ipcc

INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014

Mitigation of Climate Change

Leon Clarke

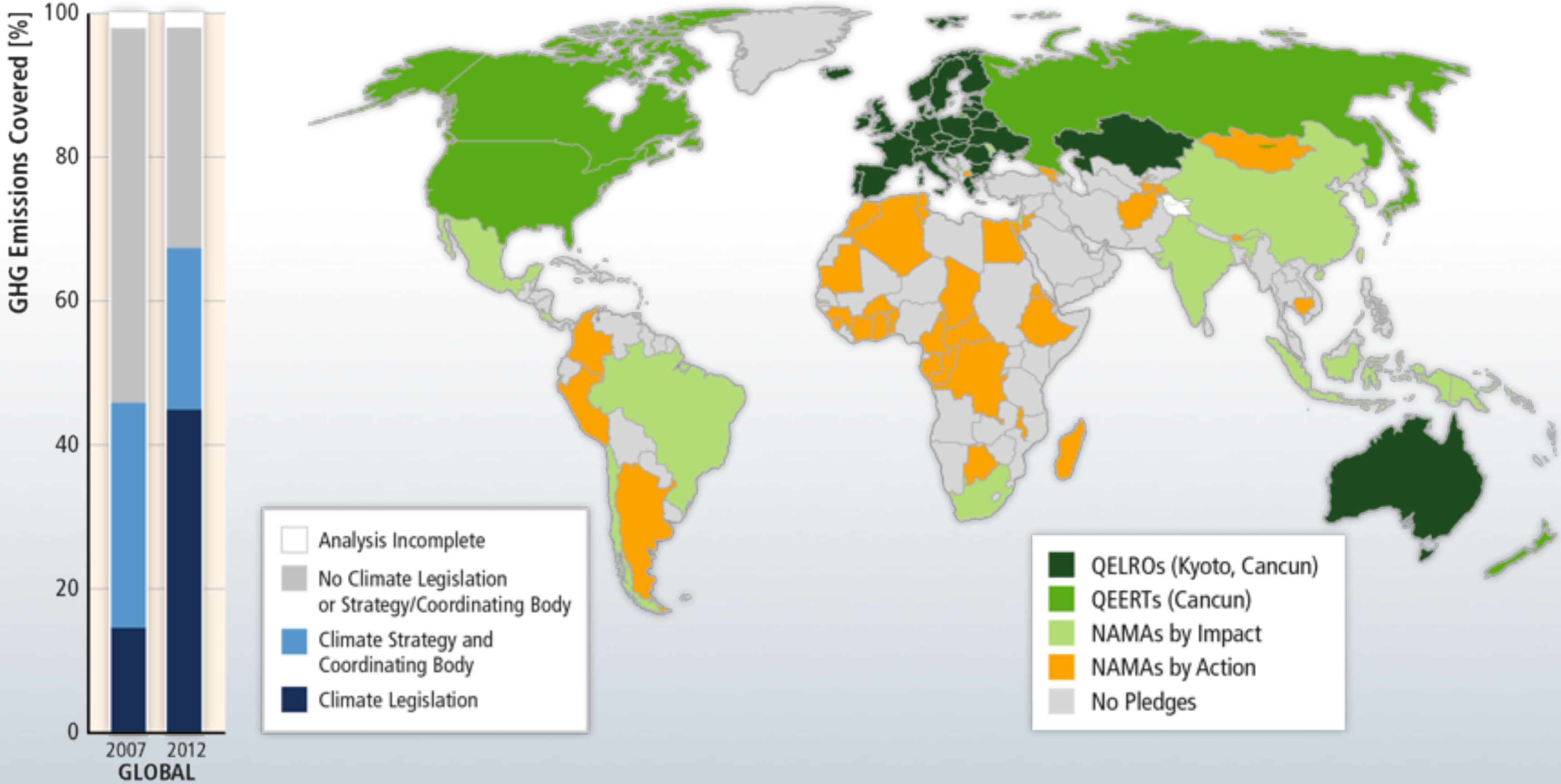
Coordinating Lead Author: Chapter 6

Working Group III contribution to the
IPCC Fifth Assessment Report

WMO UNEP

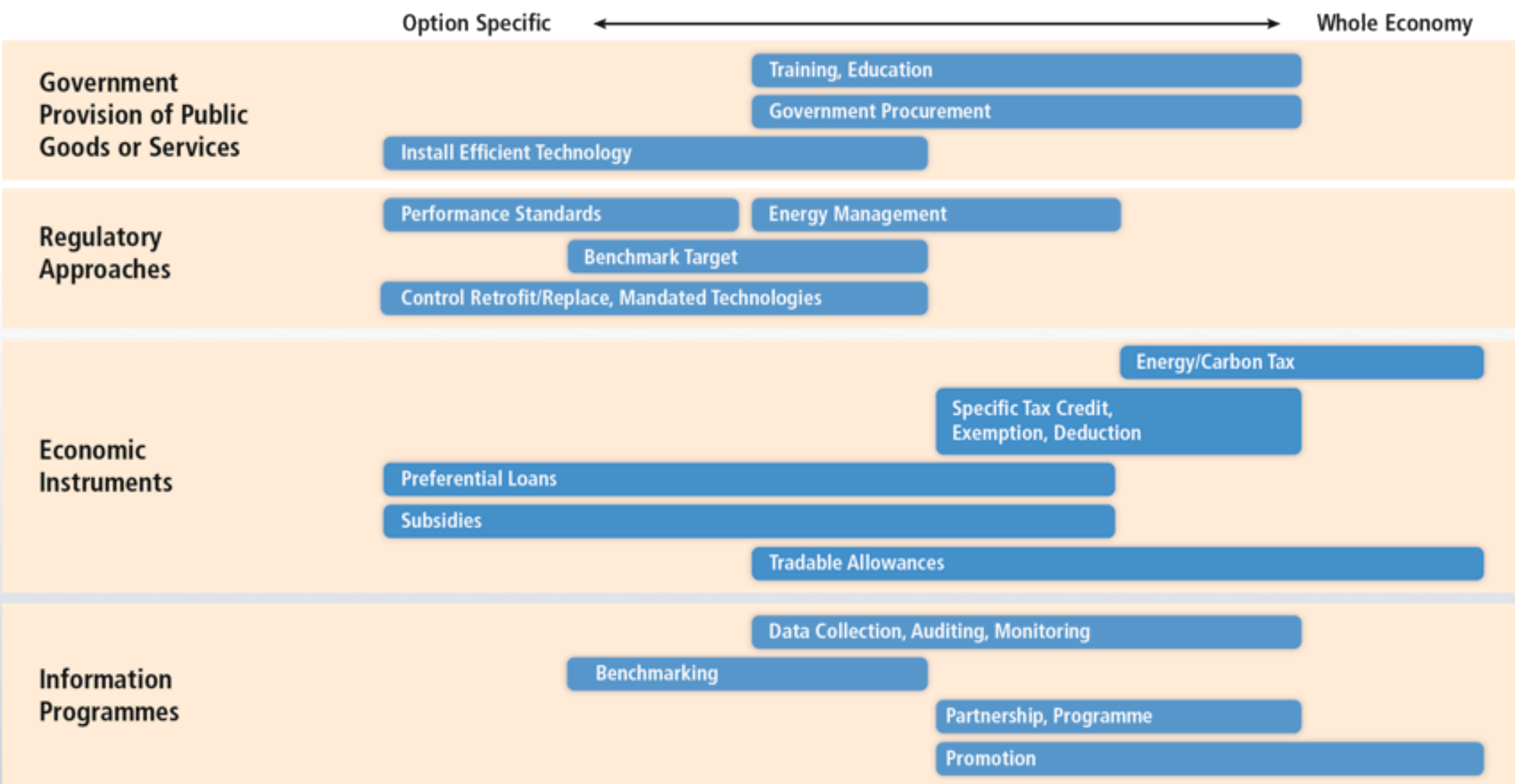

Where are emissions, concentrations, and temperature currently headed?

In 2012, 67% of global GHG emissions were subject to national legislation or strategies versus 45% in 2007.



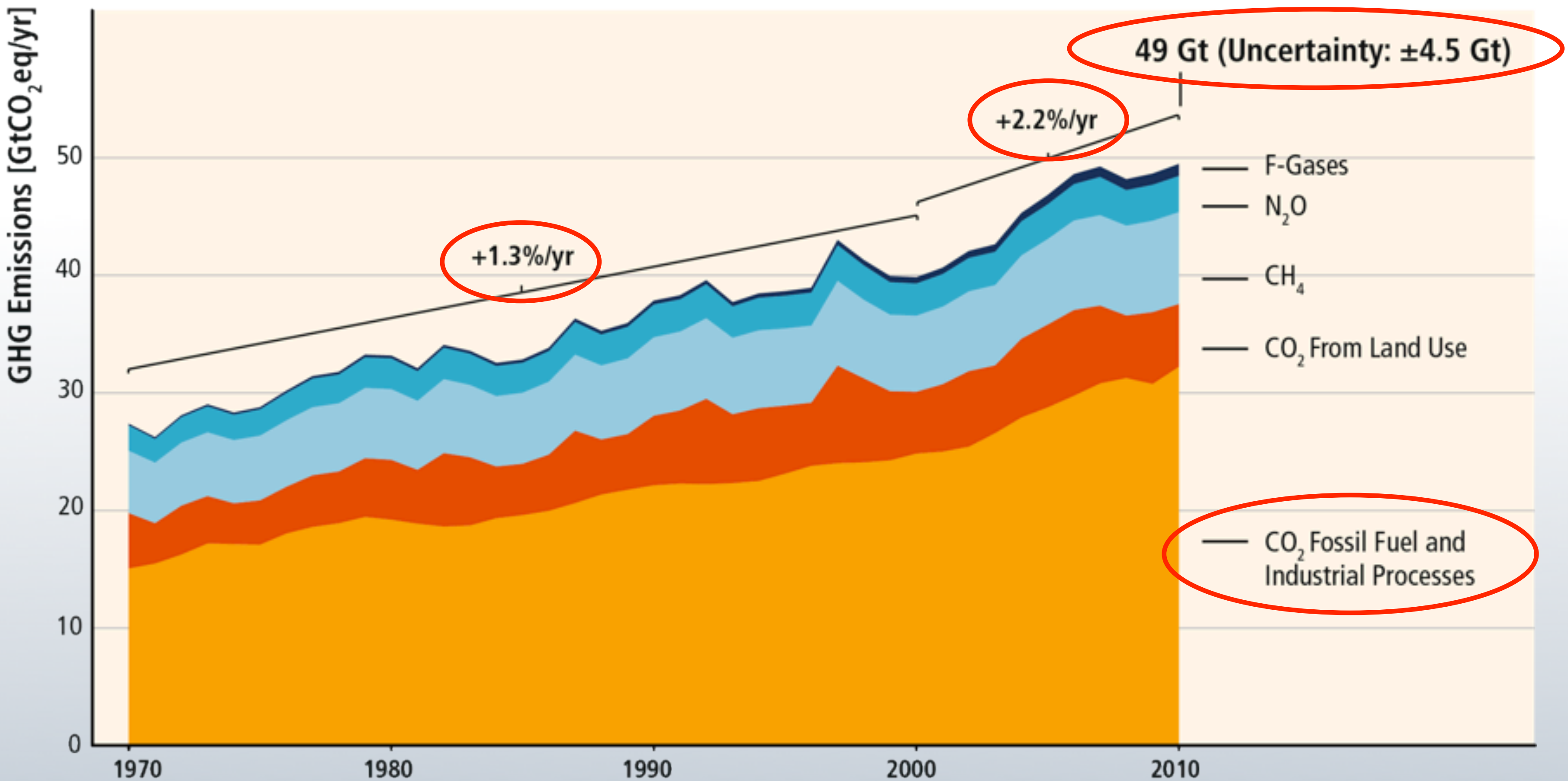
Based on Figures 15.1 and 13.3

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



Based on Figure 10.15

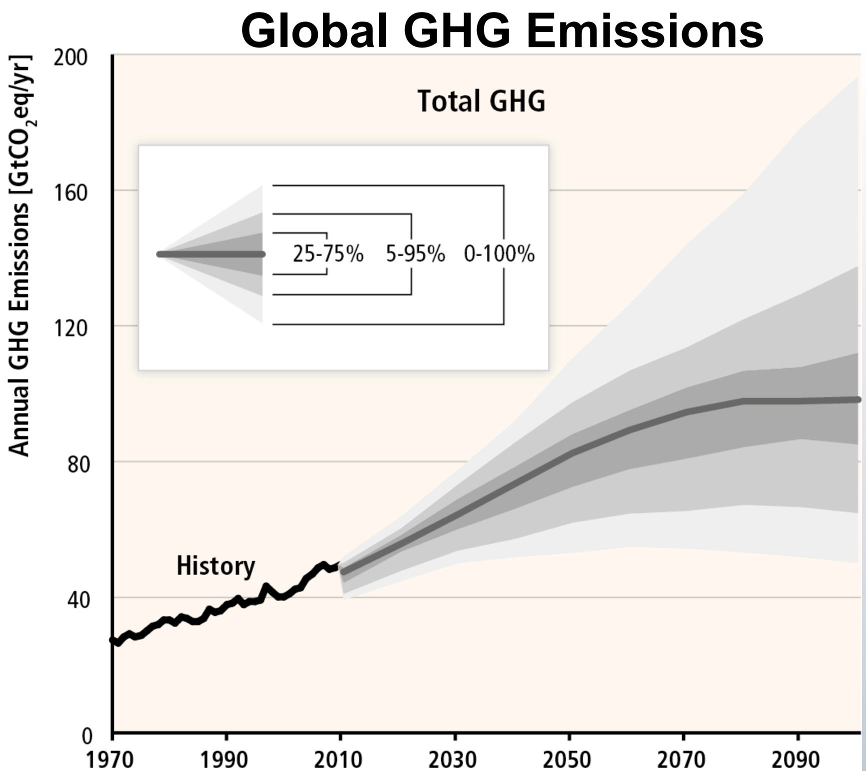
GHG emissions growth has, continued, or even accelerated despite reduction efforts.

