

# CLIMATE CHANGE 2014

## *Mitigation of Climate Change*

**Leon Clarke**

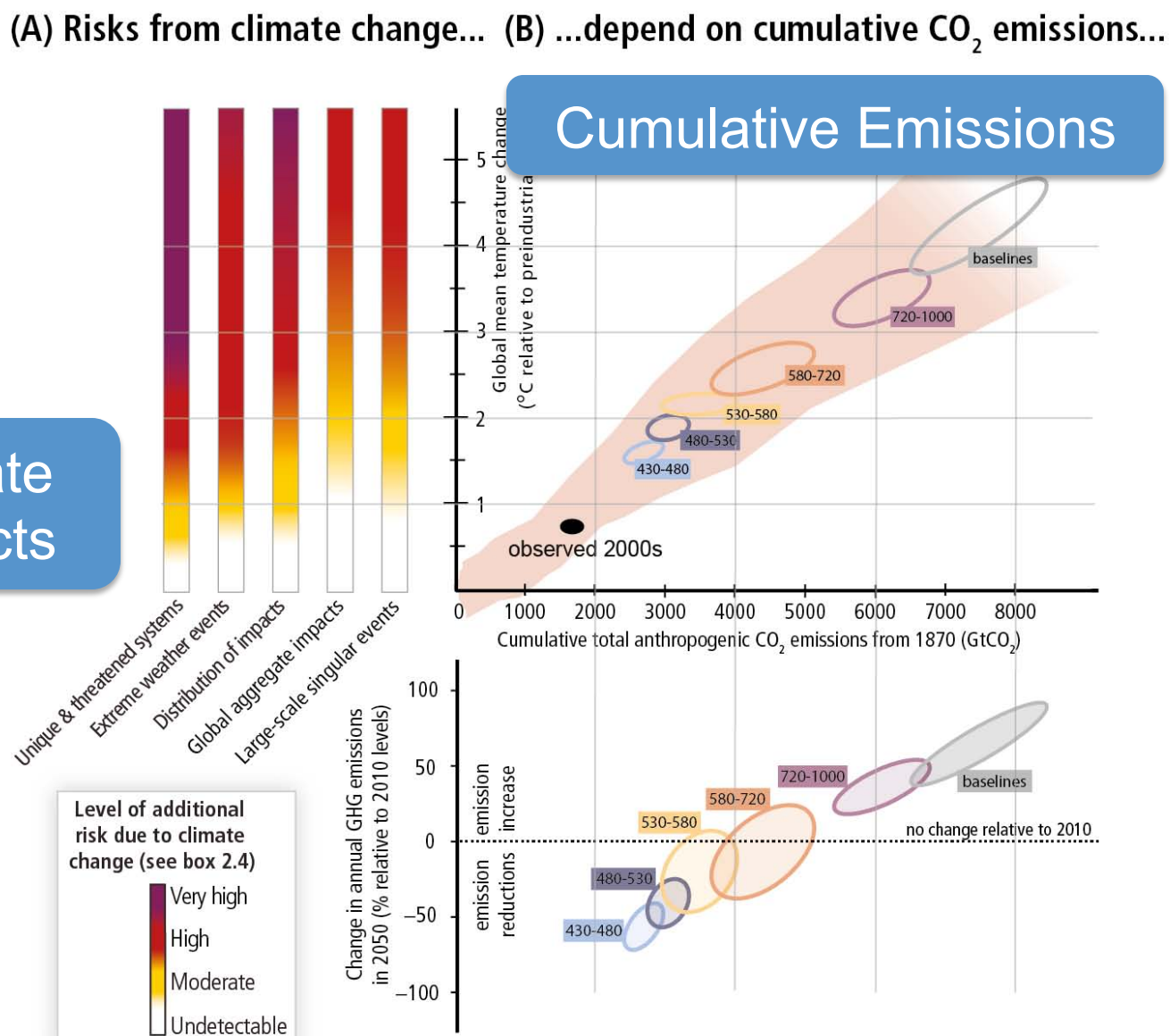
Coordinating Lead Author: Chapter 6



# Figure SPM.10

## Linking across Working Groups

### Climate Impacts



(C) ...which in turn depend on annual GHG emissions over the next decades

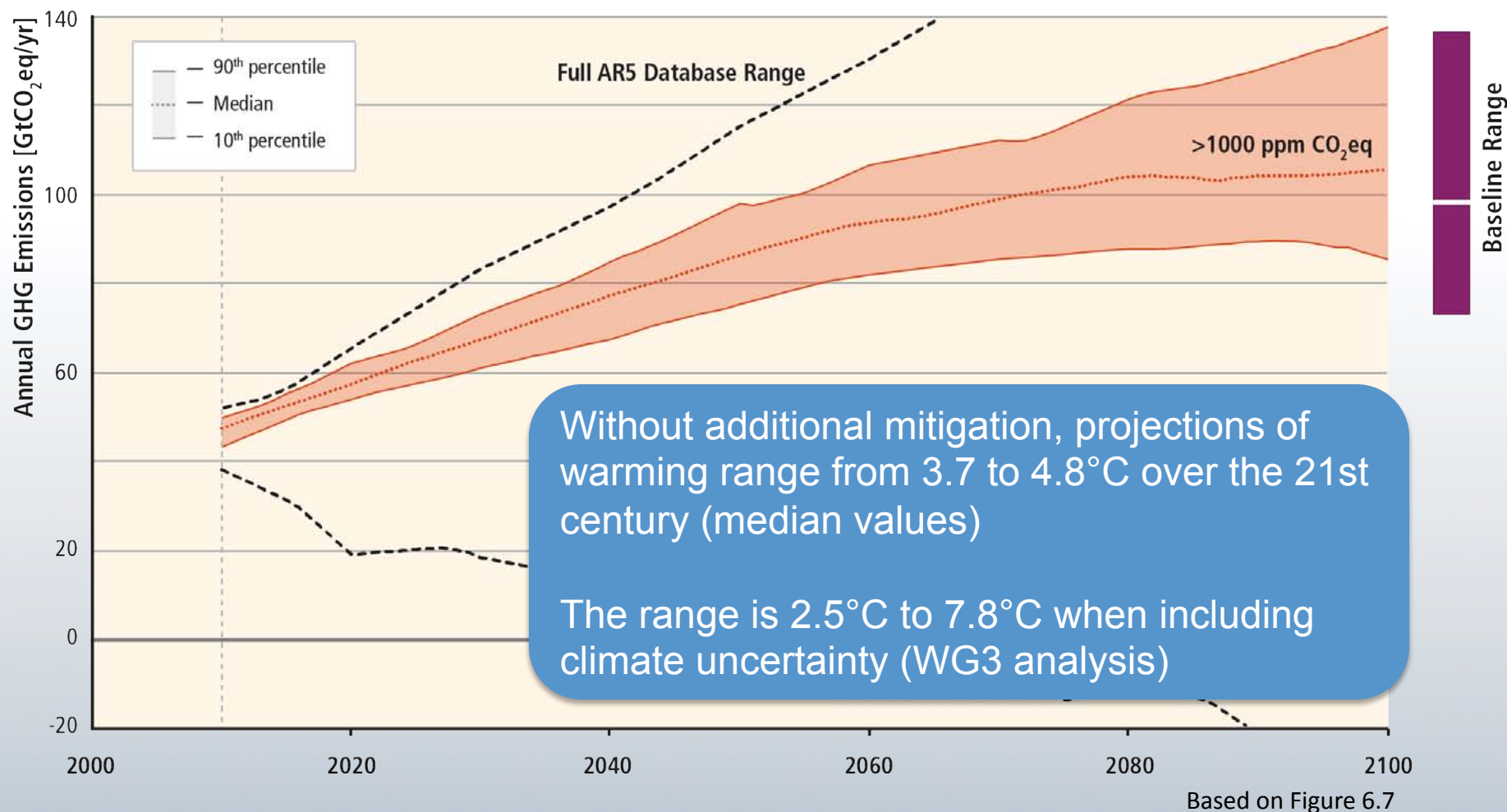
## Emissions Reductions over the Coming Decades

Where are emissions, concentrations, and temperature currently headed?





