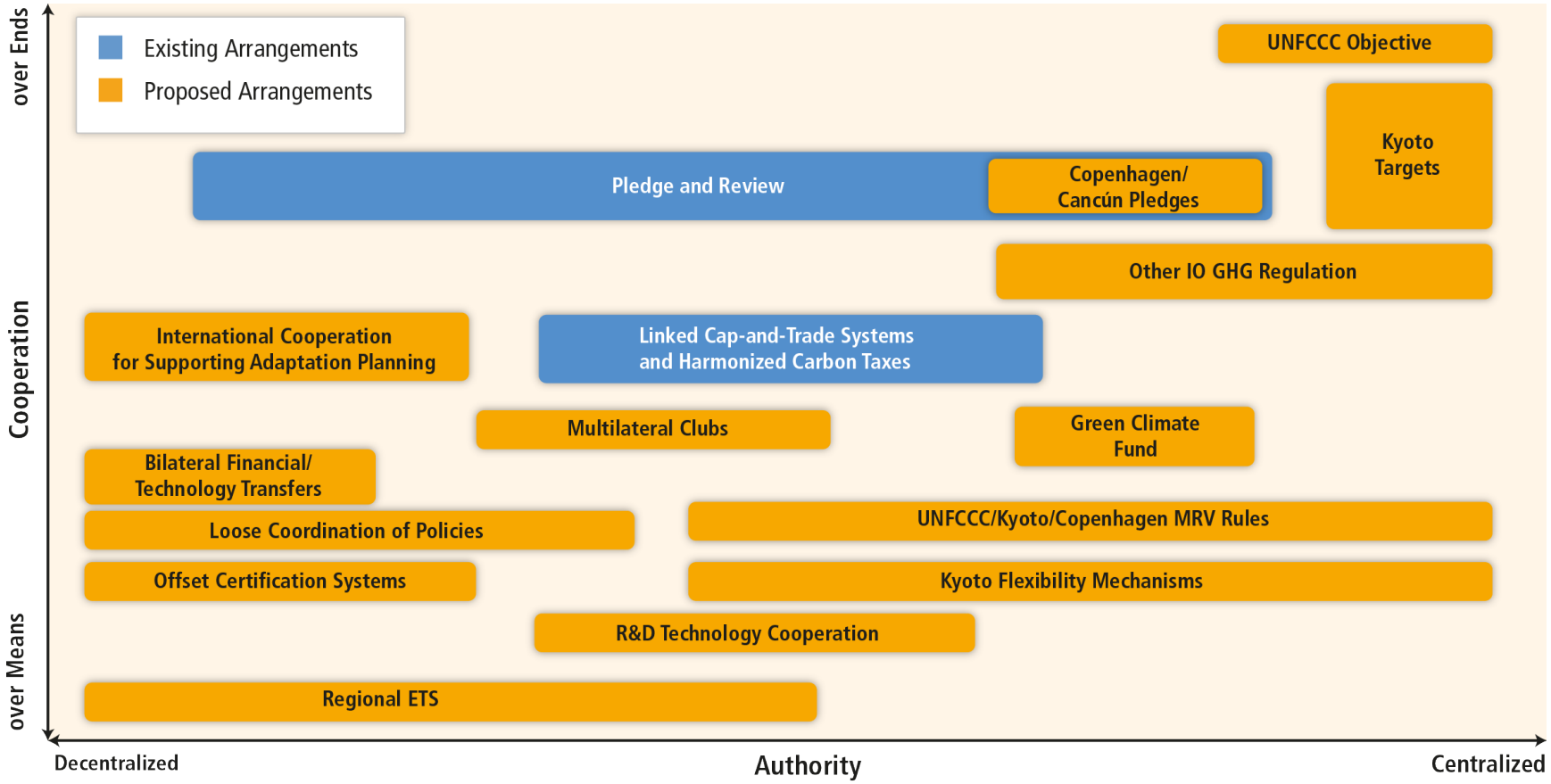
Effective mitigation will not be achieved if individual agents advance their own interests independently.



Based on Figure 13.2

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Mitigation of Climate Change

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Working Group III contribution to the
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