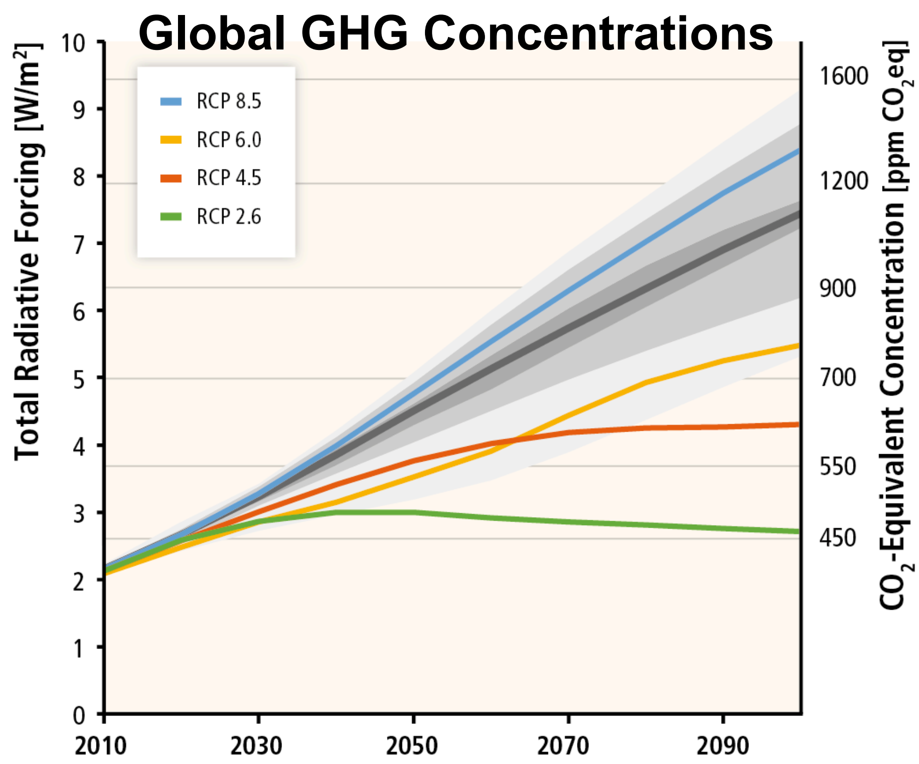


Based on Figure 1.3

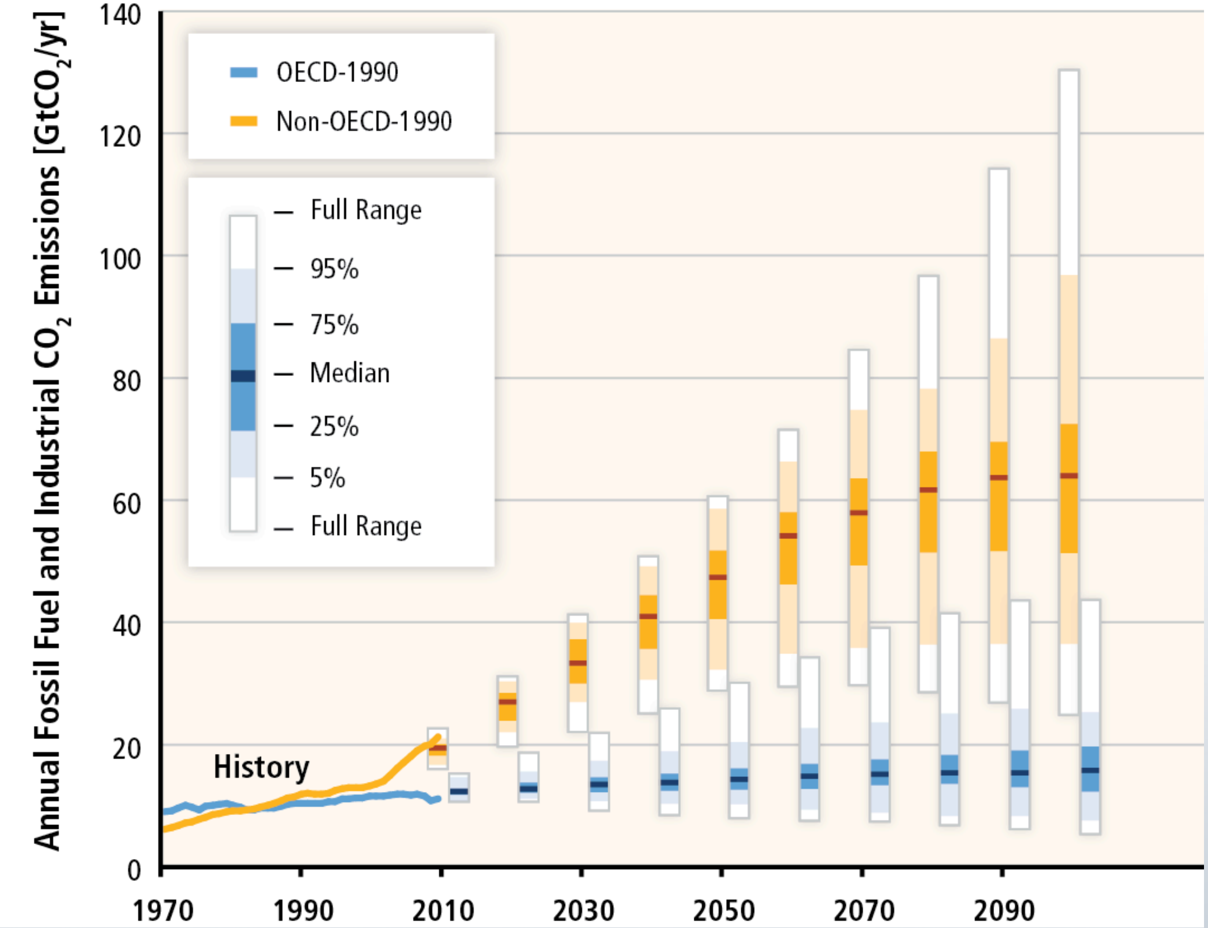
Emissions and concentrations are expected to continue to rise despite improvements in technology.

Without additional mitigation, global mean surface temperature is projected to increase by 3.7 to 4.8°C over the 21st century (median values; the range is 2.5°C to 7.8°C when including climate uncertainty)

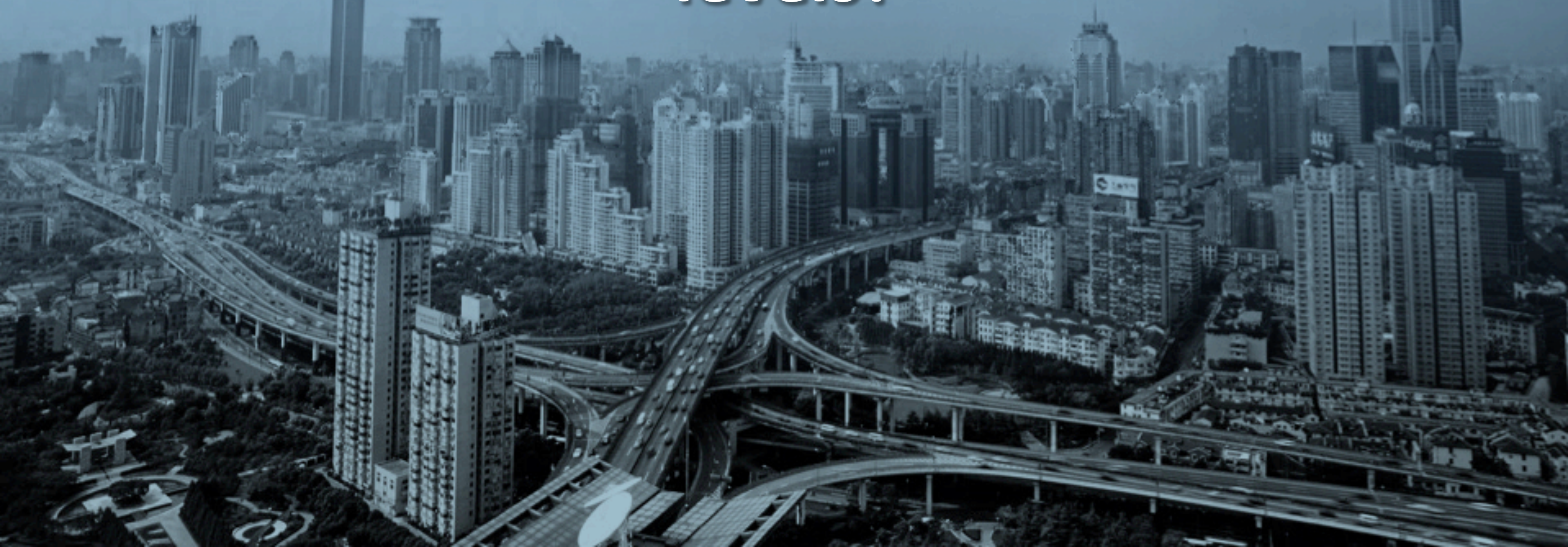




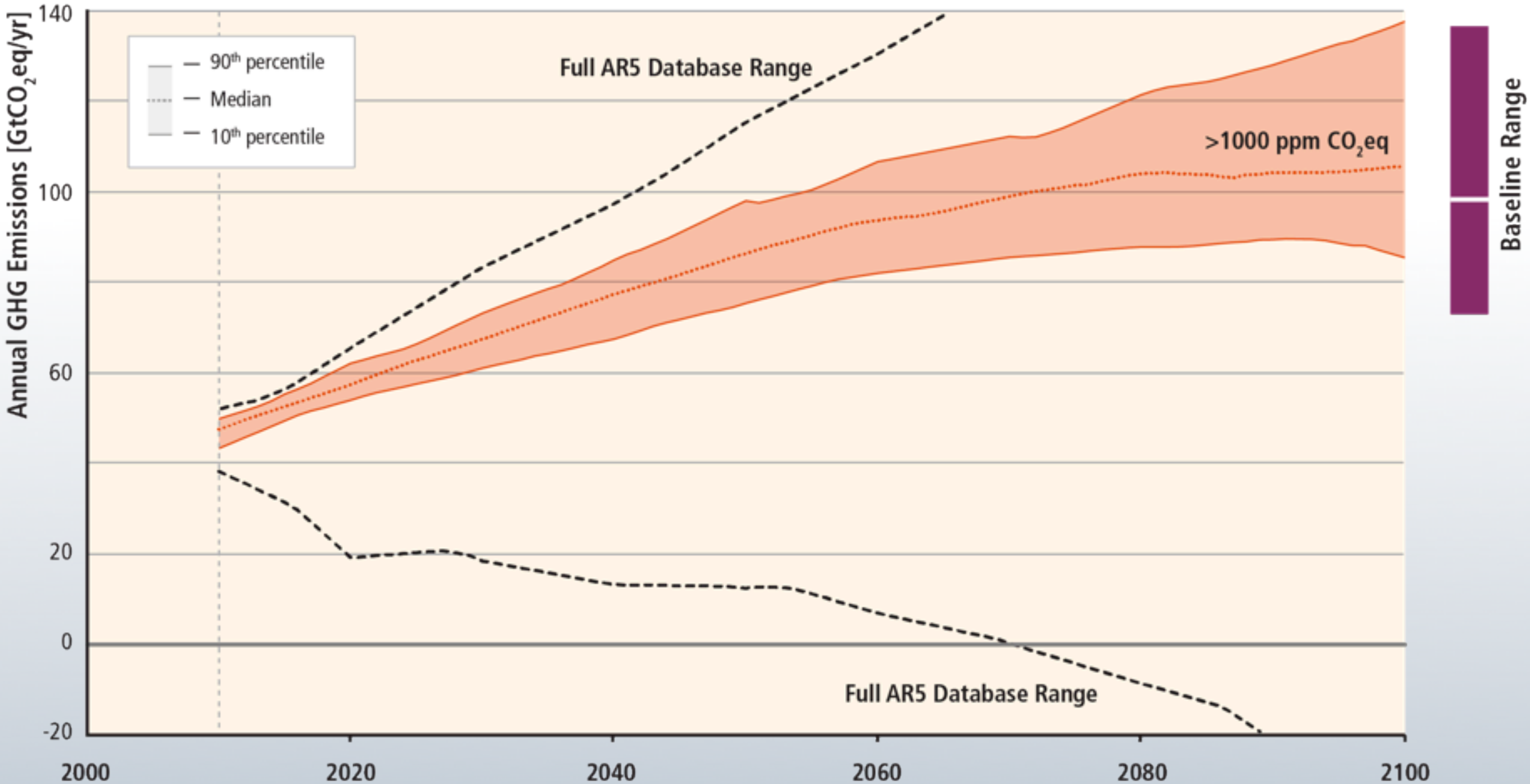
Most emissions growth occurs in the non-OECD countries.



How much must emissions be reduced to limit temperature change to 2°C or other levels?

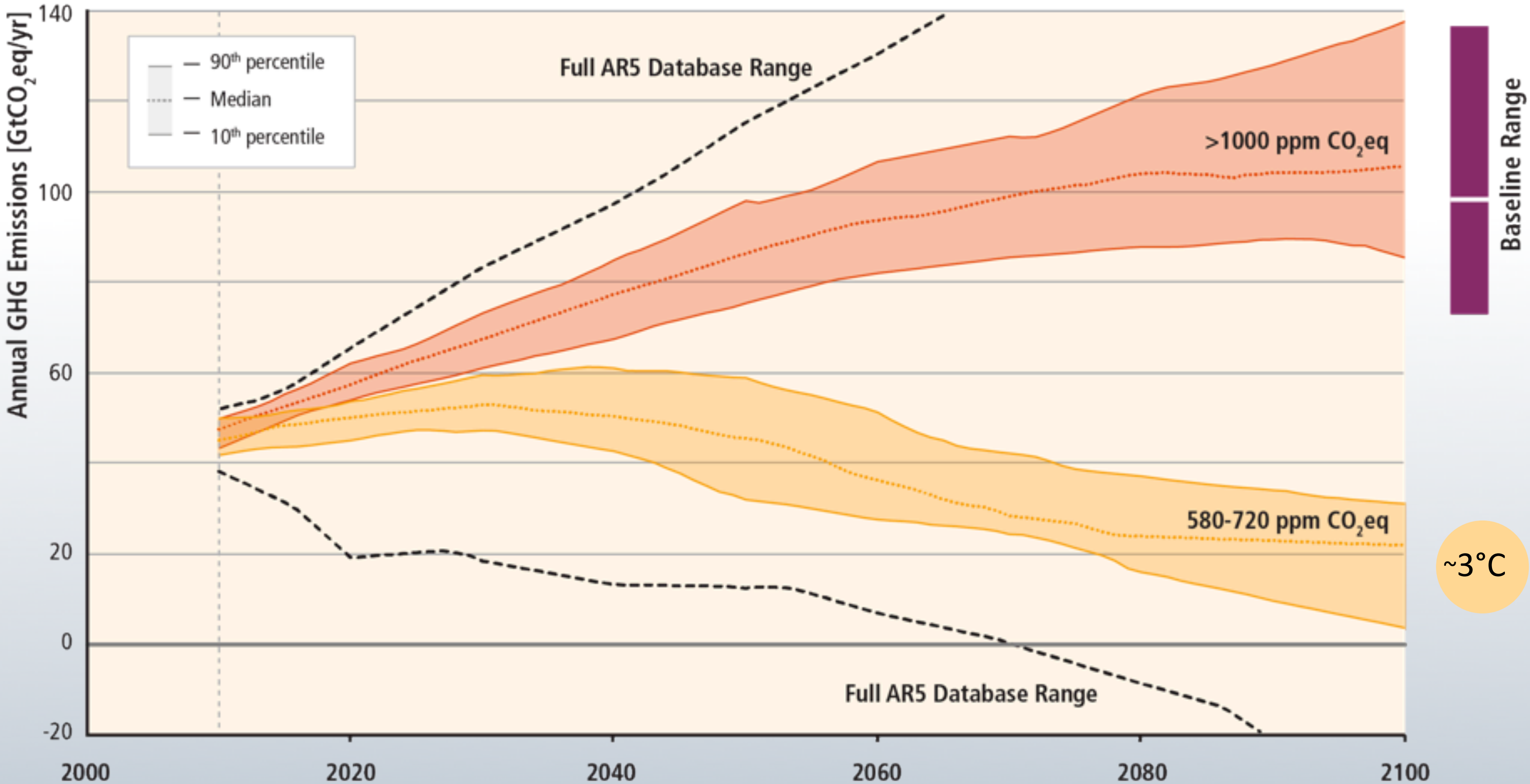


AR5 collected roughly 1200 baseline and mitigation scenarios.



Based on Figure 6.7

Limiting temperature change will require substantial emissions reductions.