# AR5 collected roughly 1200 baseline and mitigation scenarios.

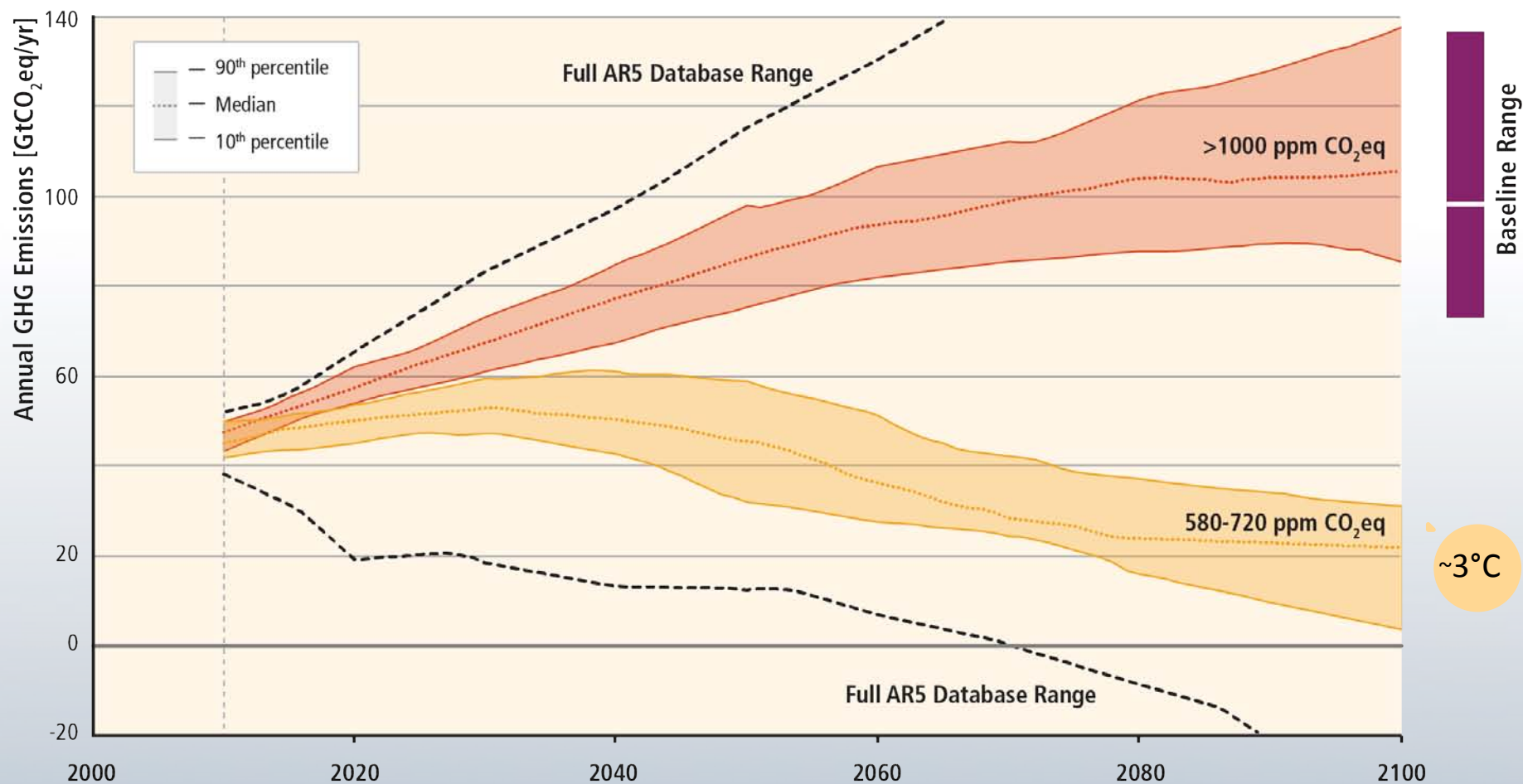


**How much must emissions be reduced to  
limit temperature change to 2°C or other  
levels?**

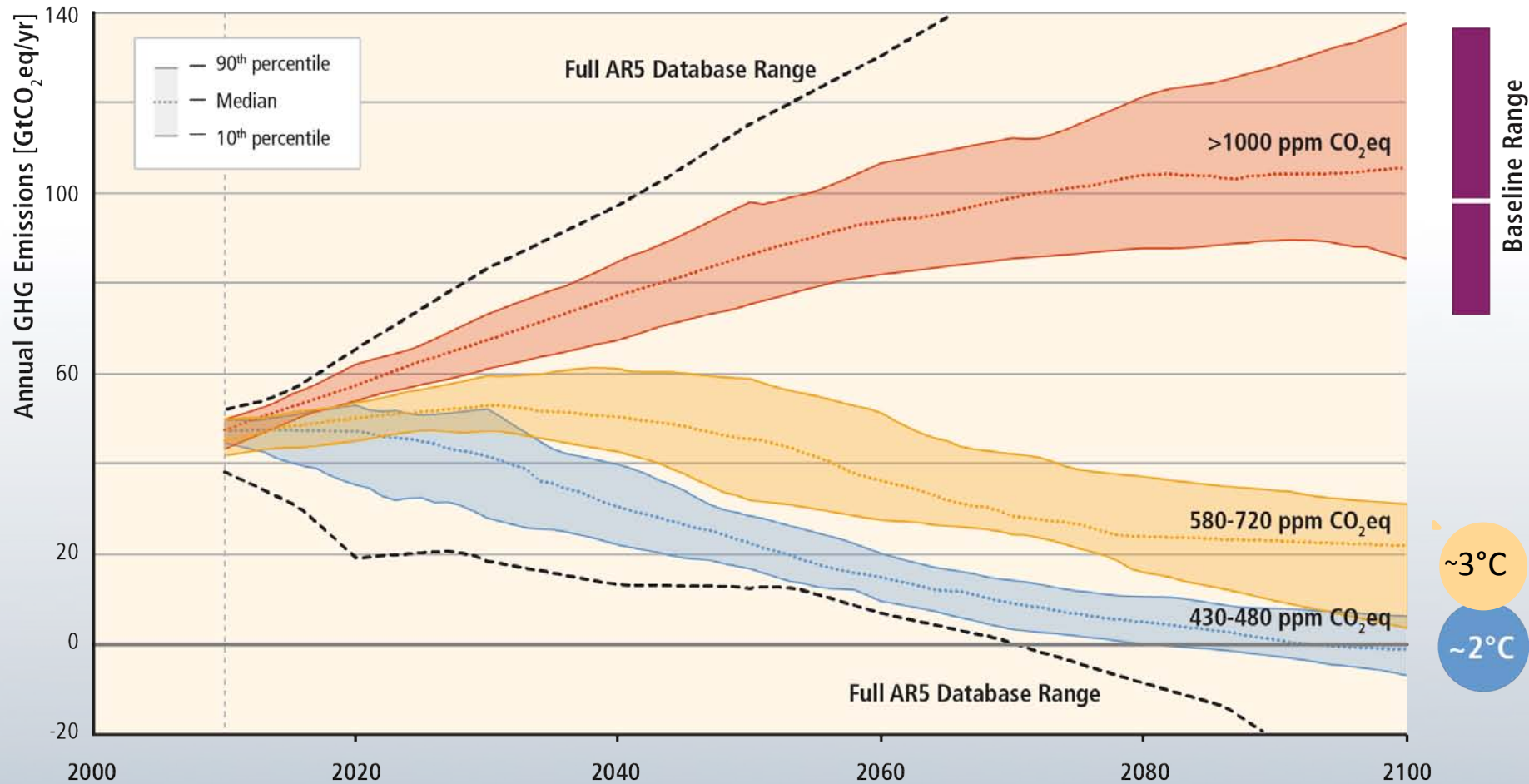