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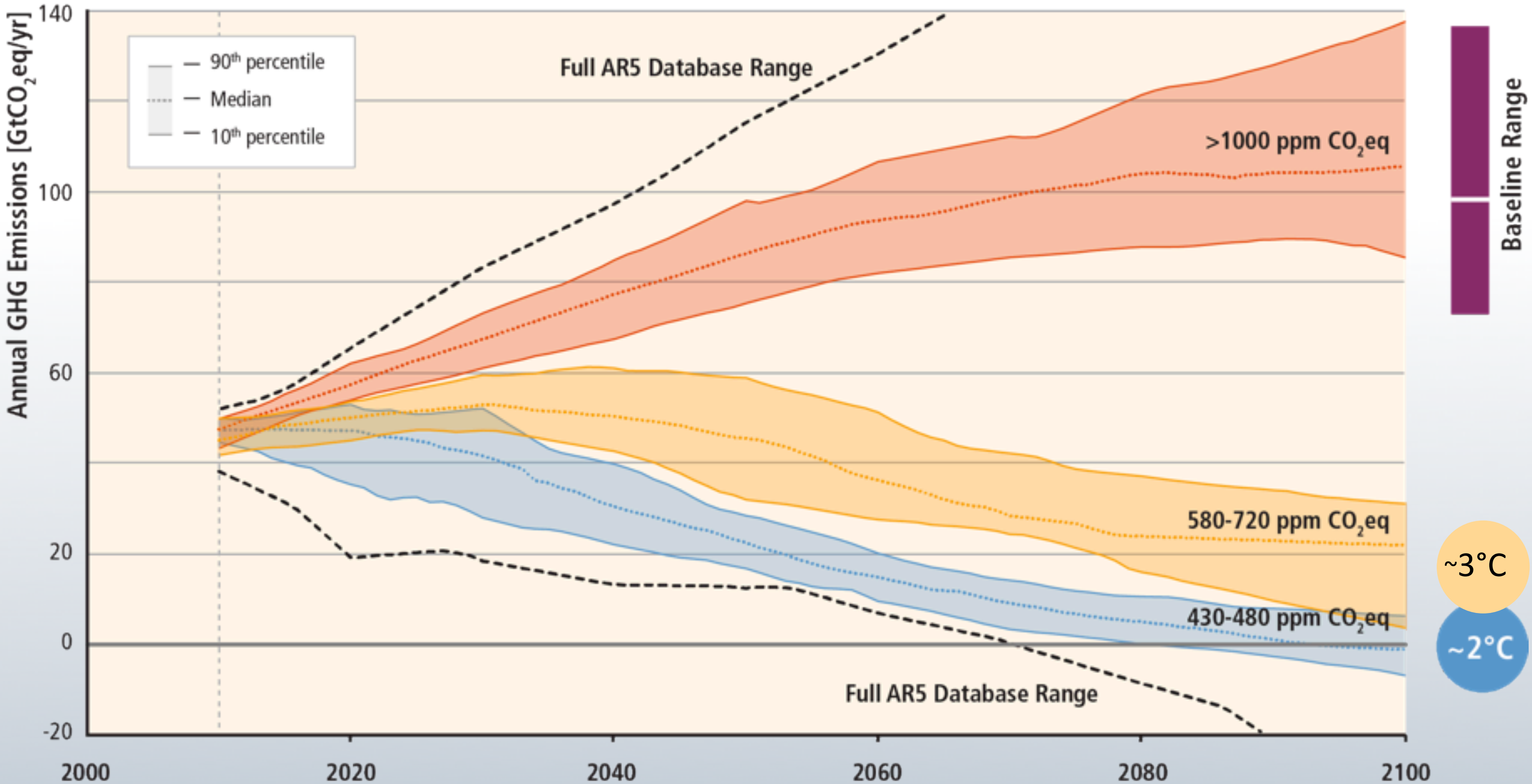
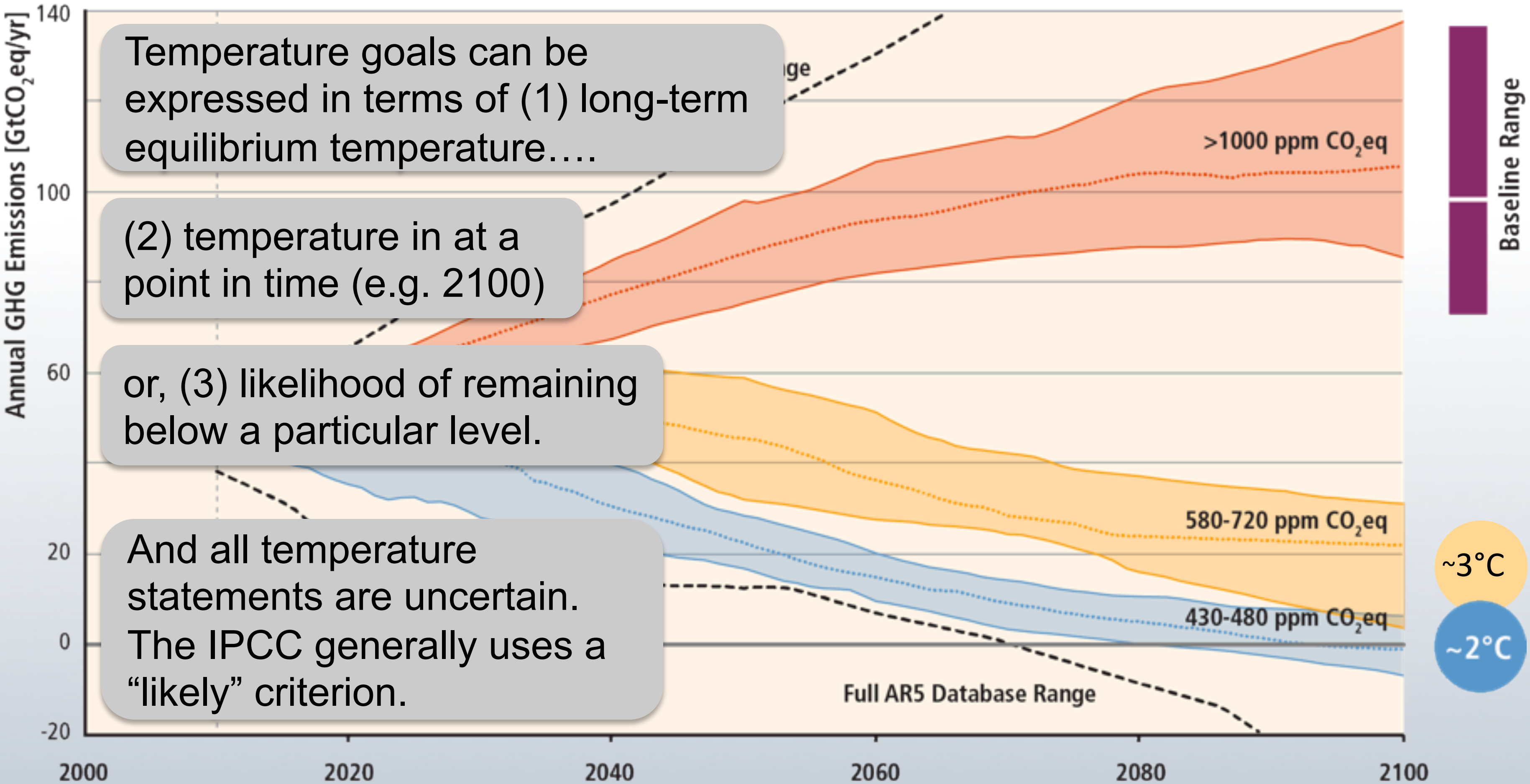


There is no simple link between temperature and any emissions pathway.



Based on Figure 6.7

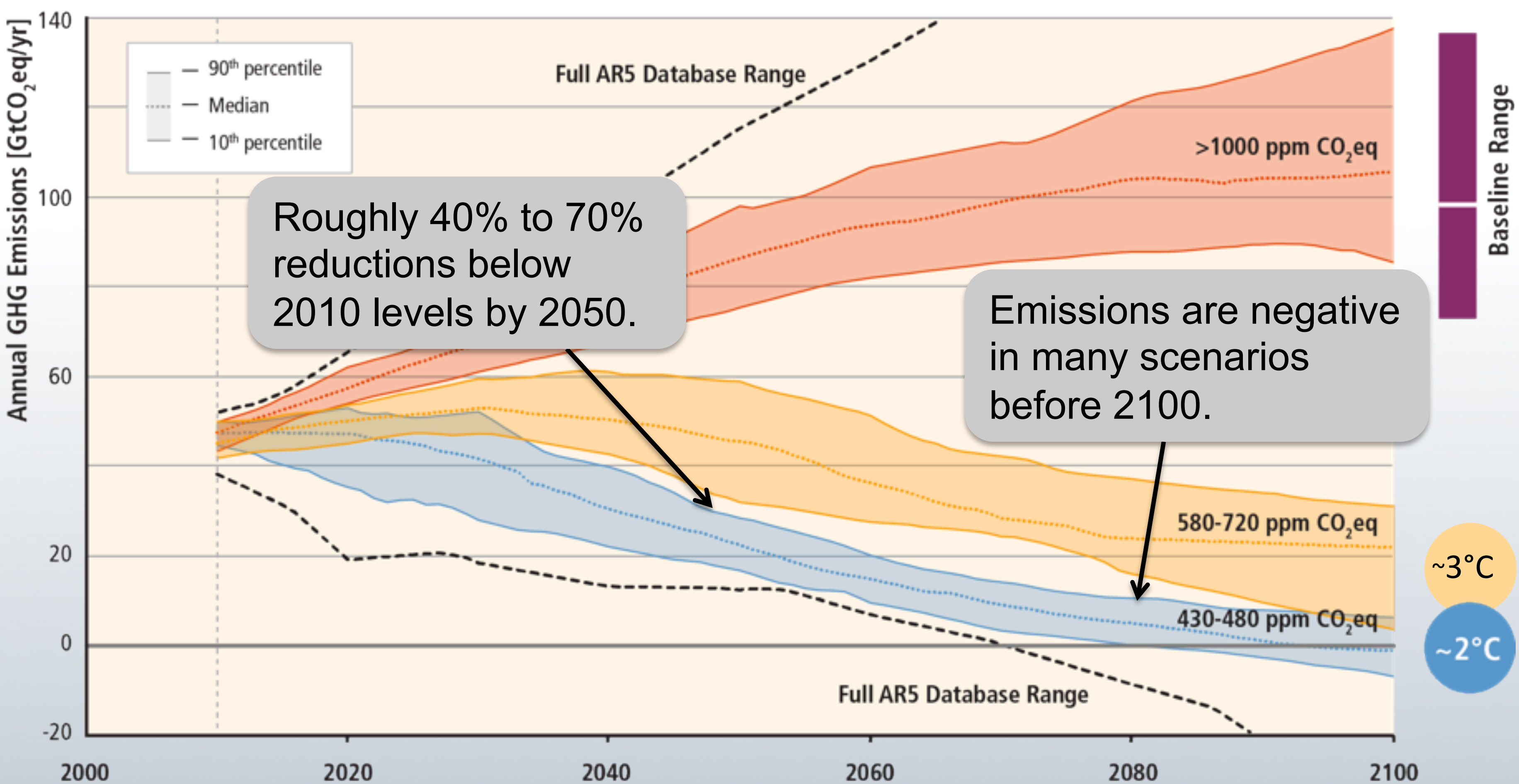
450 ppm CO2e scenarios are probabilistically associated with a 2°C goal.

Temperature is likely to stay below 2°C this century.

CO_2eq Concentrations in 2100 (CO_2eq) Category label (concentration range)[9]	Subcategories	Relative position of the RCPs[5]	Change in CO_2eq emissions compared to 2010 in (%)[4]		…-1900)[5,6]				
			2050	2100	2100 Temperature change (°C)[7]	Likelihood of staying below temperature level over the 21[st] century[8]			
						1.5°C	2.0°C	3.0°C	4.0°C
450 (430–480)	Total range[1,10]	RCP2.6	-72 to -41	-118 to -78	1.5–1.7 (1.0–2.8)	More unlikely than likely	Likely		
500 (480–530)	No overshoot of 530 ppm CO_2eq		-57 to -42	-107 to -73	1.7–1.9 (1.2–2.9)	Unlikely	More likely than not	Likely	Likely
	Overshoot of 530 ppm CO_2eq		-55 to -25	-114 to -90	1.8–2.0 (1.2–3.3)		About as likely as not		
550 (530–580)	No overshoot of 580 ppm CO_2eq		-47 to -19	-81 to -59	2.0–2.2 (1.4–3.6)		More unlikely than likely[12]		
	Overshoot of 580 ppm CO_2eq		-16 to 7	-183 to -86	2.1–2.3 (1.4–3.6)				
(580–650)	Total range	RCP4.5	-38 to 24	-134 to -50	2.3–2.6 (1.5–4.2)				
(650–720)	Total range		-11 to 17	-54 to -21	2.6–2.9 (1.8–4.5)				
(720–1000)	Total range	RCP6.0	18 to 54	-7 to 72	3.1–3.7 (2.1–5.8)				
>1000	Total range	RCP8.5	52 to 95	74 to 178	4.1–4.8 (2.8–7.8)				ore unlikely than likely

The 450 ppmv CO2e scenarios are typically more unlikely then likely to remain below 1.5°C this century.

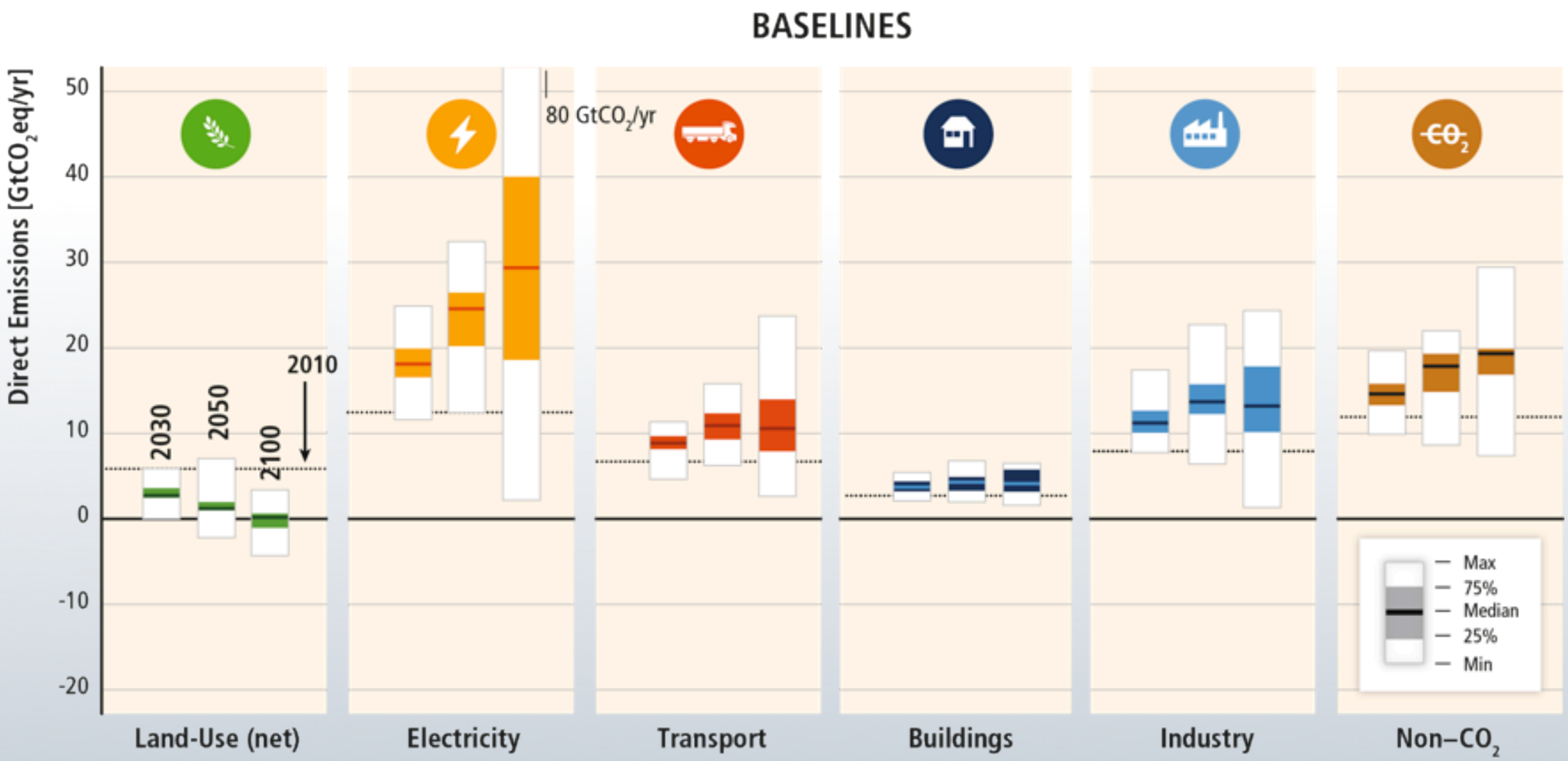
Limiting concentrations and temperature change requires substantial mitigation in the near- and long-term.



Based on Figure 6.7

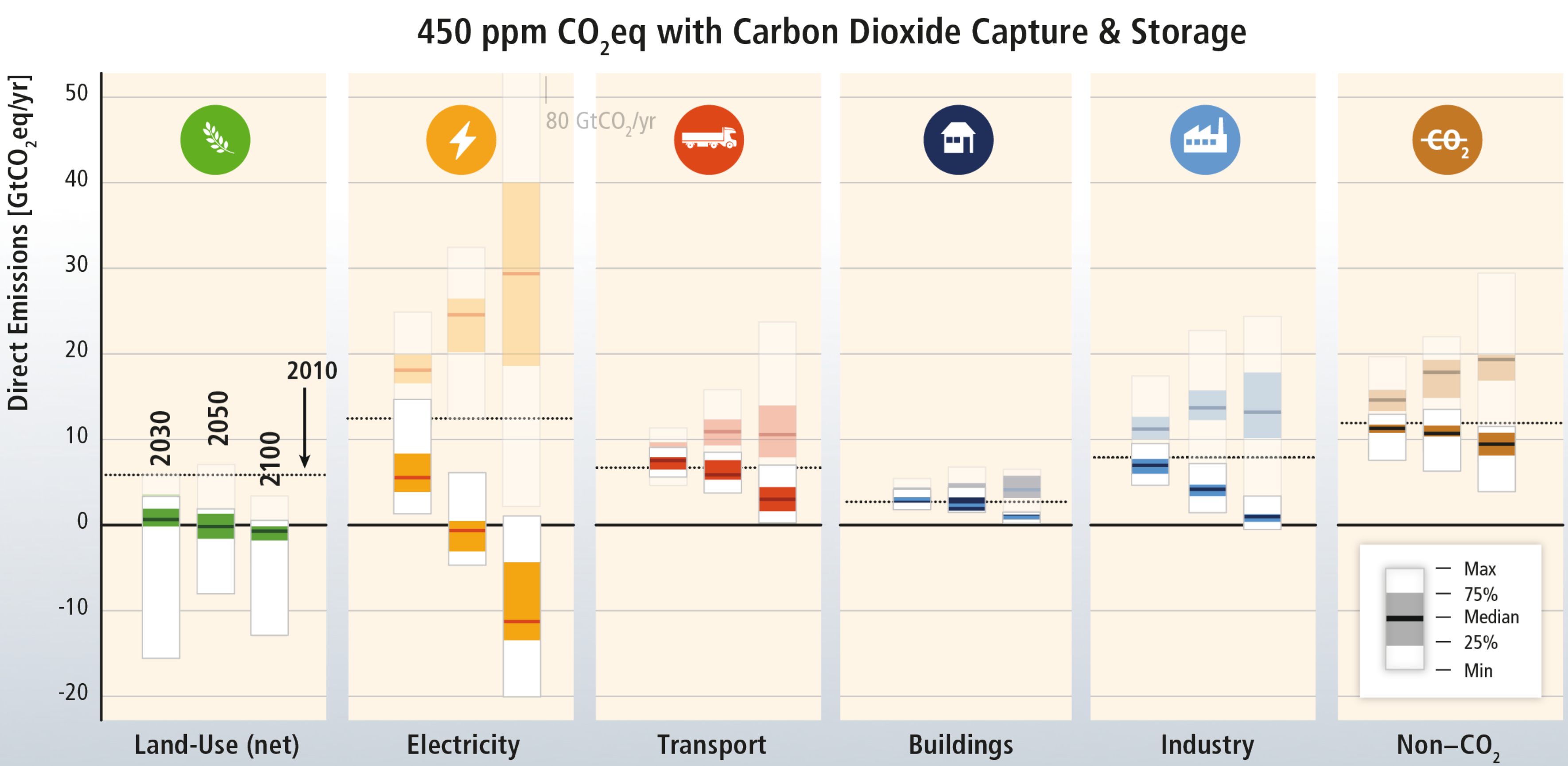
Which sectors will contribute to mitigation?

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



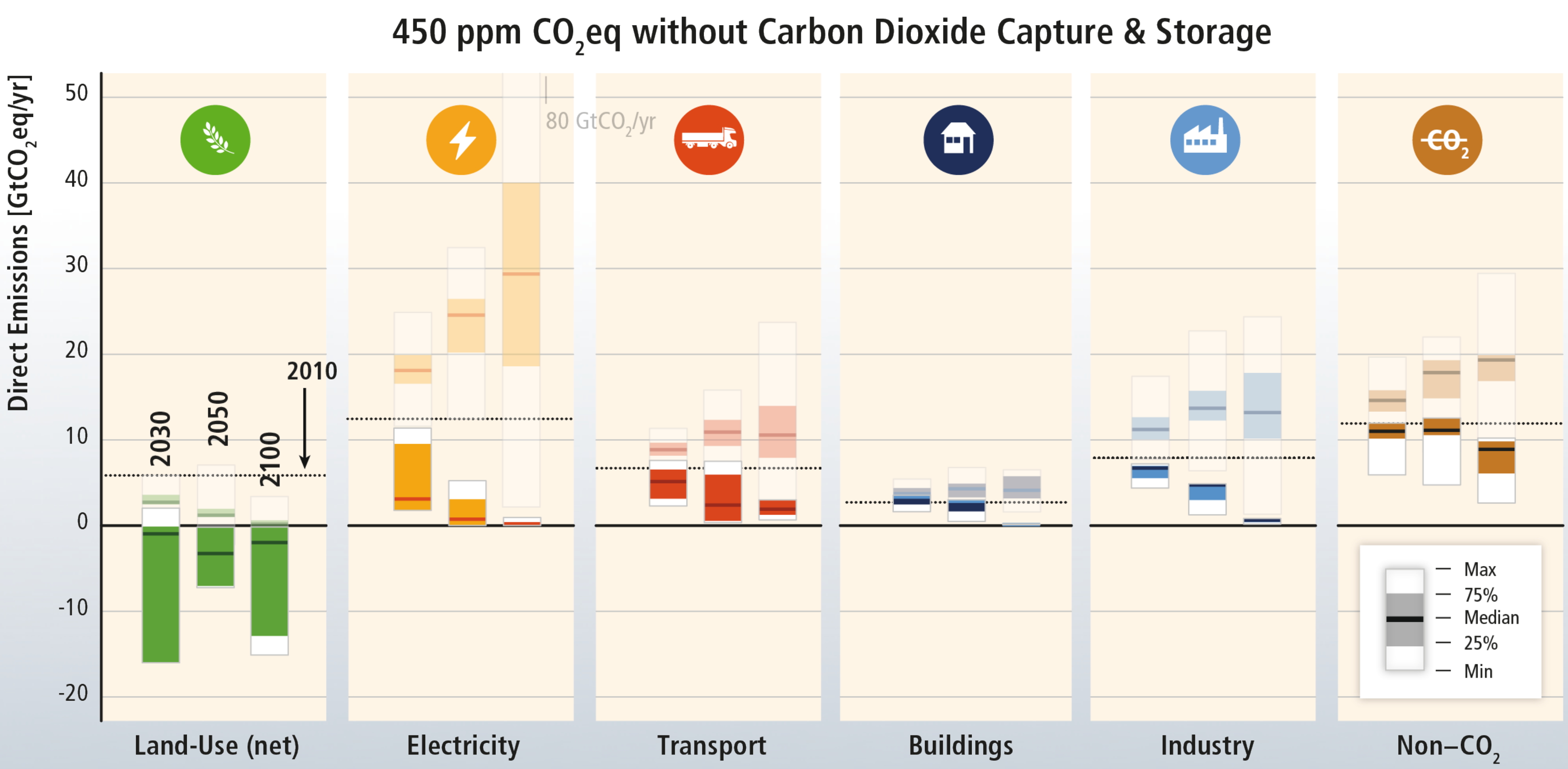
Based on Figure TS.17

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



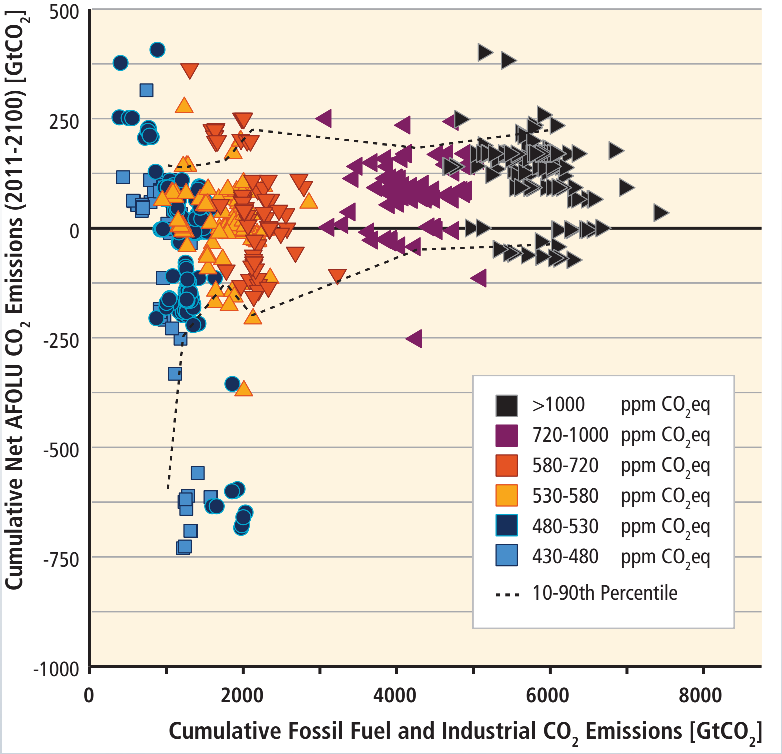
Based on Figure TS.17

Mitigation efforts in one sector determine efforts in others.



Based on Figure TS.17

There are very different perceptions about the role of land use change emissions

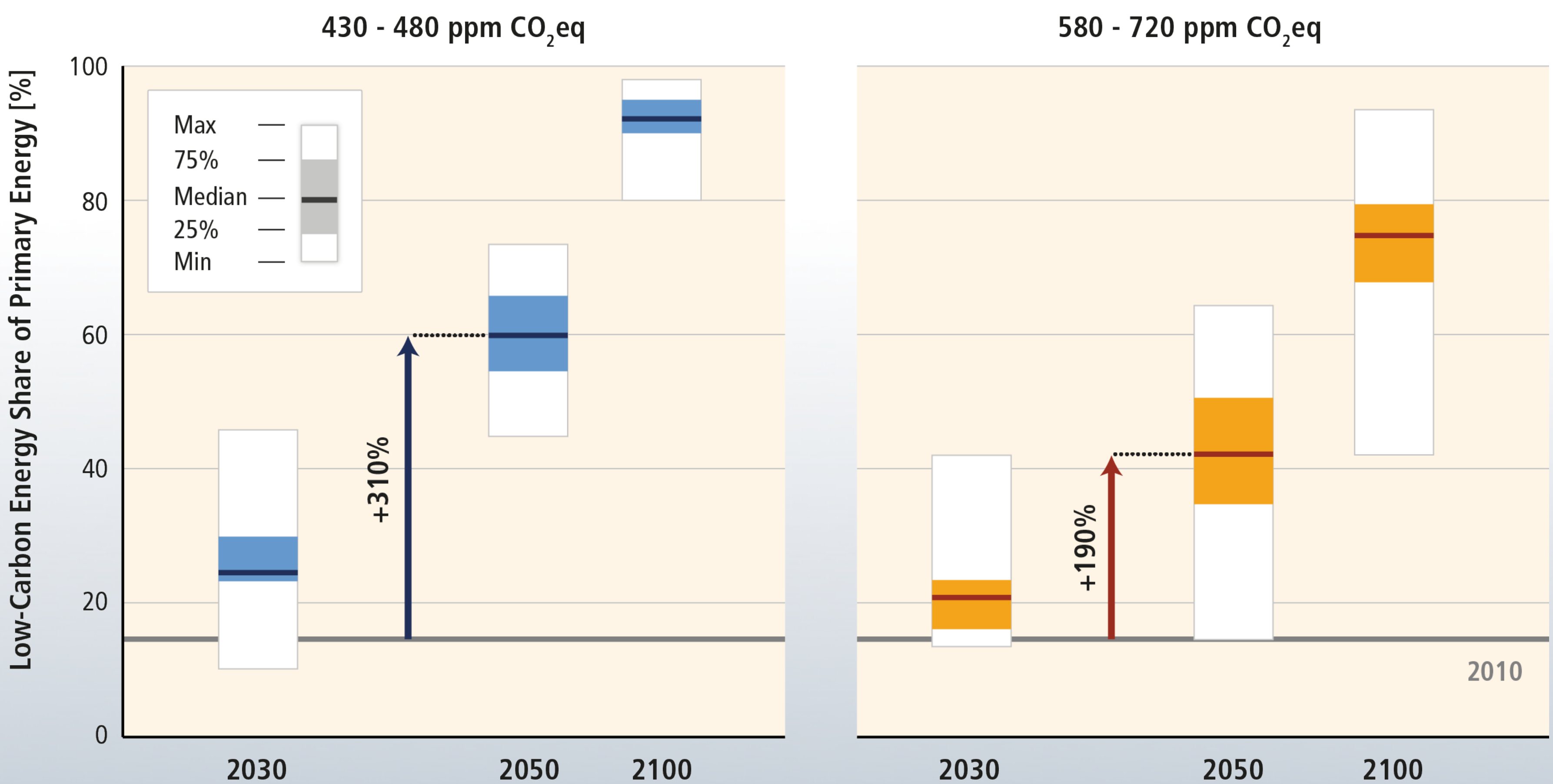


Land use change emissions depend critically on biomass and on the way that land use is included in climate change mitigation

Scenarios largely do not include feedbacks from a changing climate.

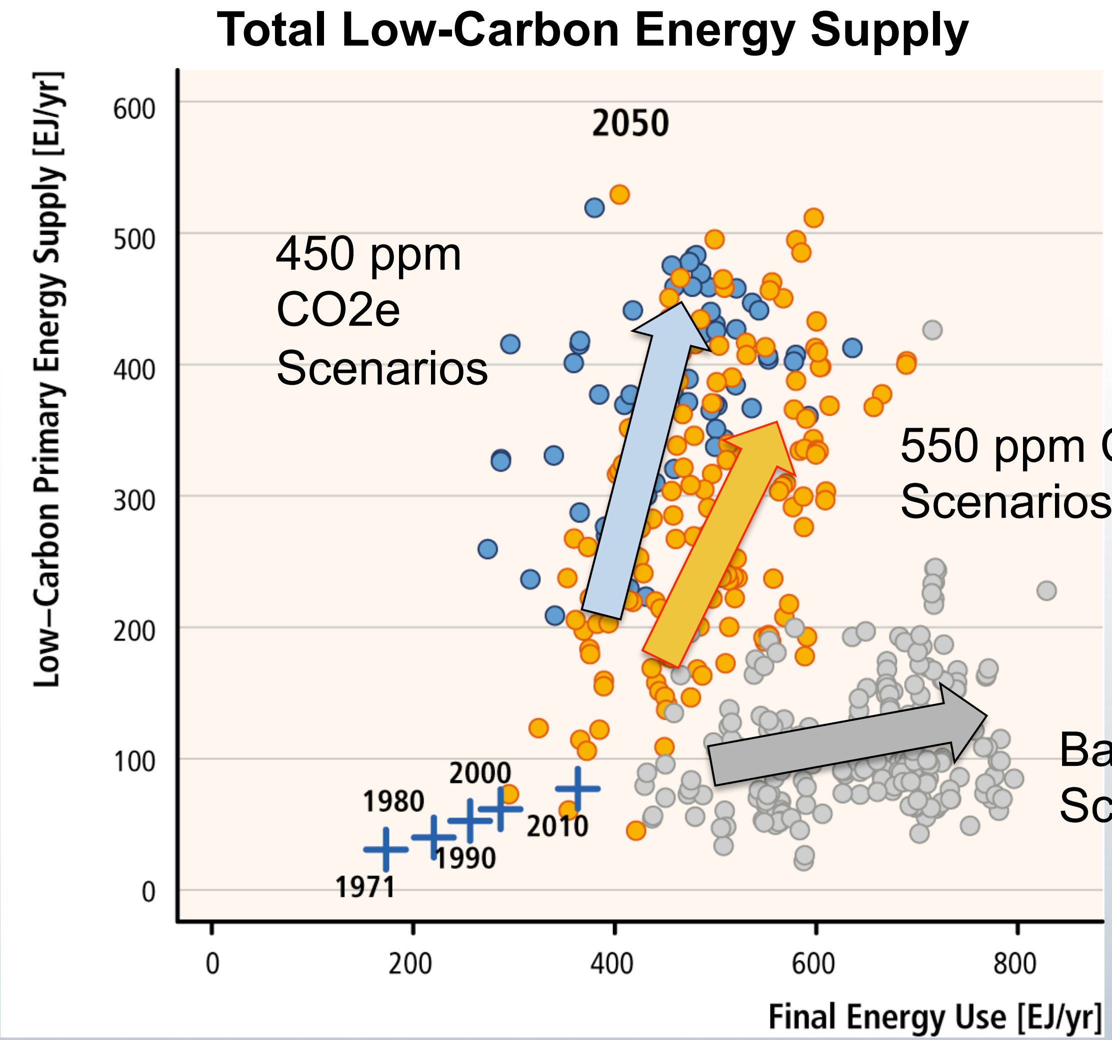
How much does the energy system need to change to limit temperature change?