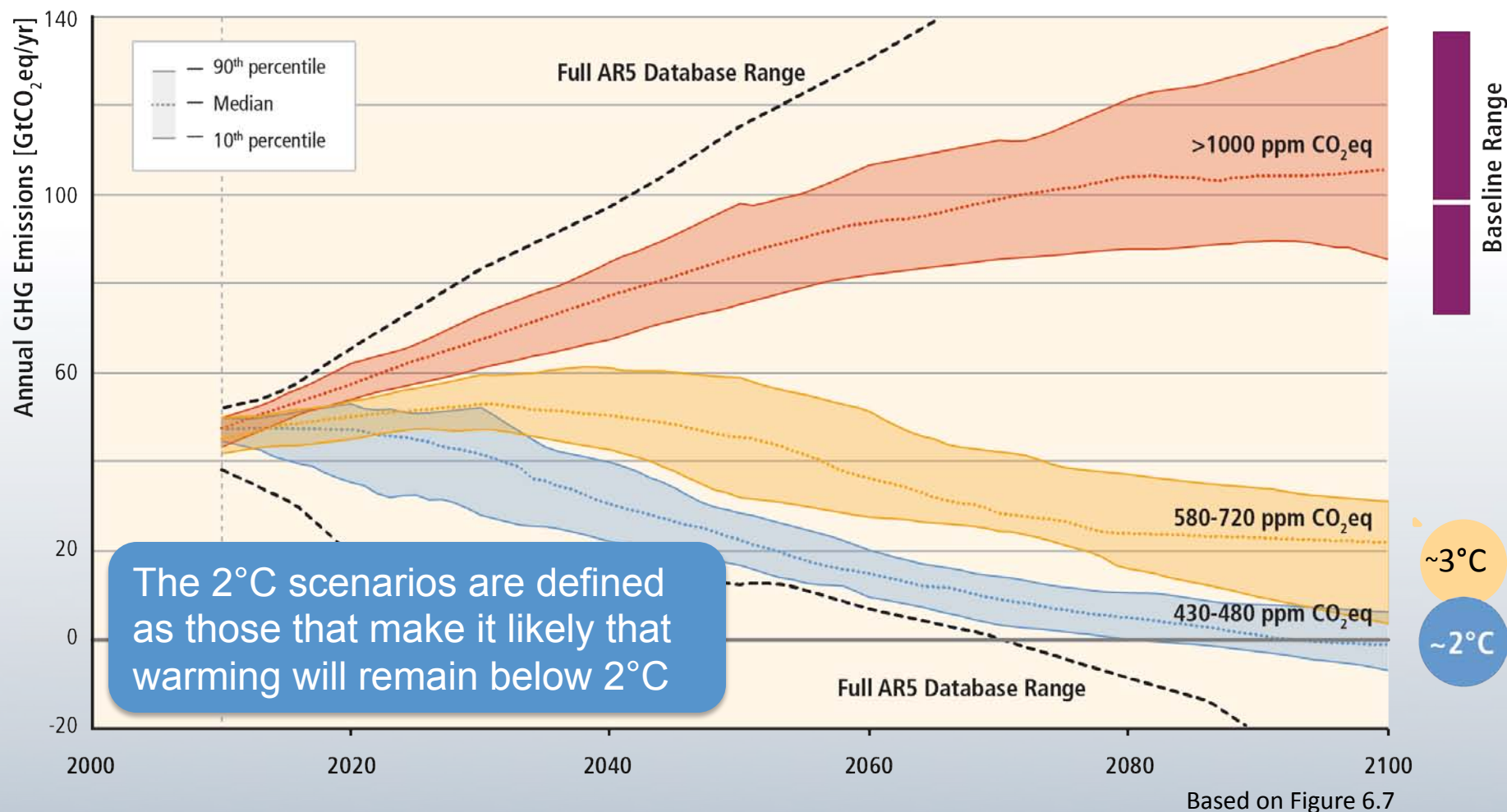
# Limiting temperature change will require substantial emissions reductions.



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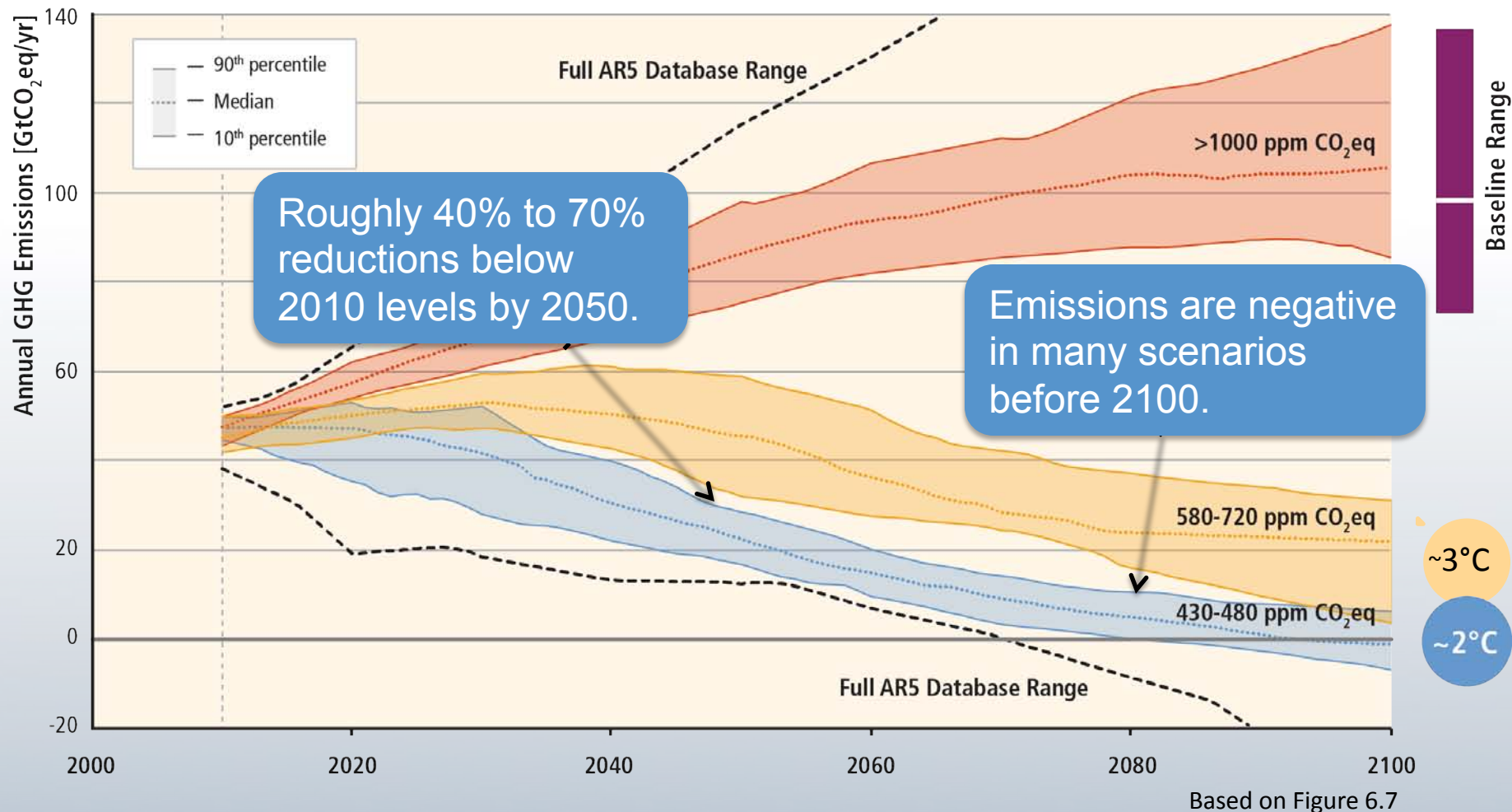


# There are several ways to define a limit on warming.

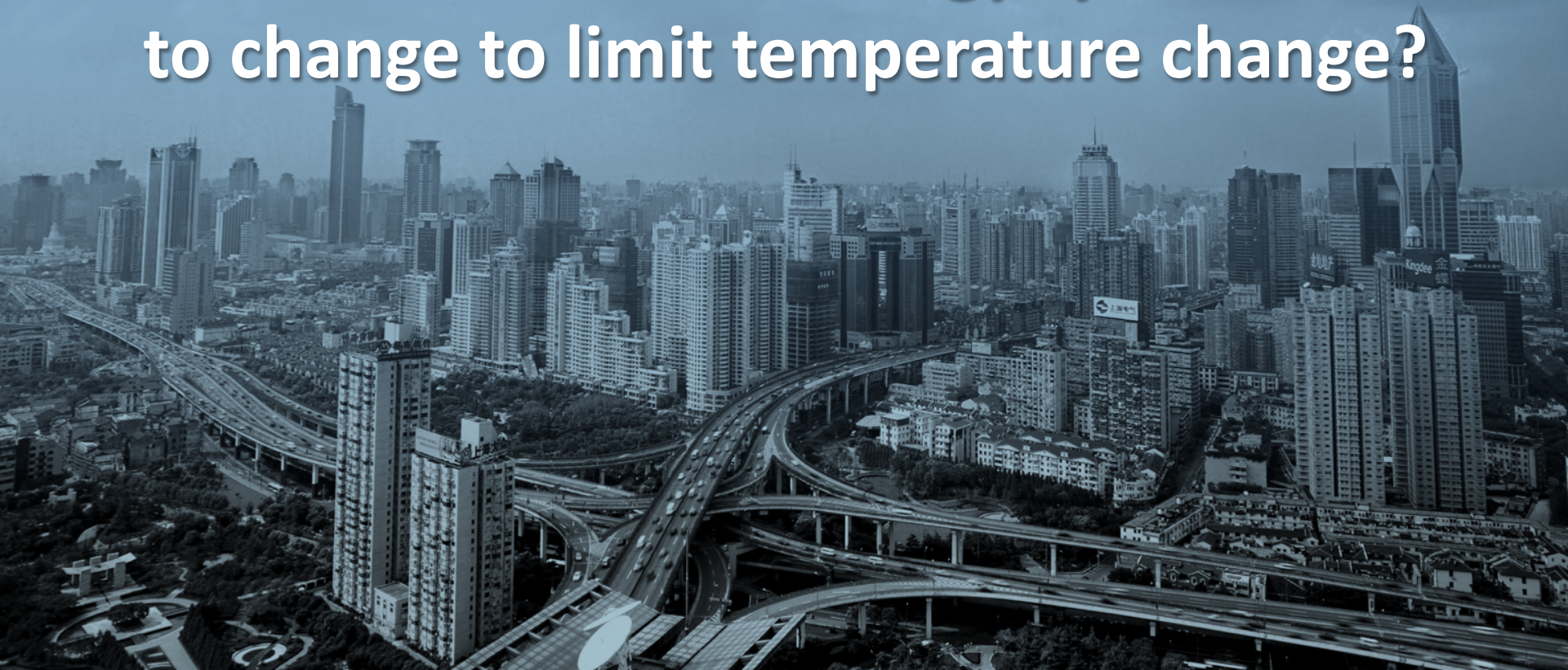




# Limiting concentrations and temperature change requires substantial mitigation in the near- and long-term.

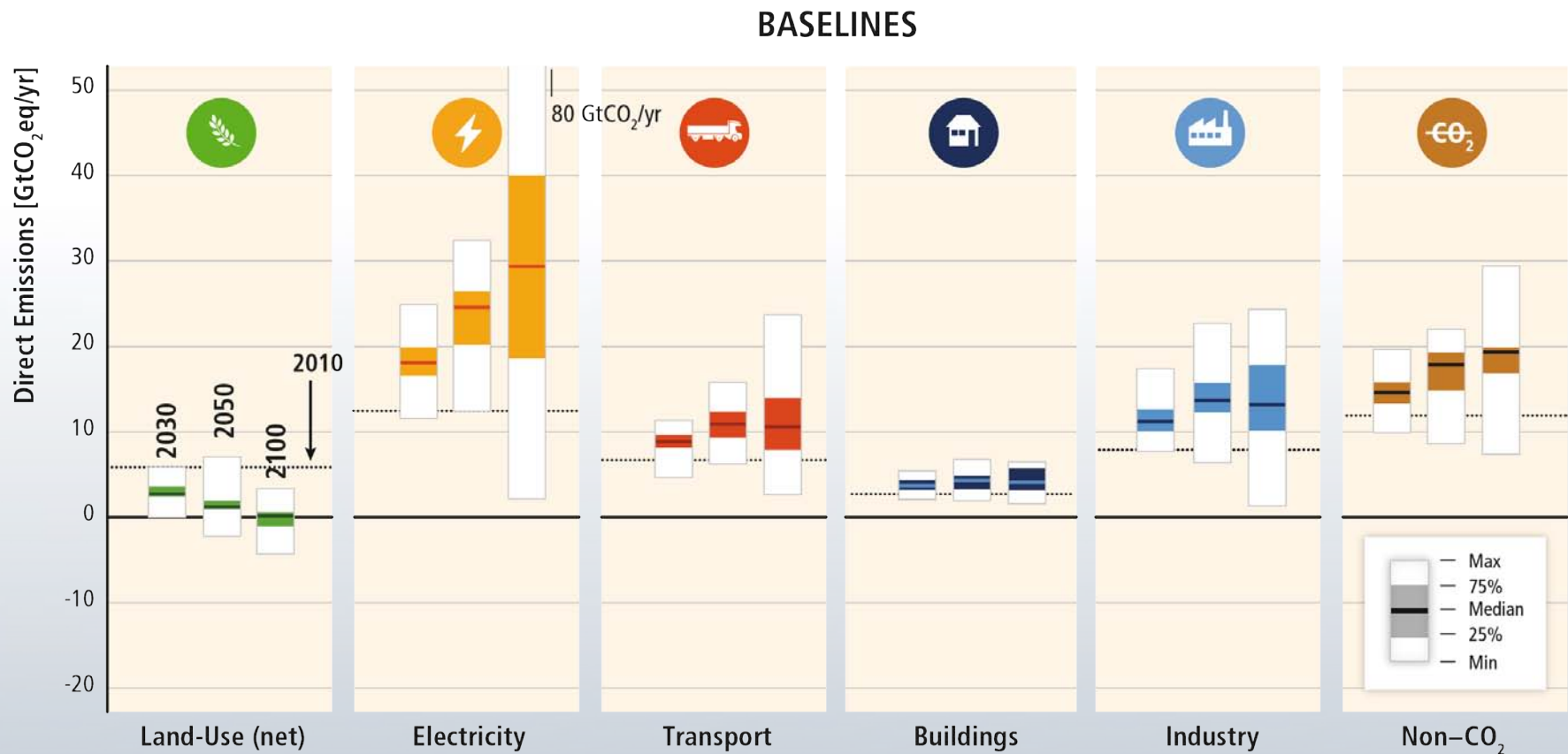


How much does the energy system need to change to limit temperature change?





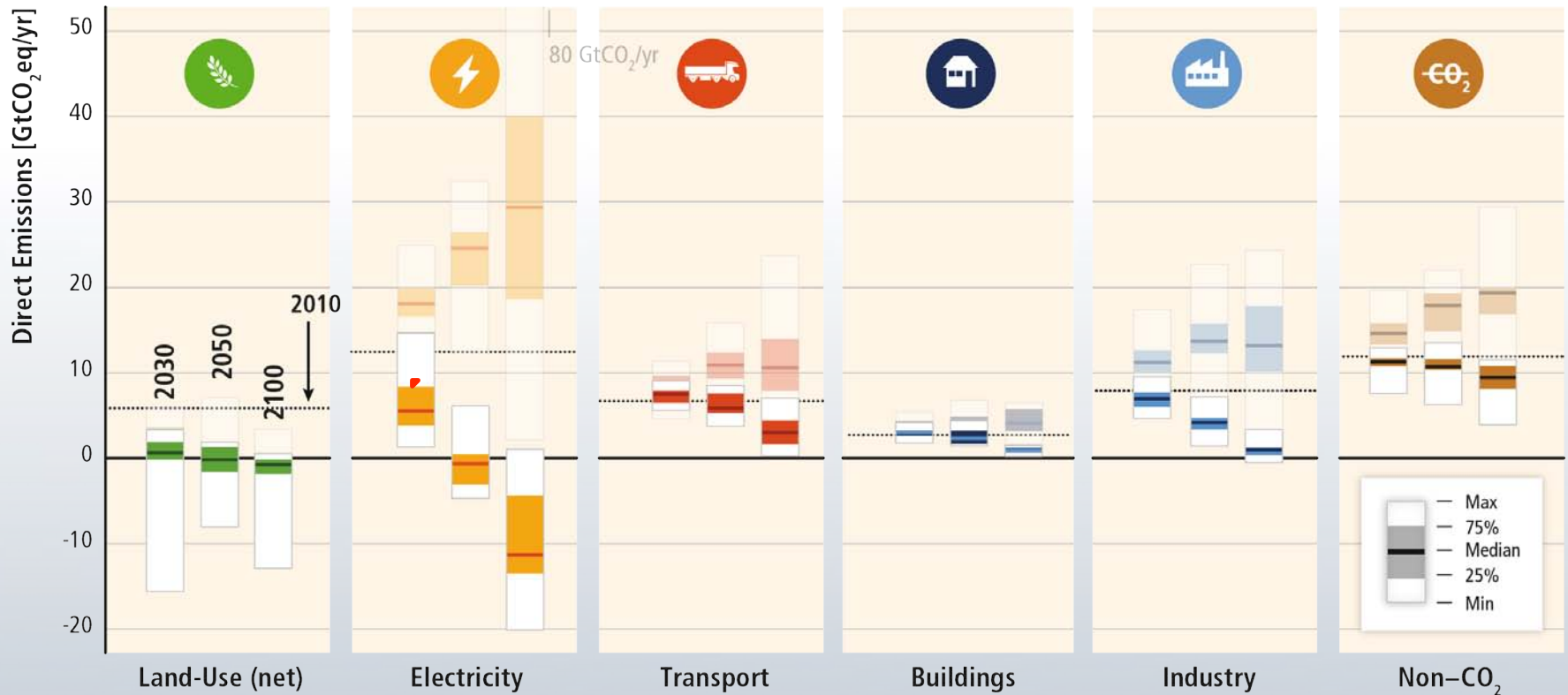
# Baseline scenarios suggest rising GHG emissions in all sectors, except for CO<sub>2</sub> emissions in the land-use sector.