Mitigation involves substantial upscaling of low-carbon energy.



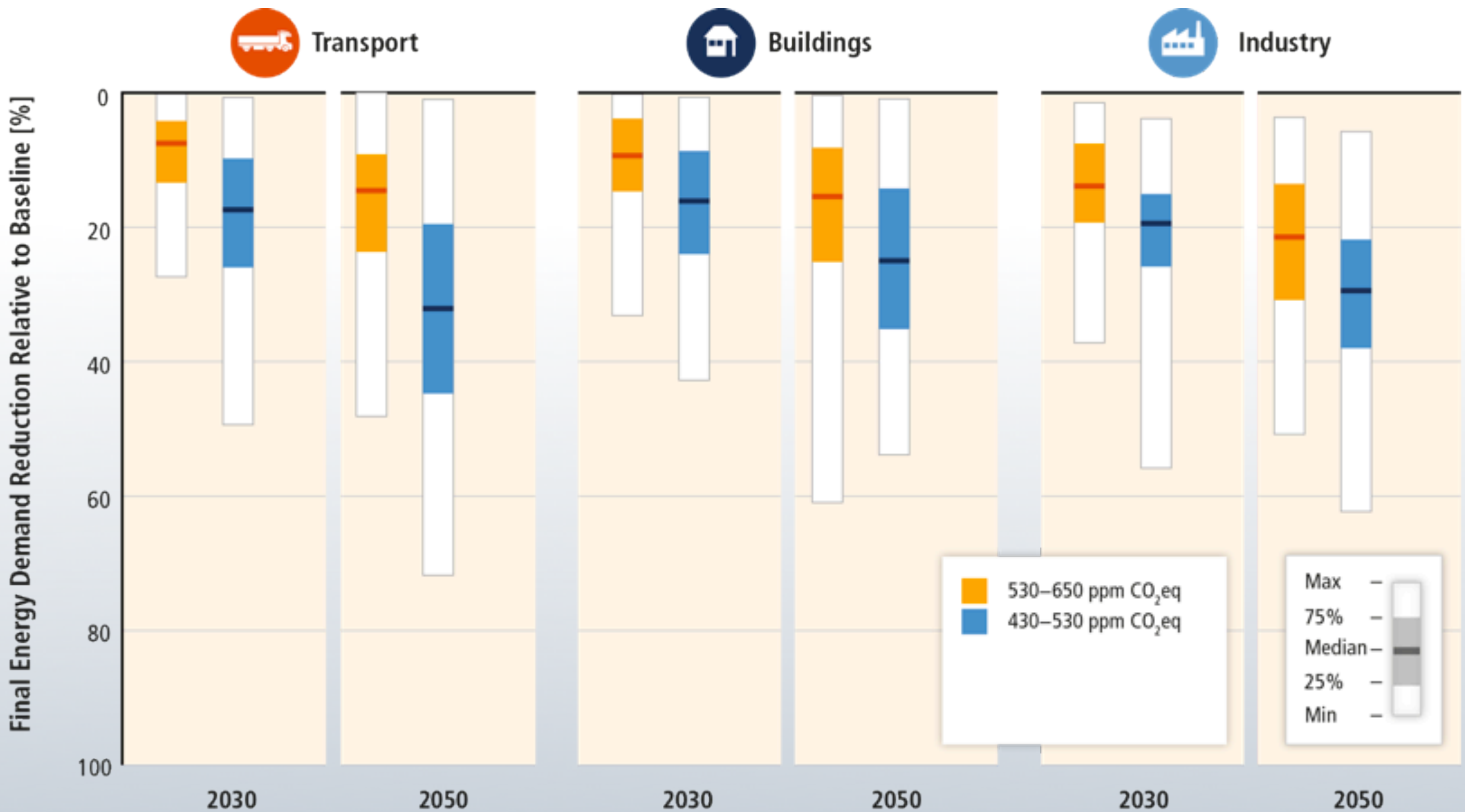
Based on Figure 7.16

Mitigation involves substantial upscaling of low-carbon energy.



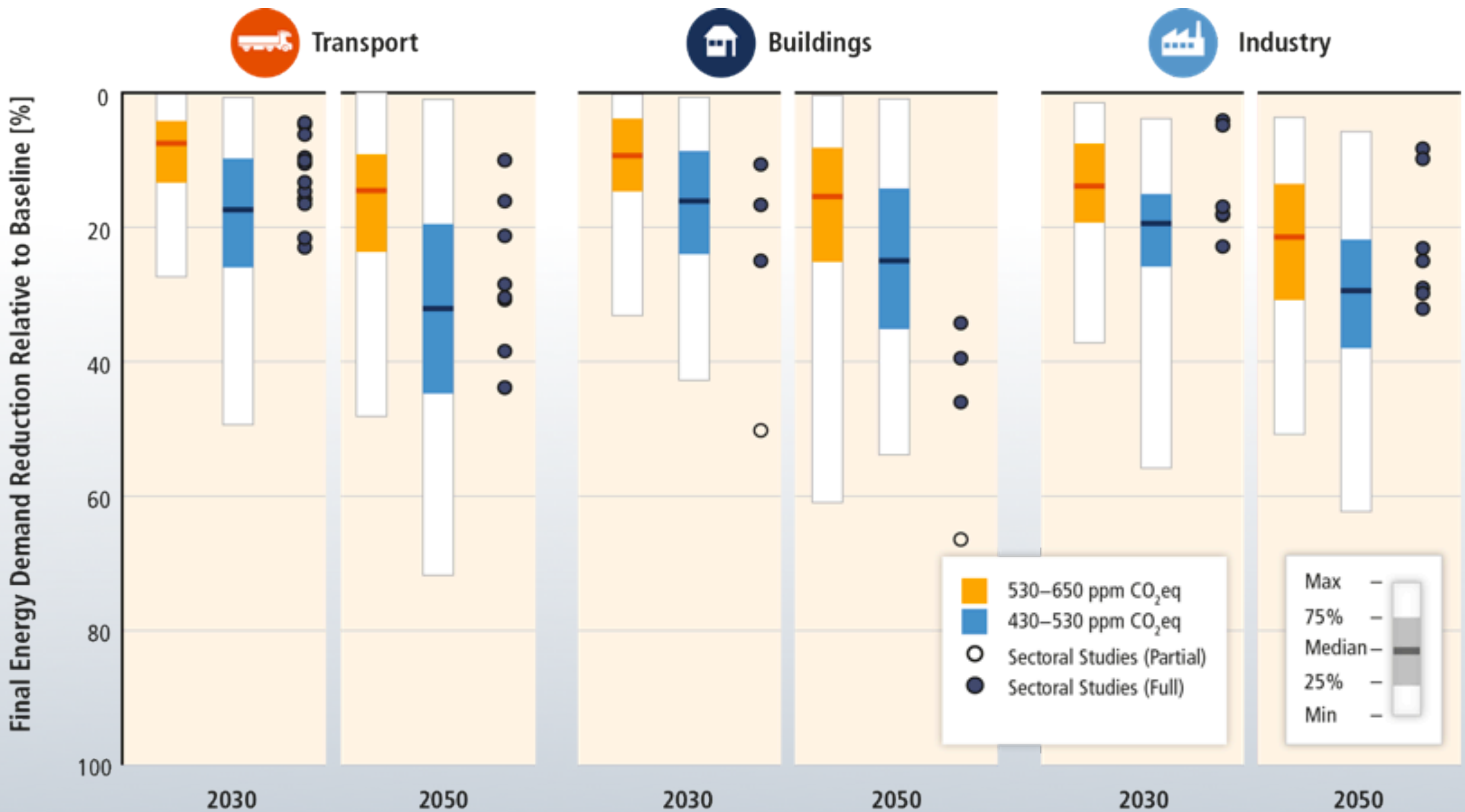
Note: Includes baseline and idealized policy implementation scenarios. Historical data from IEA (2012a)

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



Based on Figure 6.37

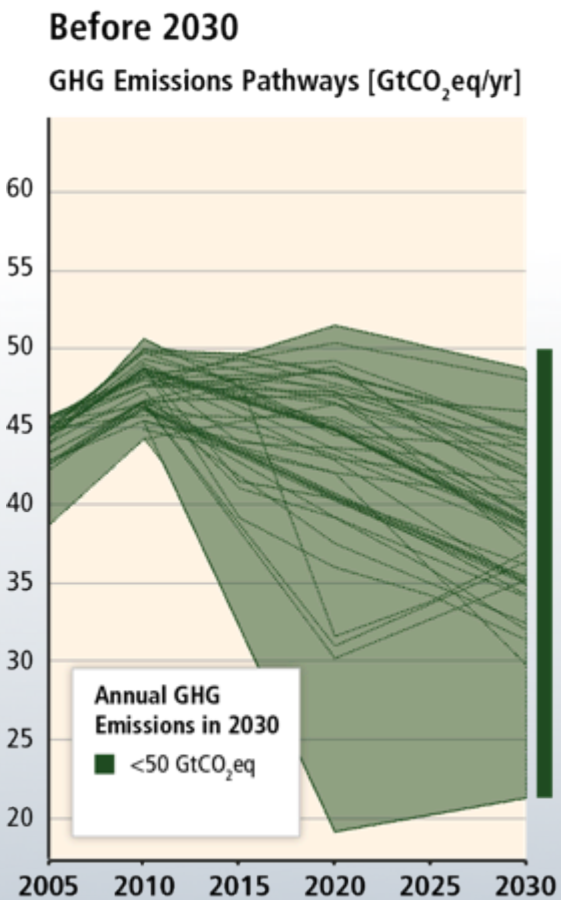
Reducing energy demand through efficiency enhancements and behavioural changes are a key mitigation strategy.



Based on Figure 6.37

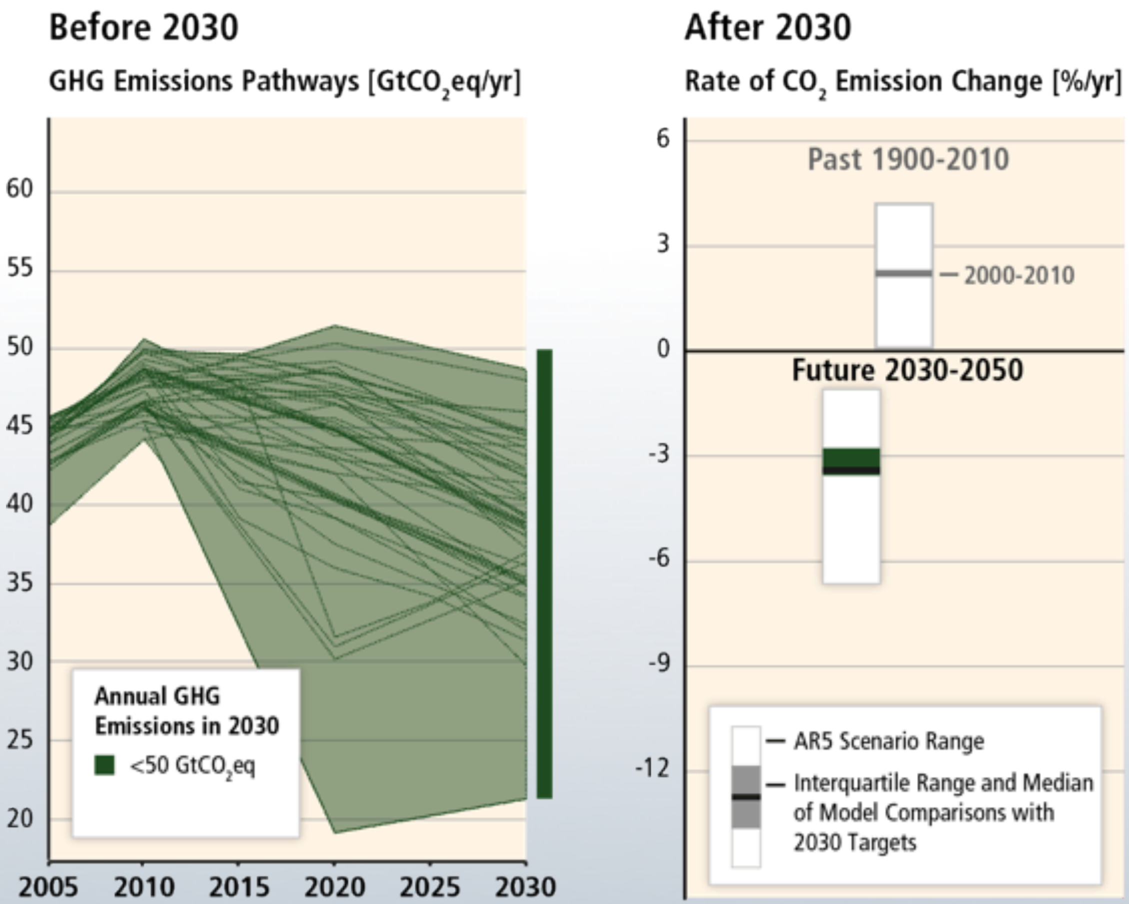
How will delays in mitigation influence the challenge of meeting 2°C?

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.