Based on Figure TS.17

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

## 450 ppm CO<sub>2</sub>eq with Carbon Dioxide Capture & Storage

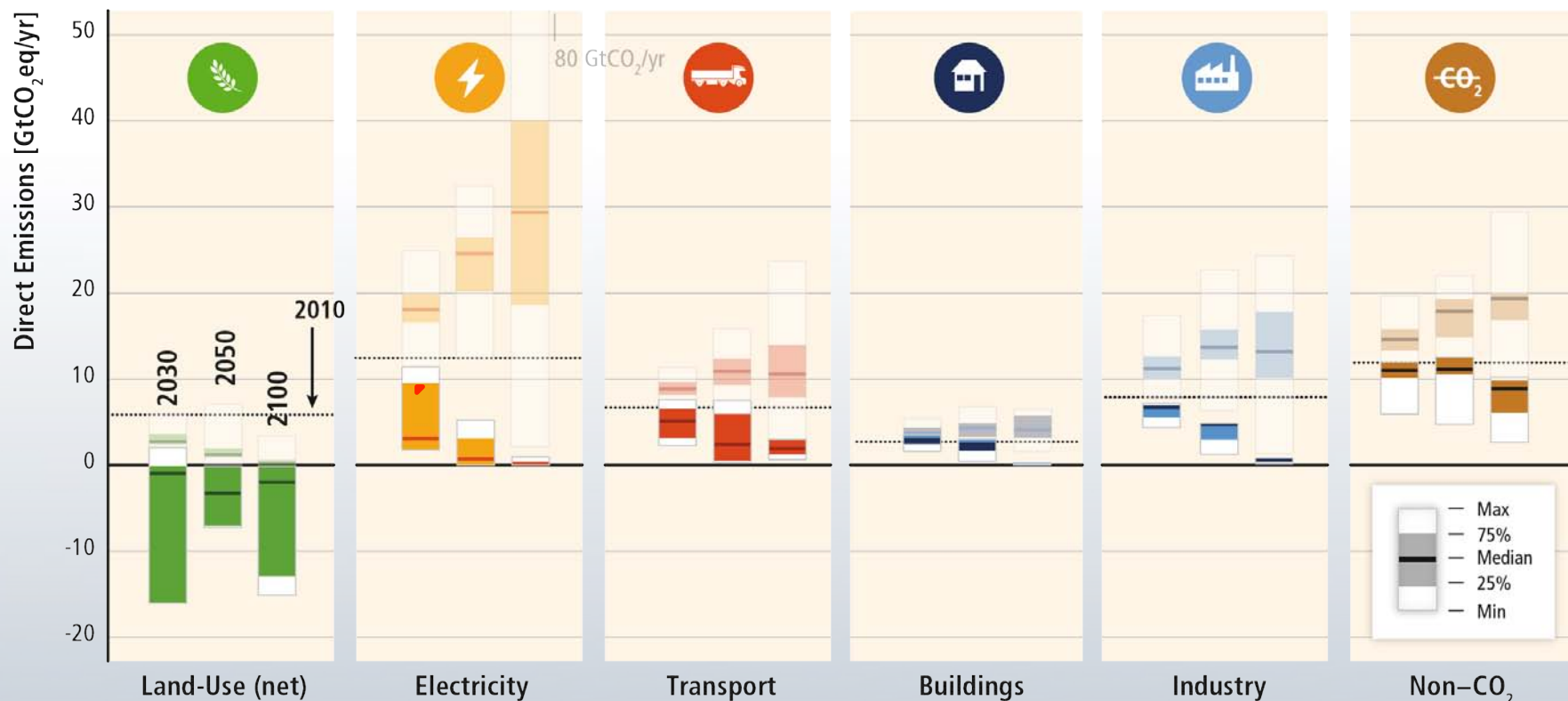


Based on Figure TS.17



# Mitigation efforts in one sector determine efforts in others.

## 450 ppm CO<sub>2</sub>eq without Carbon Dioxide Capture & Storage



Based on Figure TS.17

How will mitigation over the next 15 years  
influence the challenge of meeting 2°C?

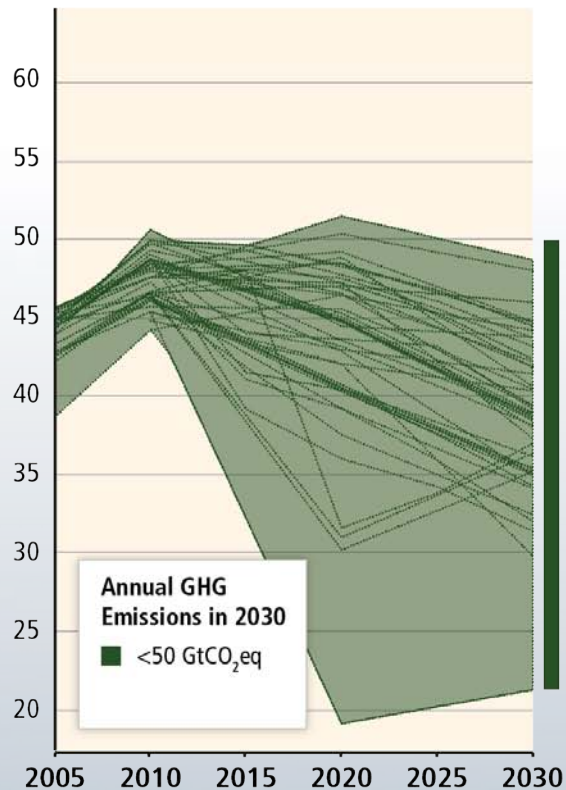




# Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.

Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]