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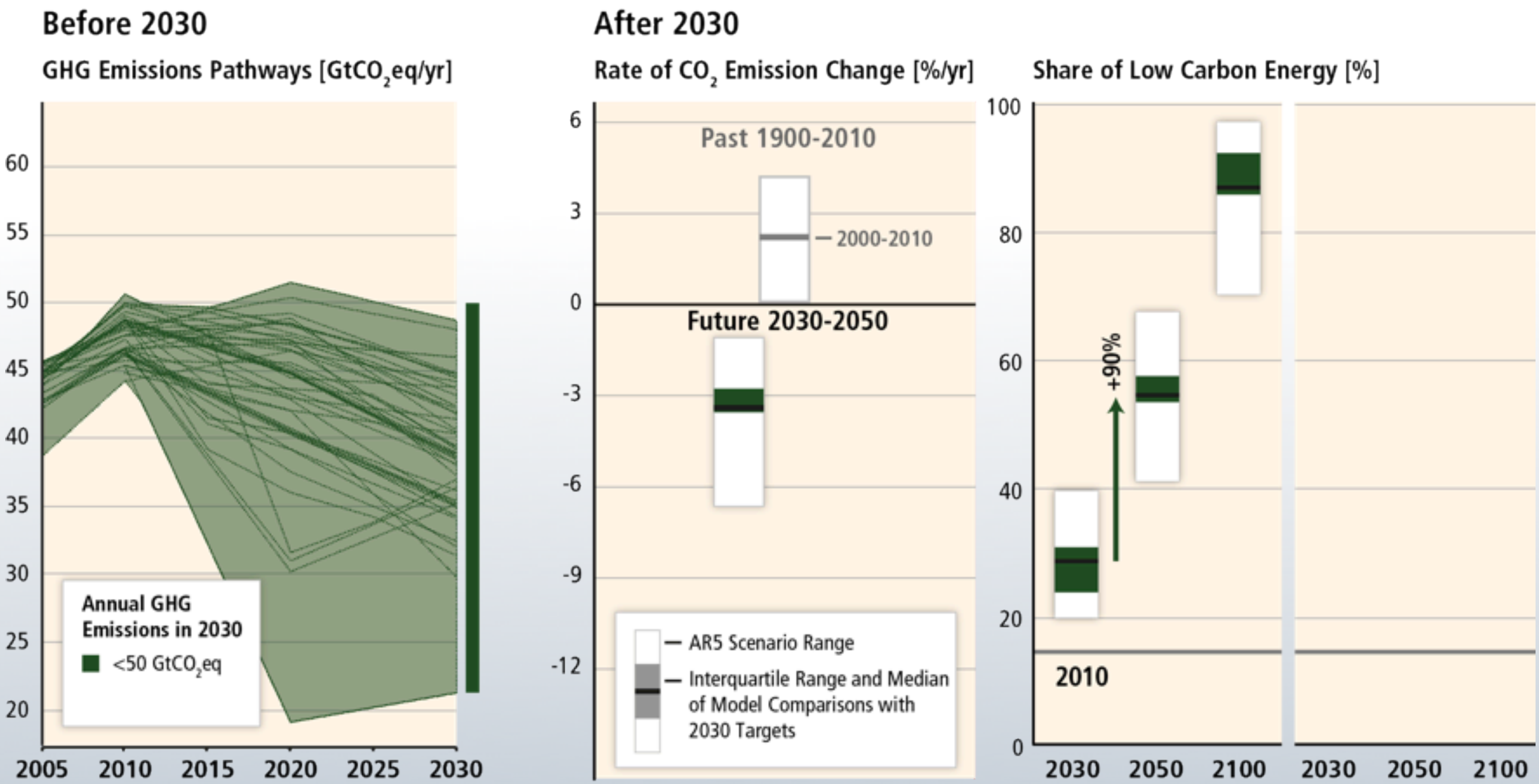
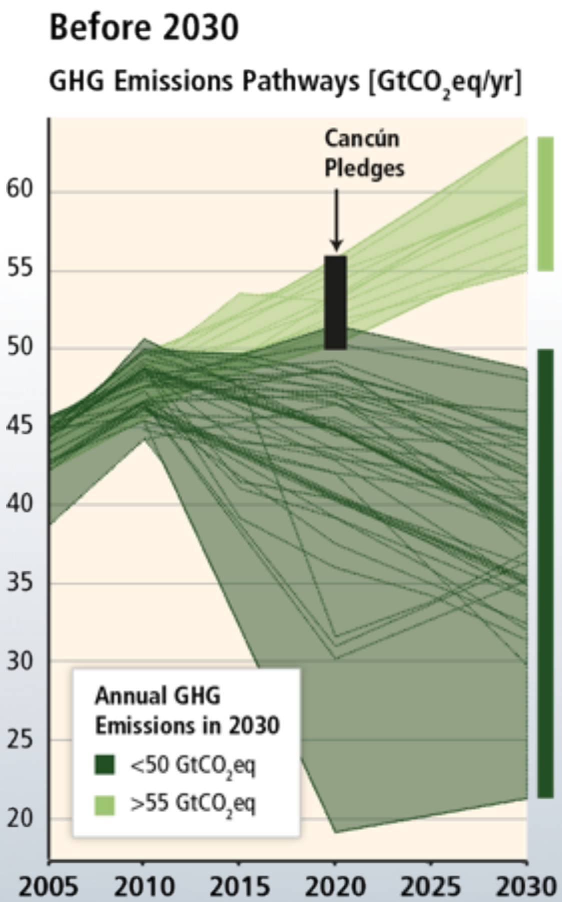


Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.



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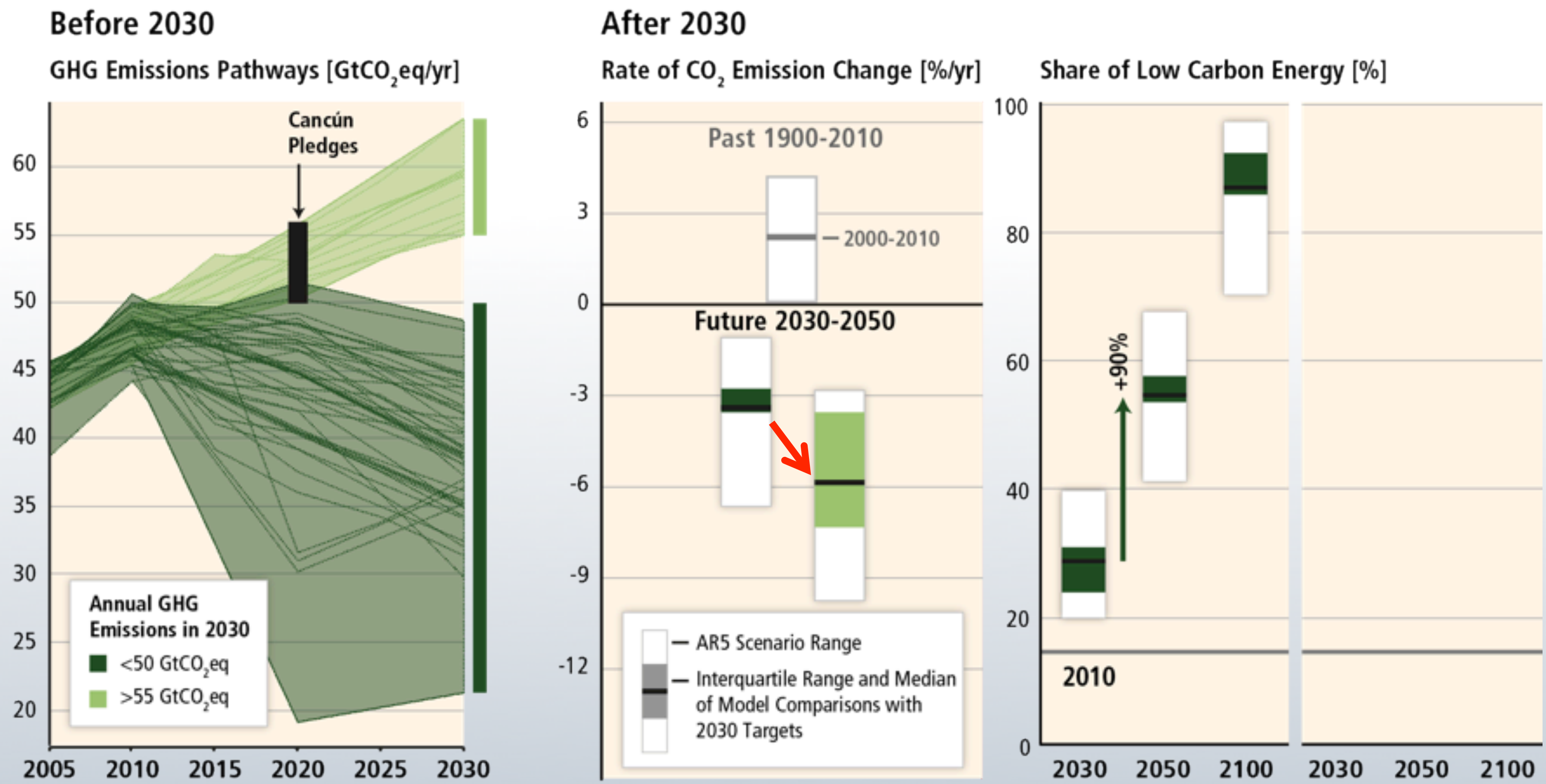

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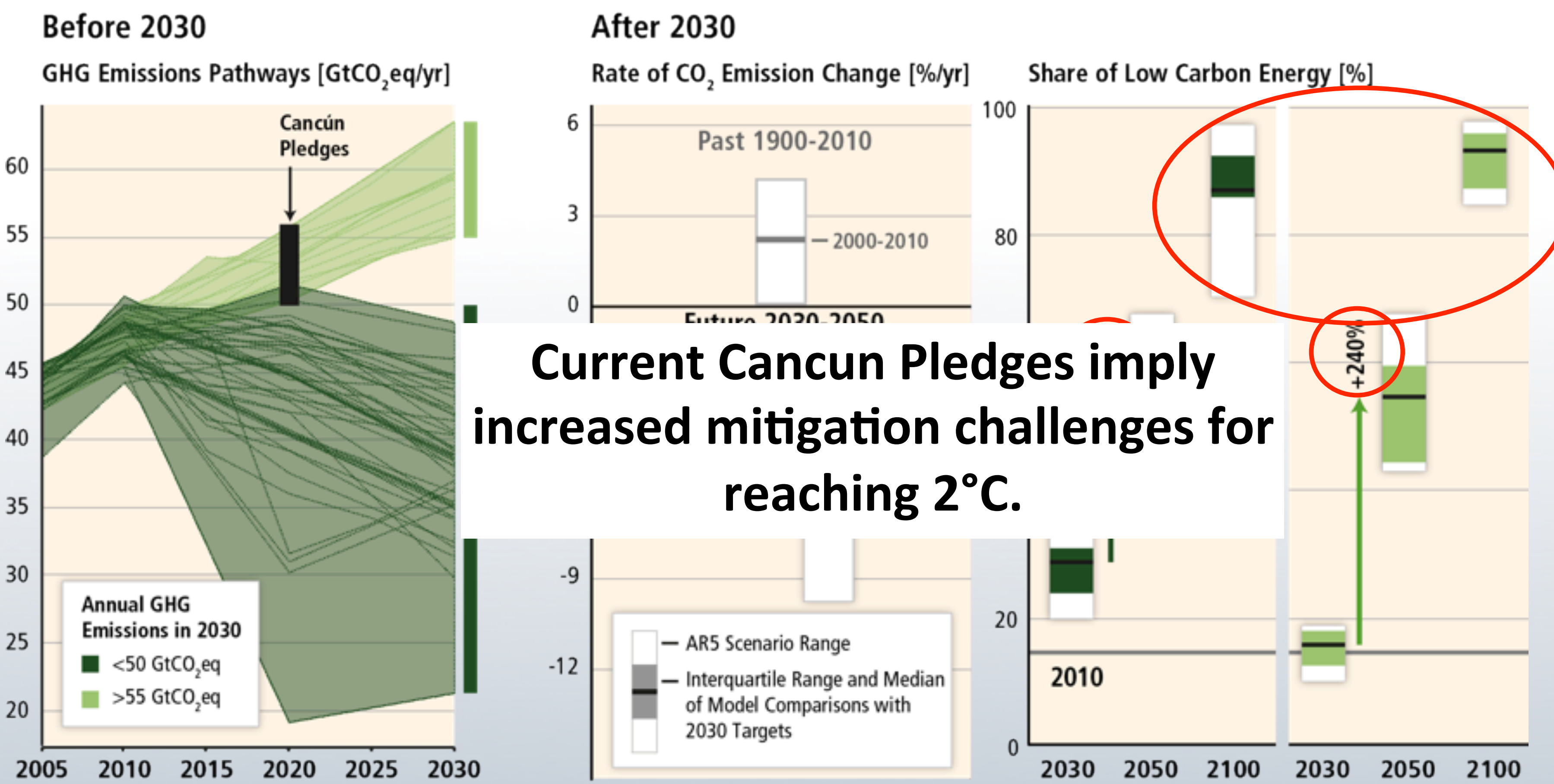
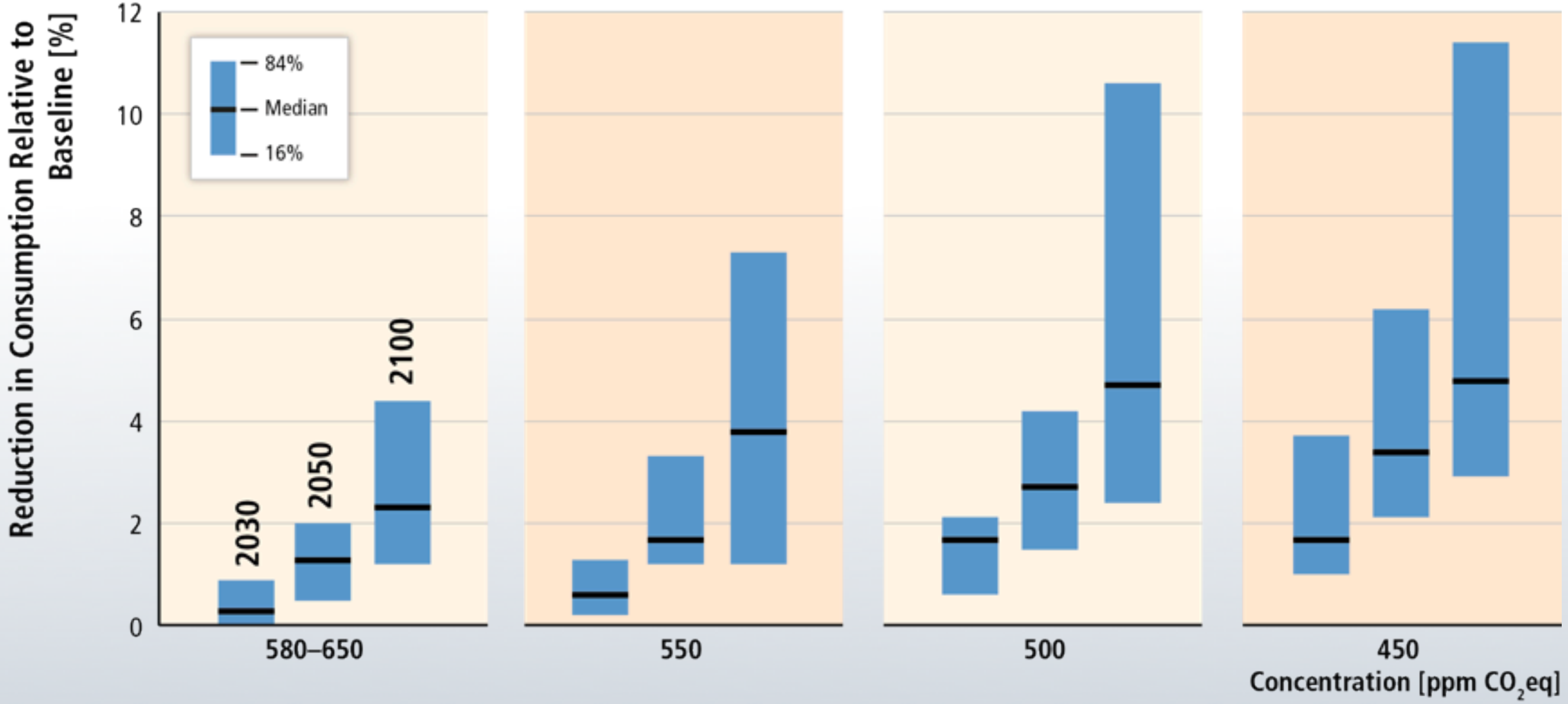


Current Cancun Pledges imply increased mitigation challenges for reaching 2°C.

Based on Figures 6.32 and 7.16

How much will it cost to reduce emissions?

Estimates of aggregate global mitigation costs vary widely, even under idealized assumptions; they increase with mitigation.