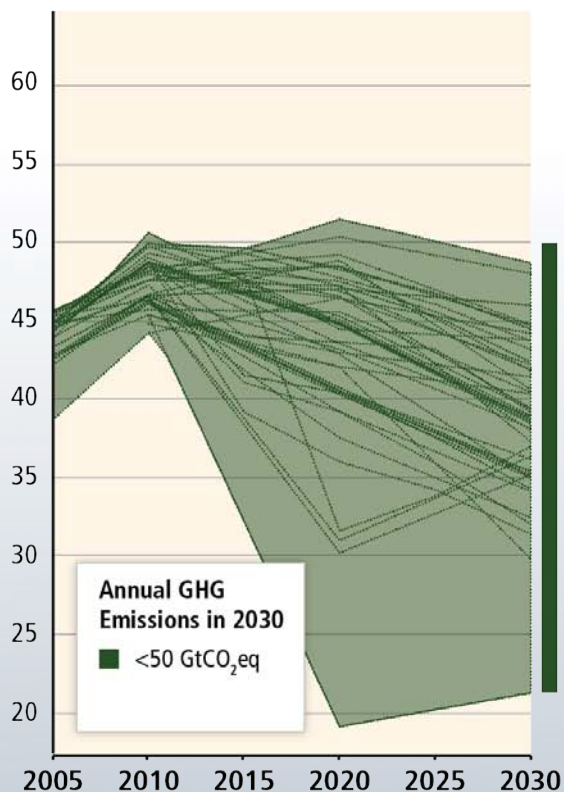


„immediate action“

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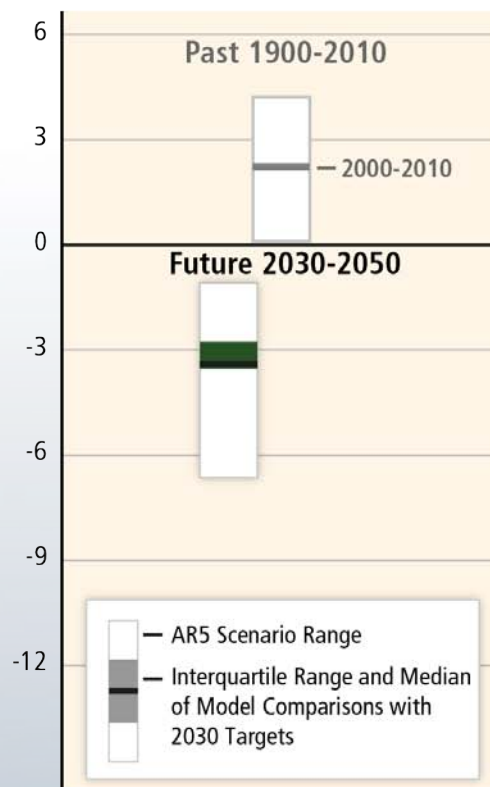
## Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]



## After 2030

Rate of CO<sub>2</sub> Emission Change [%/yr]

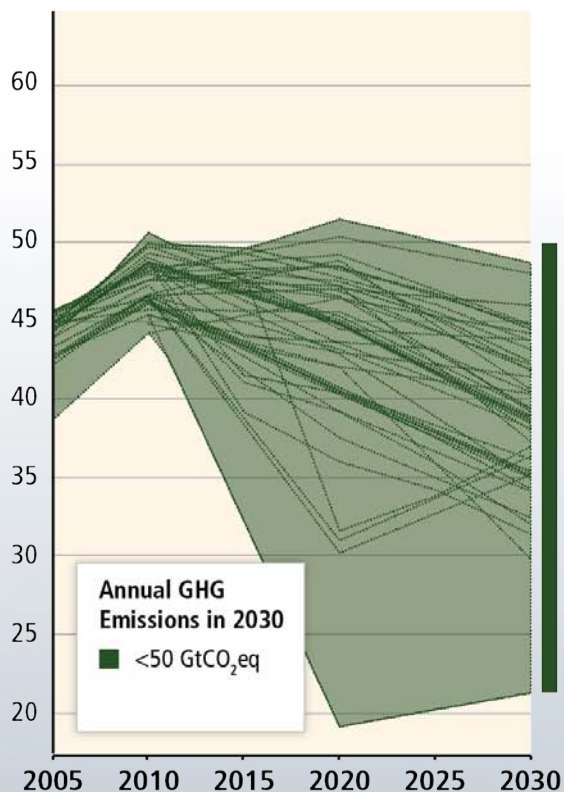




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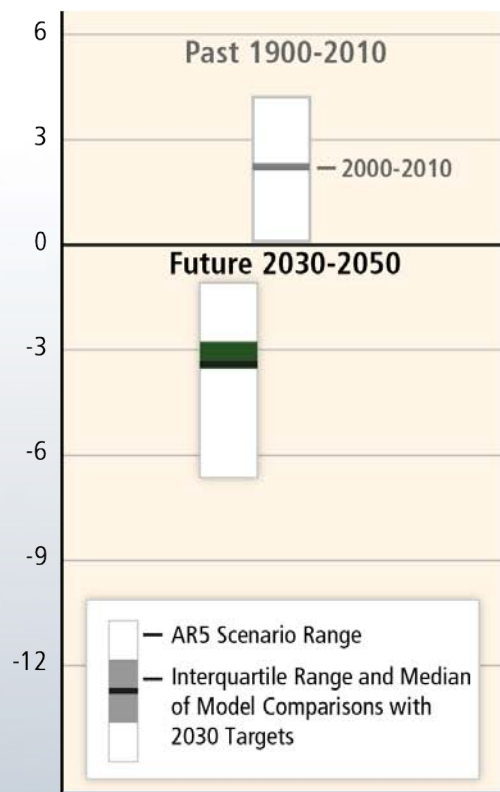
## Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]

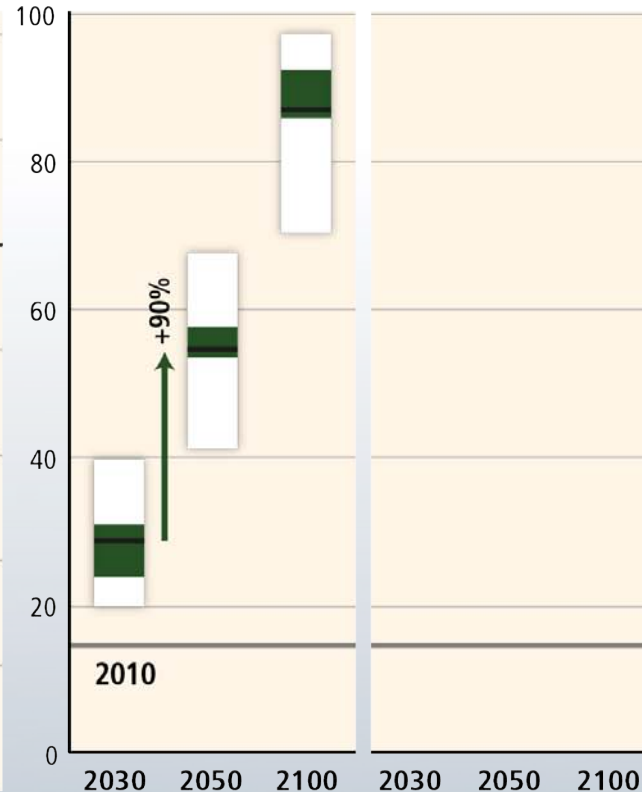


## After 2030

Rate of CO<sub>2</sub> Emission Change [%/yr]



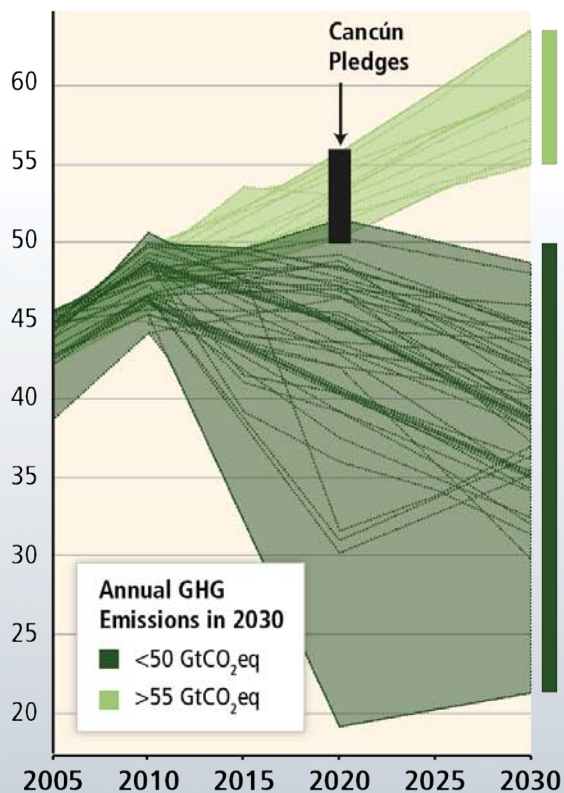
Share of Low Carbon Energy [%]



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

Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]