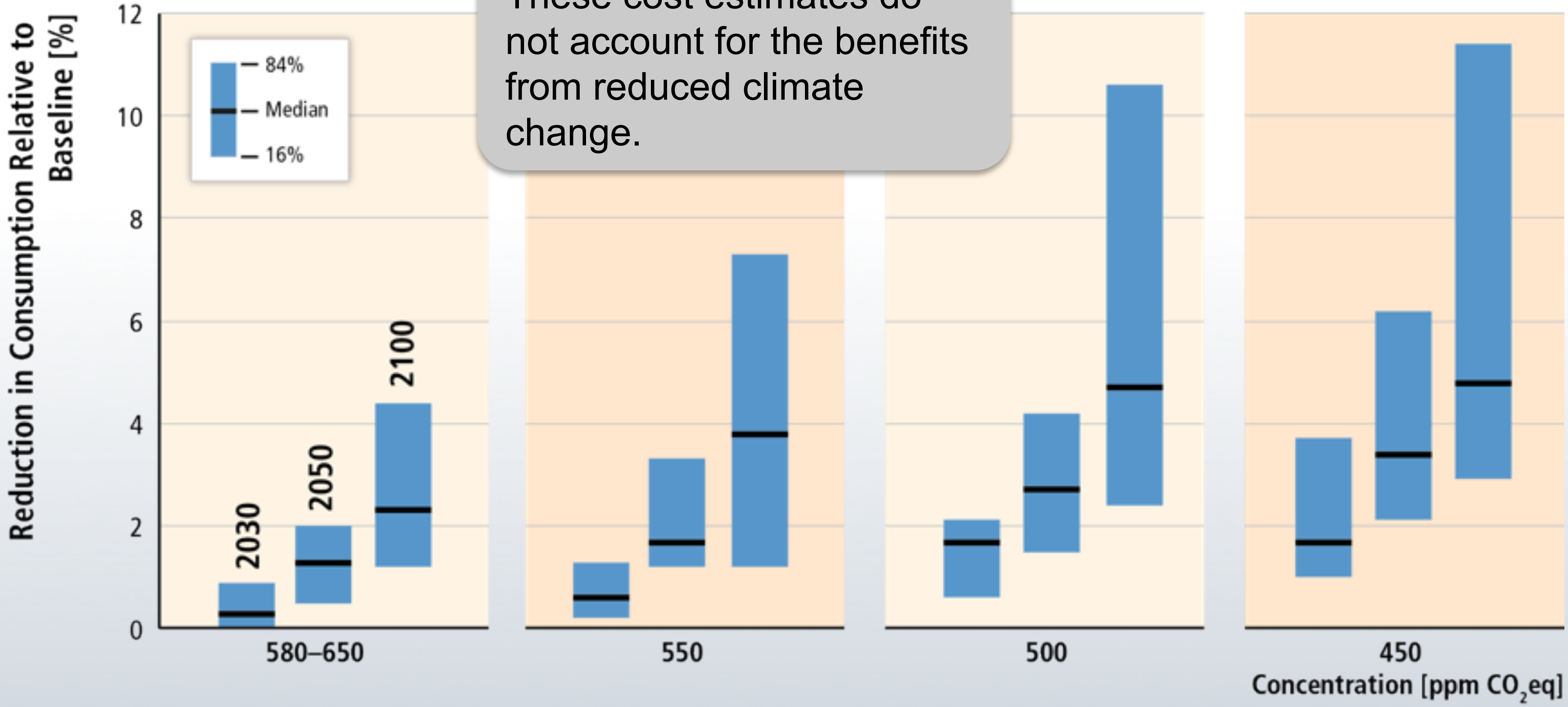


Percentage Point Reduction in Annualized Consumption Growth Rate over 21st Century			
0.03 (0.01-0.05)	0.04 (0.01-0.09)	0.06 (0.03-0.13)	0.06 (0.04-0.14)

Based on Table SPM.2

Estimates of aggregate global mitigation costs vary widely, even under idealized assumptions; they increase with mitigation.

These cost estimates do not account for the benefits from reduced climate change.

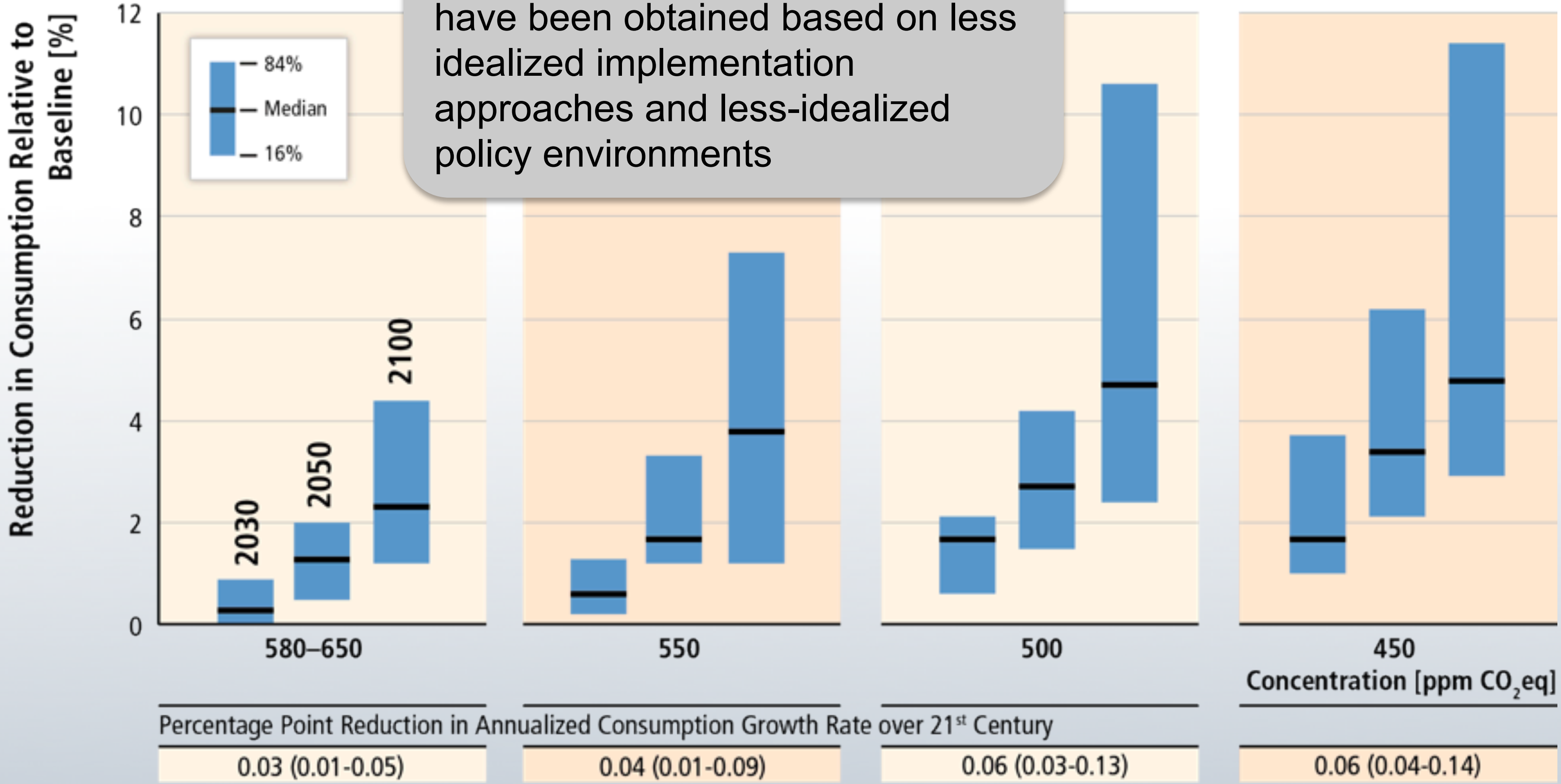


580–650	550	500	450
Percentage Point Reduction in Annualized Consumption Growth Rate over 21st Century			
0.03 (0.01-0.05)	0.04 (0.01-0.09)	0.06 (0.03-0.13)	0.06 (0.04-0.14)

Based on Table SPM.2

Estimates of aggregate global mitigation costs vary widely, even under idealized assumptions; they increase with mitigation.

Both higher and lower estimates have been obtained based on less idealized implementation approaches and less-idealized policy environments



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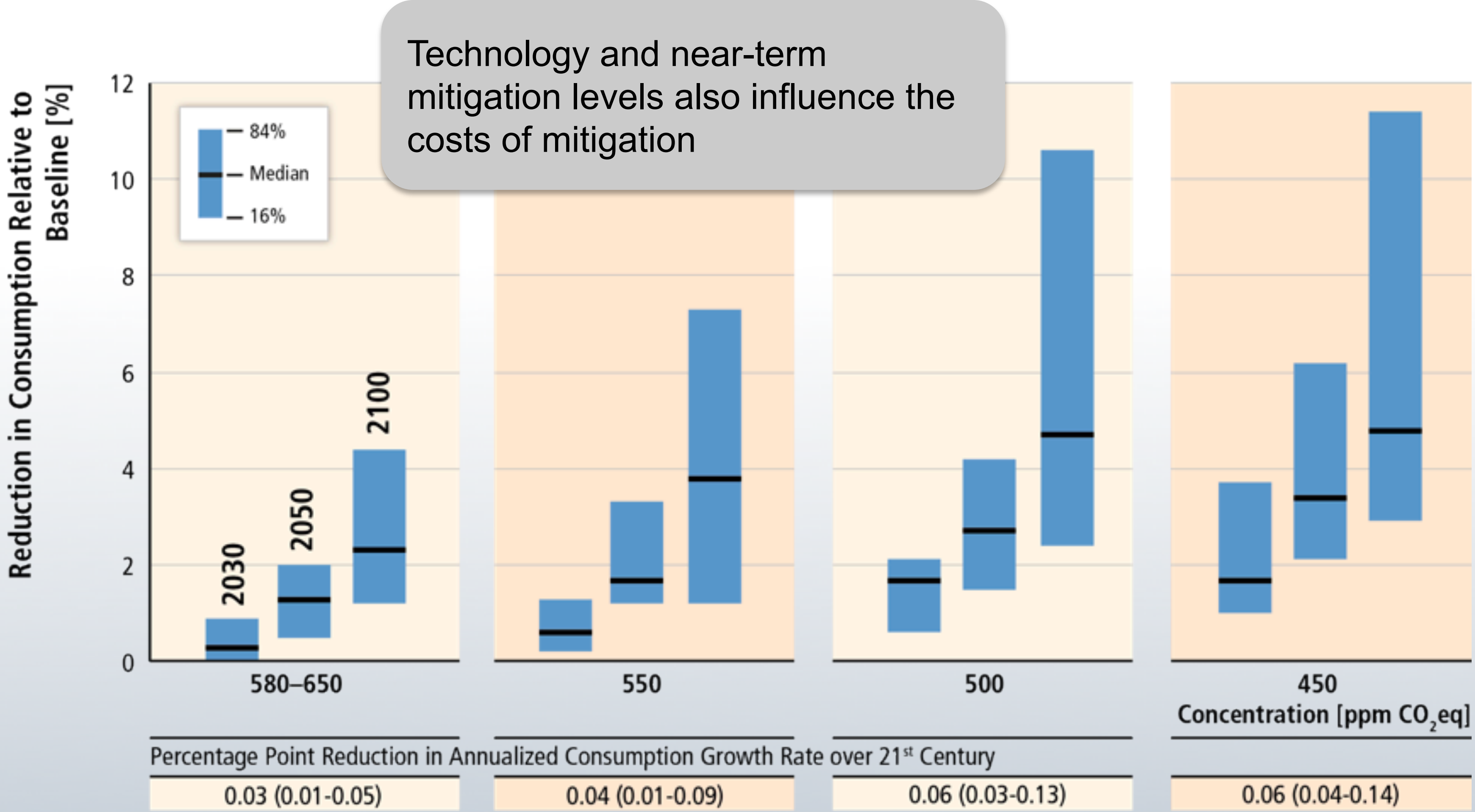
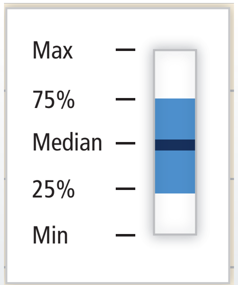
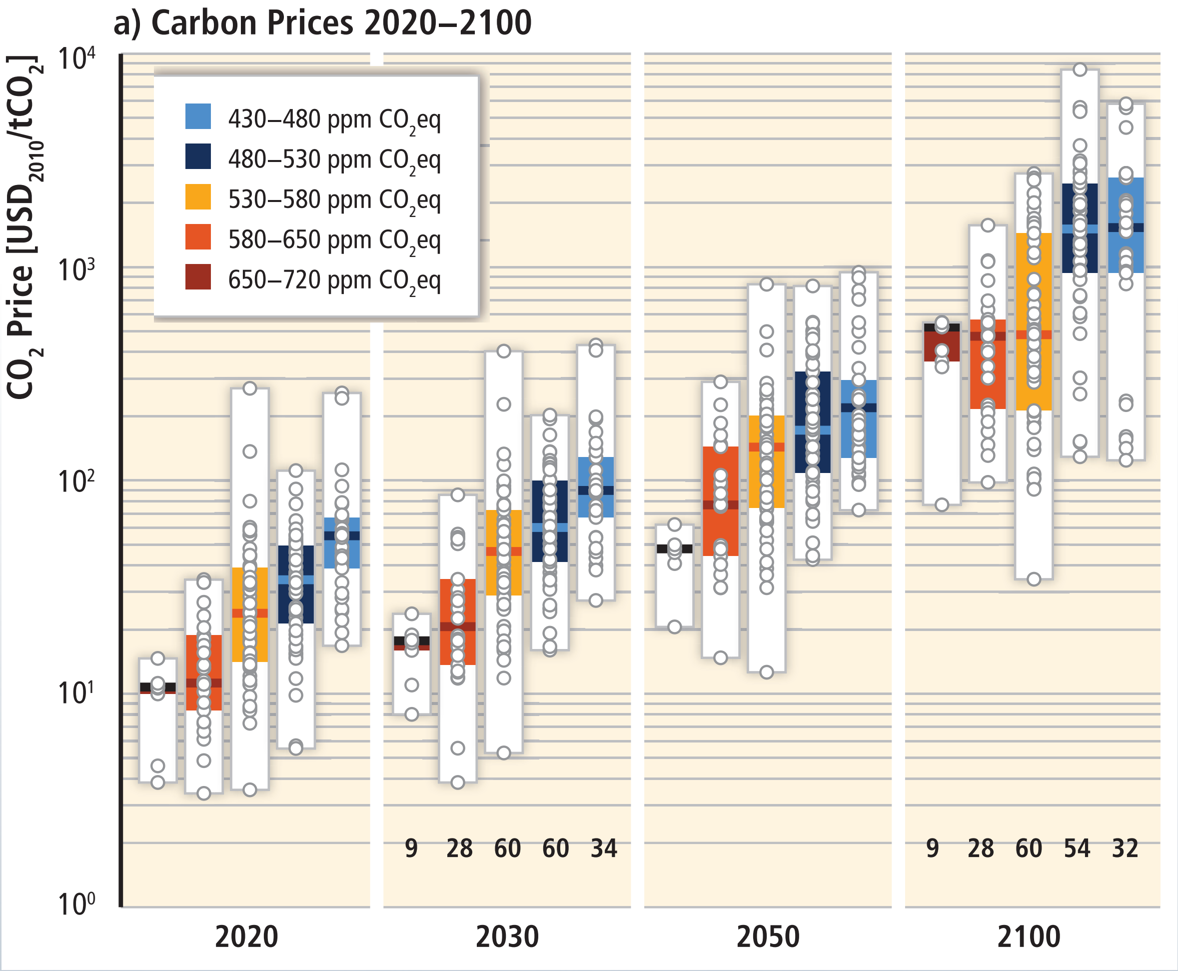