„delayed mitigation“

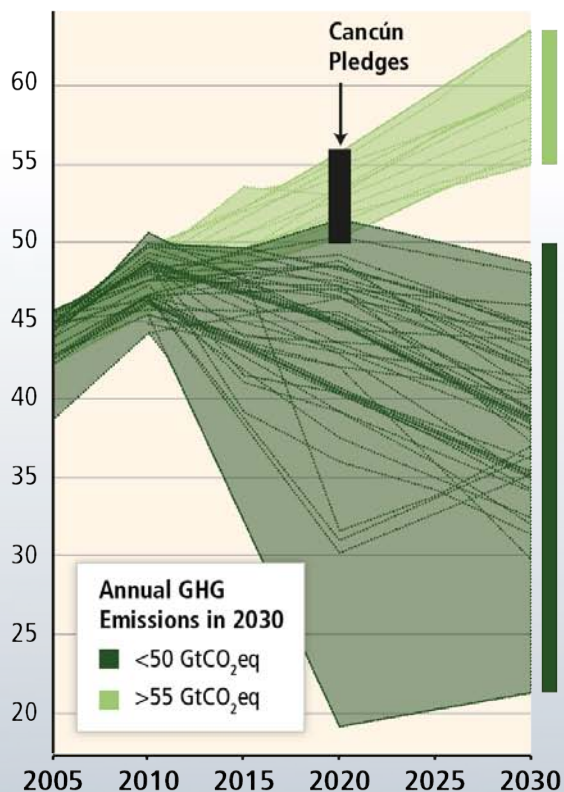
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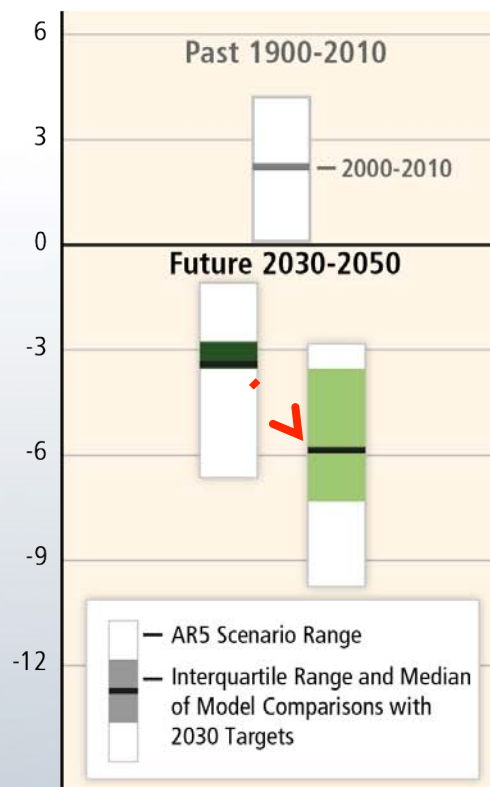
## Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]



## After 2030

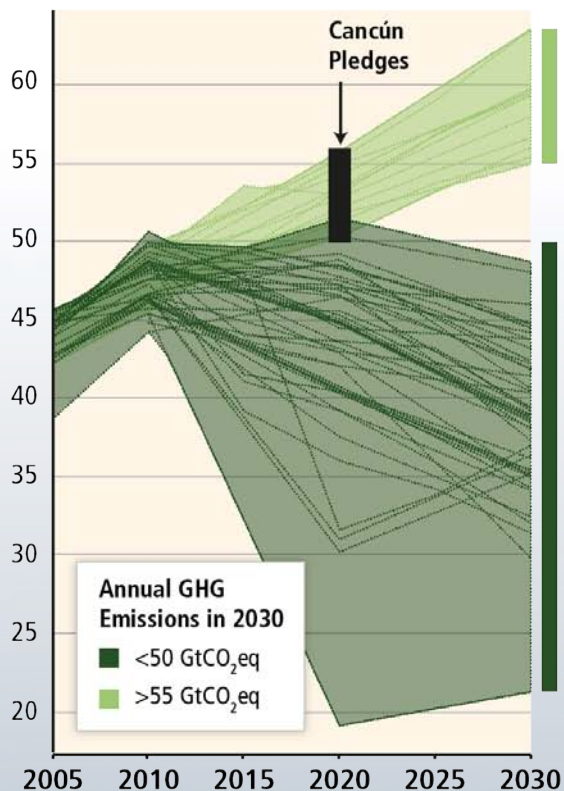
Rate of CO<sub>2</sub> Emission Change [%/yr]



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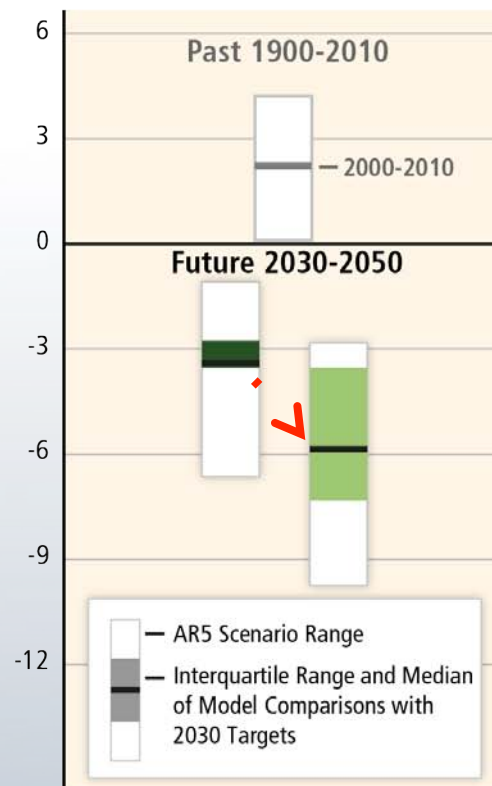
## Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]

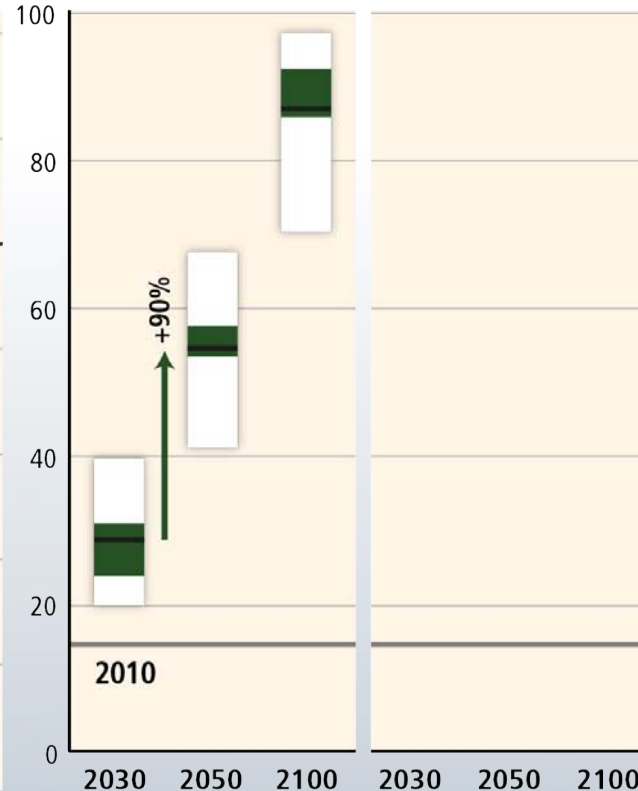


## After 2030

Rate of CO<sub>2</sub> Emission Change [%/yr]



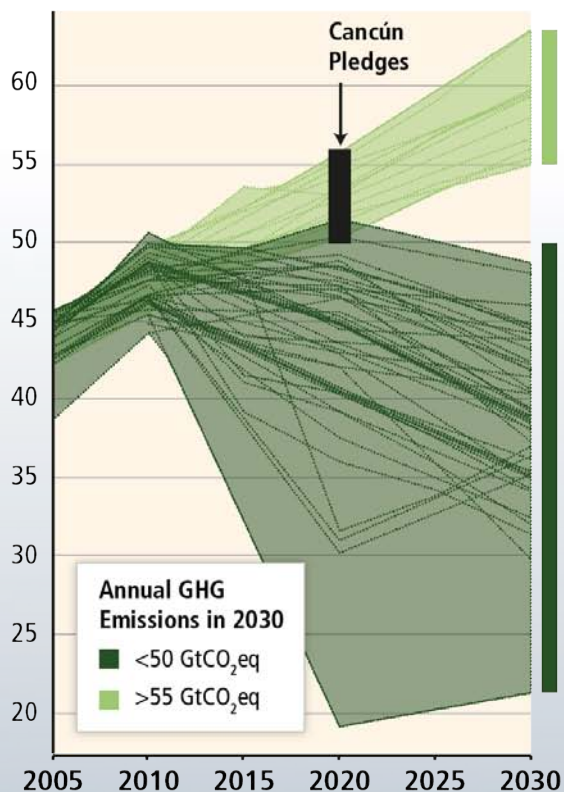
Share of Low Carbon Energy [%]