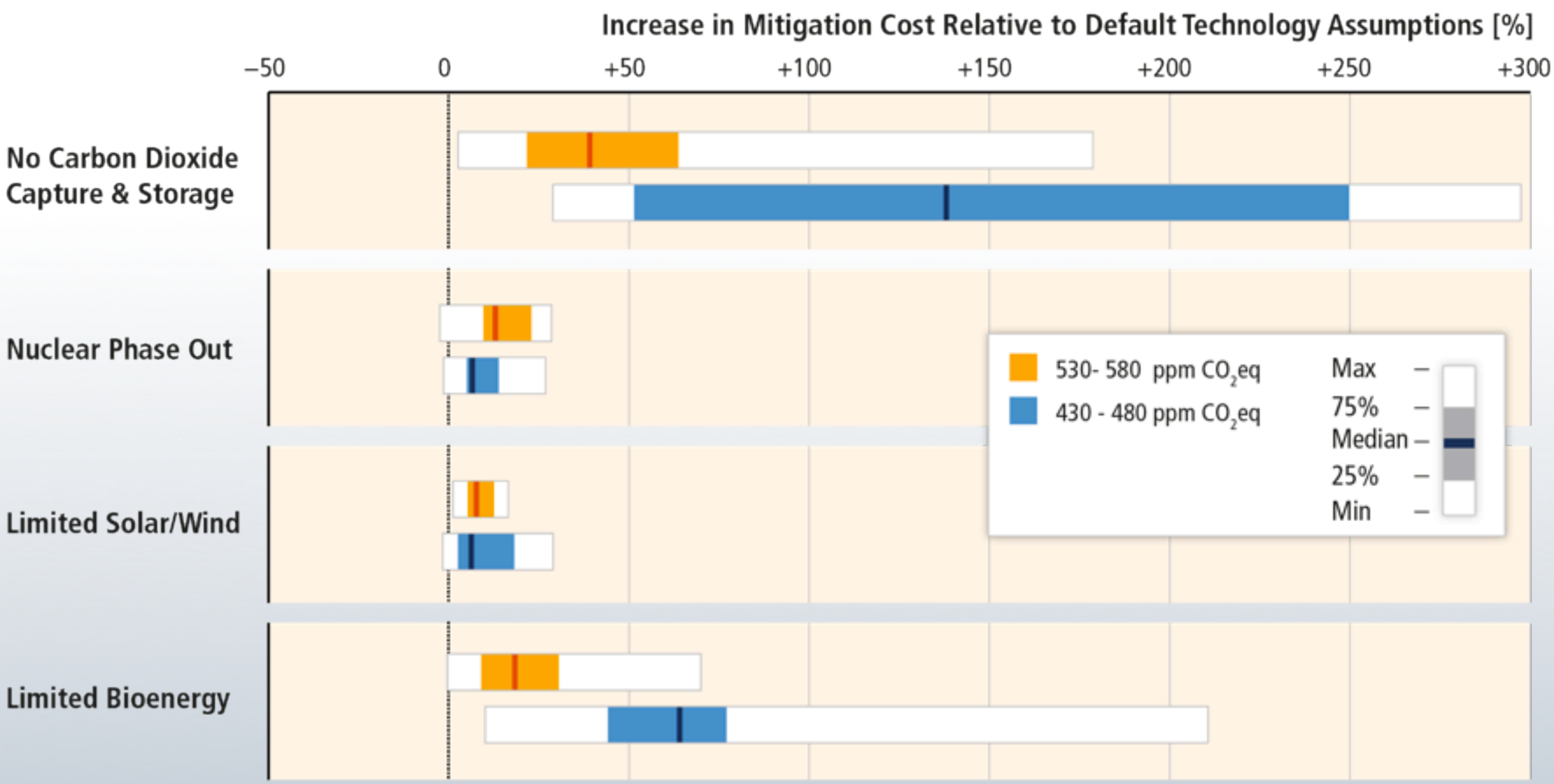
Based on Table SPM.2

Carbon prices increase with the stringency of mitigation





Availability of technology can greatly influence mitigation costs.



Based on Figure 6.24

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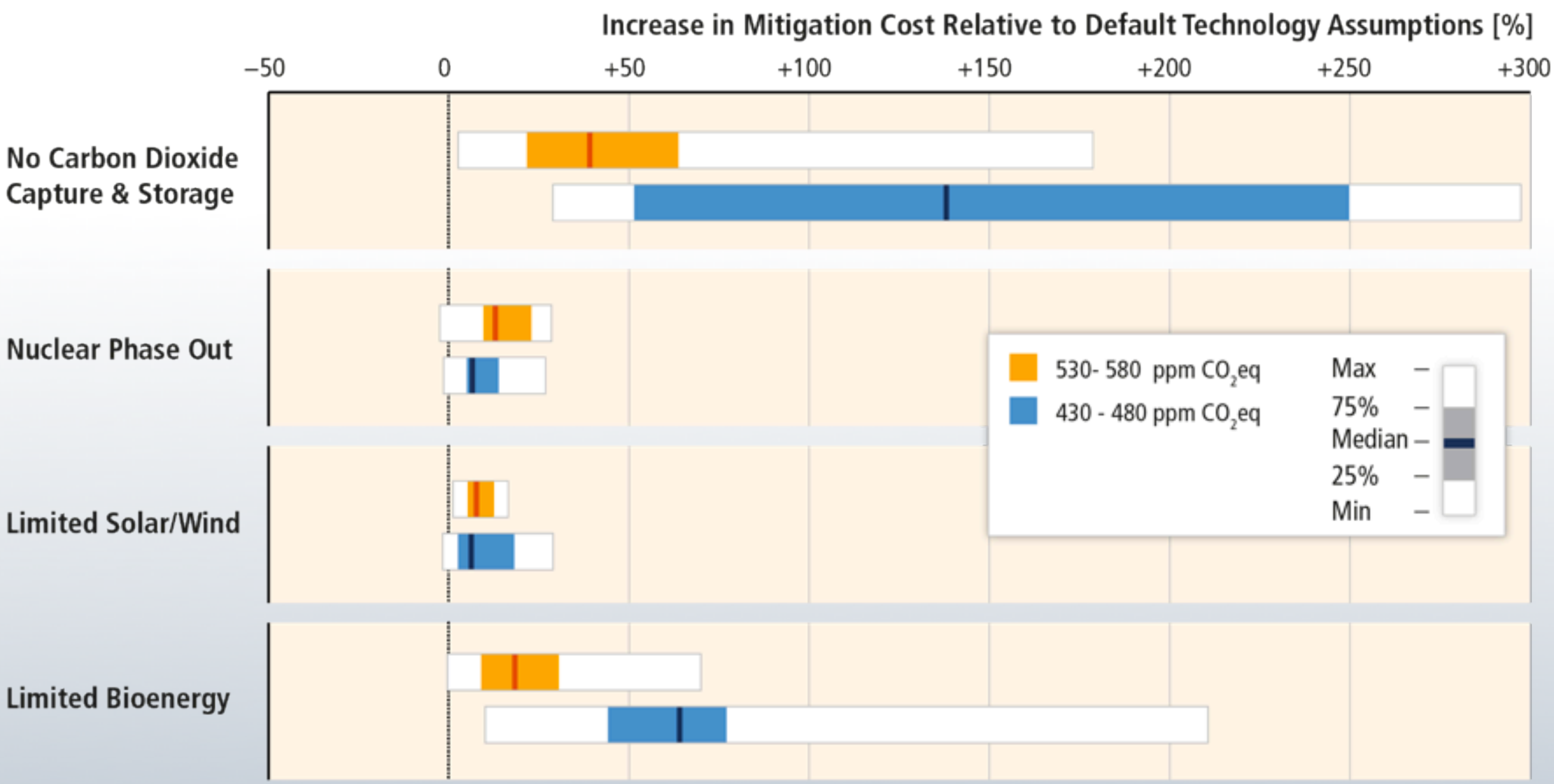
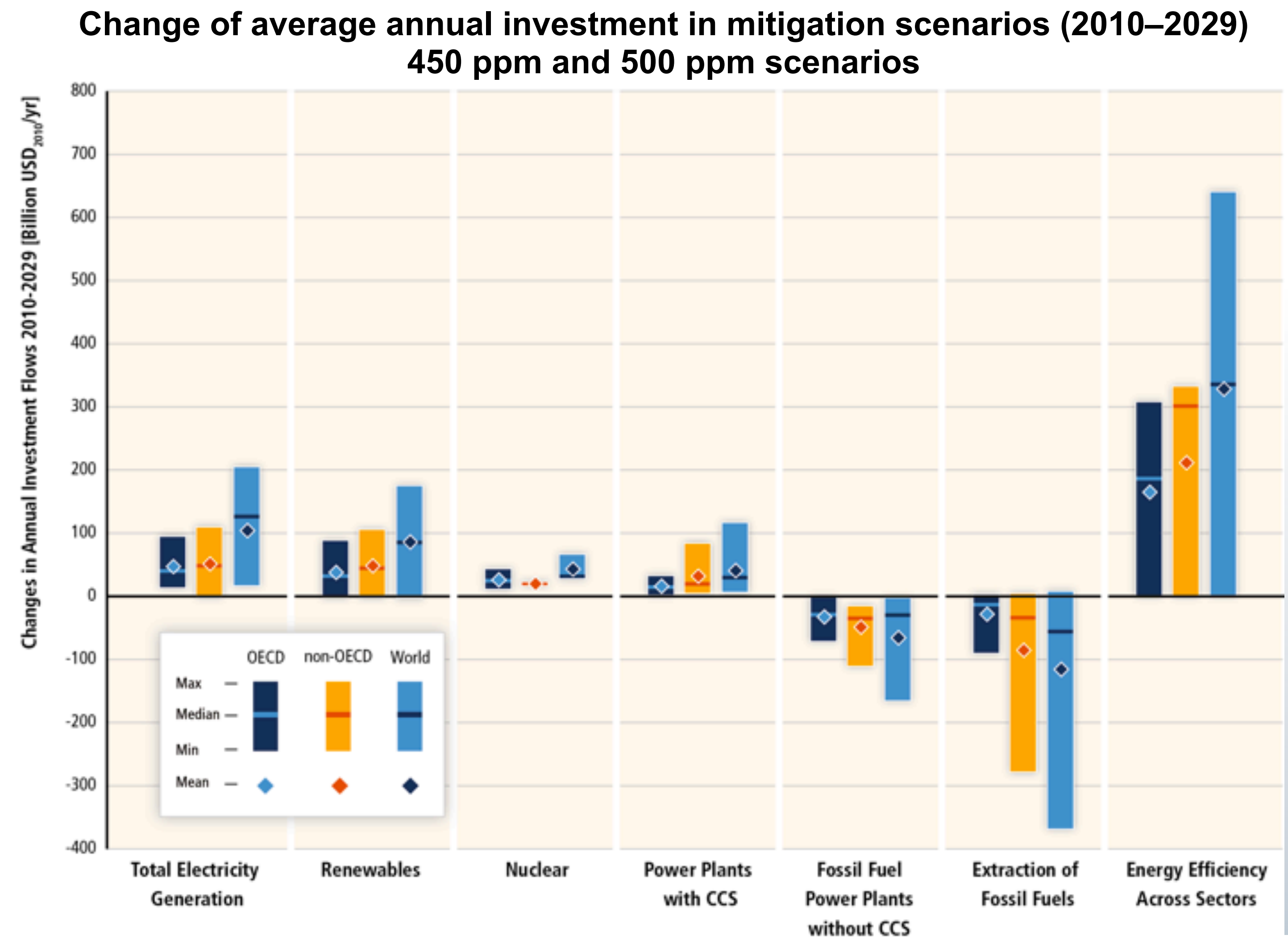


Many models have not been able to reach about 450 ppmv CO2e without key technologies.

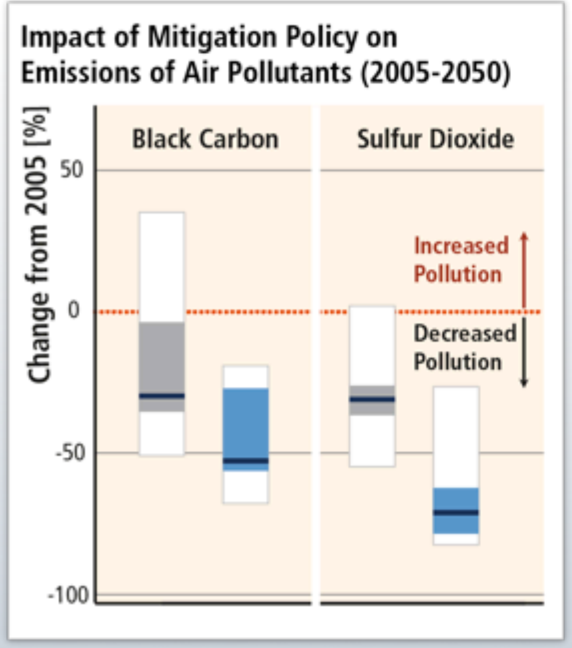
Based on Figure 6.24

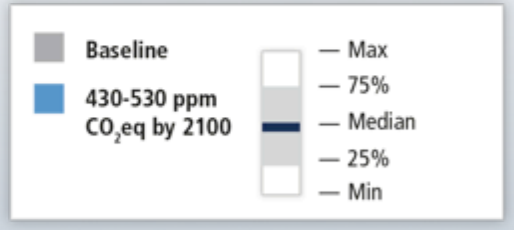
Substantial reductions in emissions would involve large changes in investment patterns.



How does mitigation interact with other societal goals?

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





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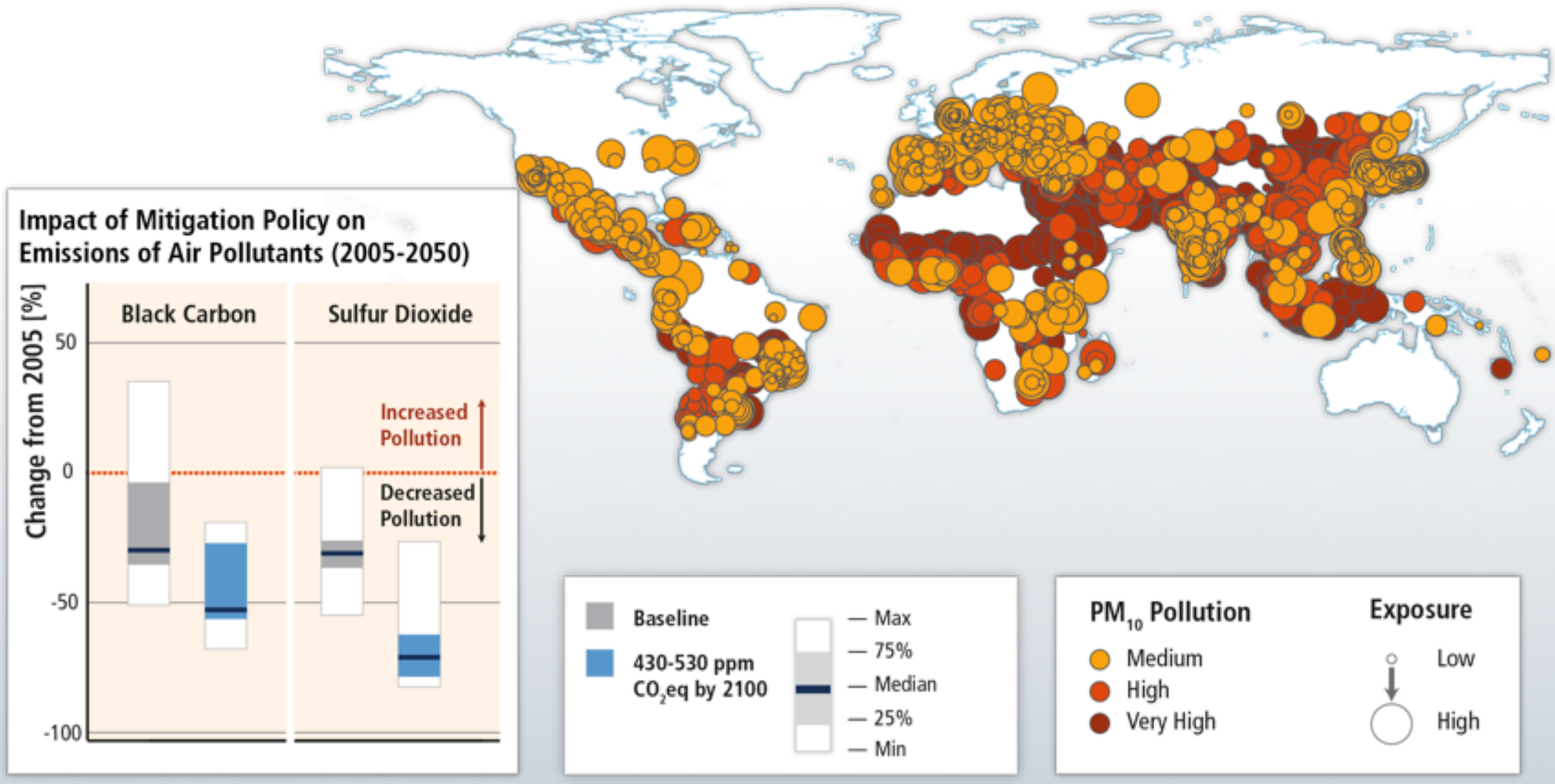

Based on Figures 6.33 and 12.23

CLIMATE CHANGE 2014

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www.mitigation2014.org

Working Group III contribution to the
IPCC Fifth Assessment Report

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