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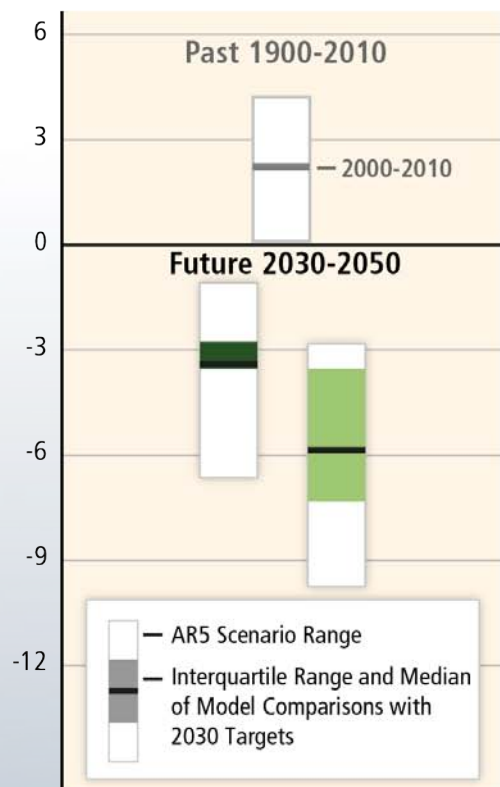
## Before 2030

GHG Emissions Pathways [GtCO<sub>2</sub>eq/yr]

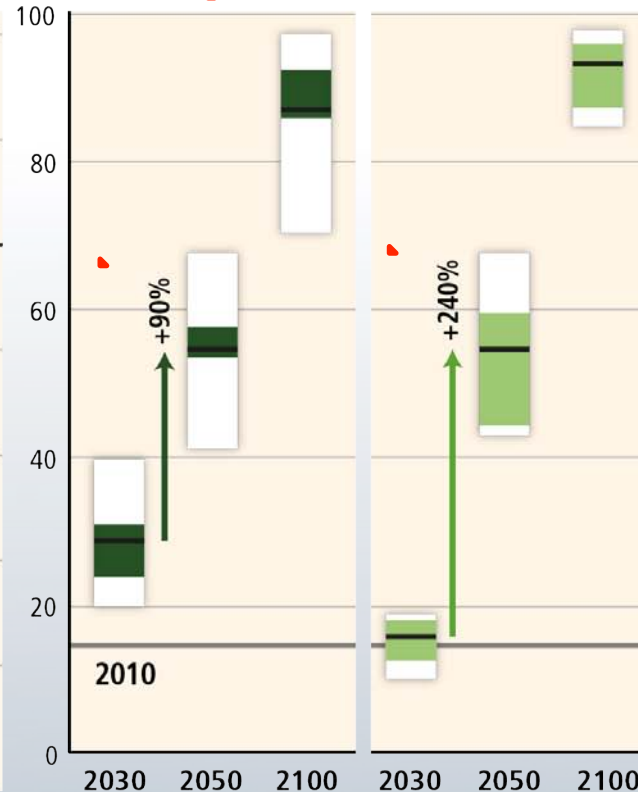


## After 2030

Rate of CO<sub>2</sub> Emission Change [%/yr]



Share of Low Carbon Energy [%]



Based on Figures 6.32 and 7.16



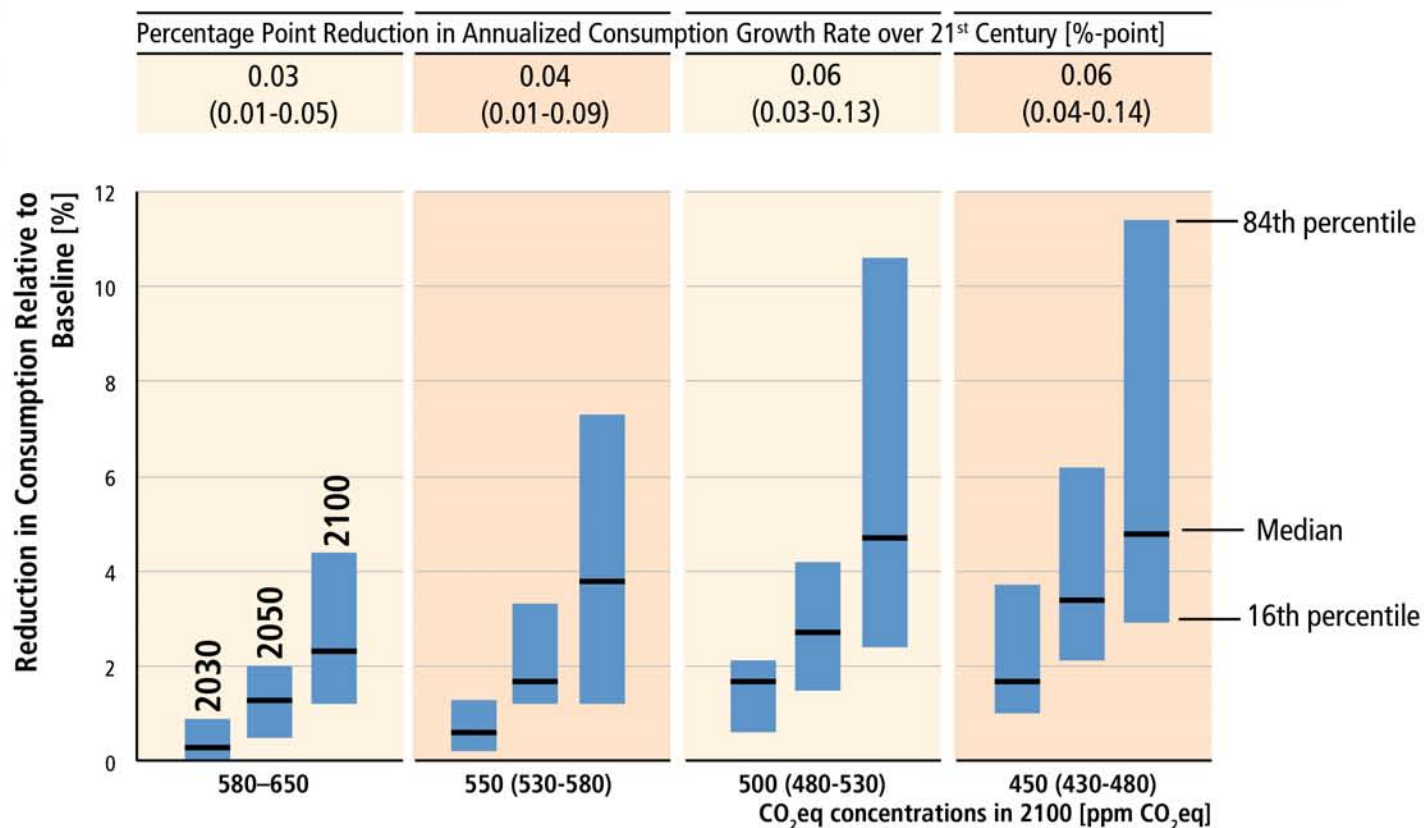
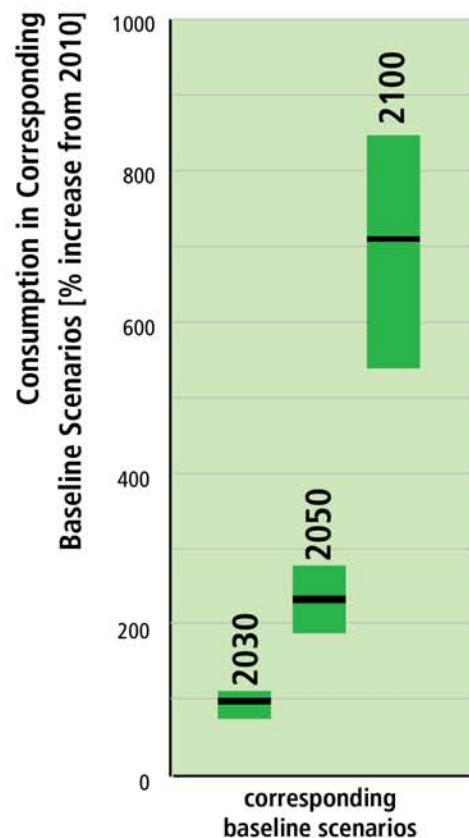
How much will it cost to reduce  
emissions?



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

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

Global Mitigation Costs and Consumption Growth in Baseline Scenarios

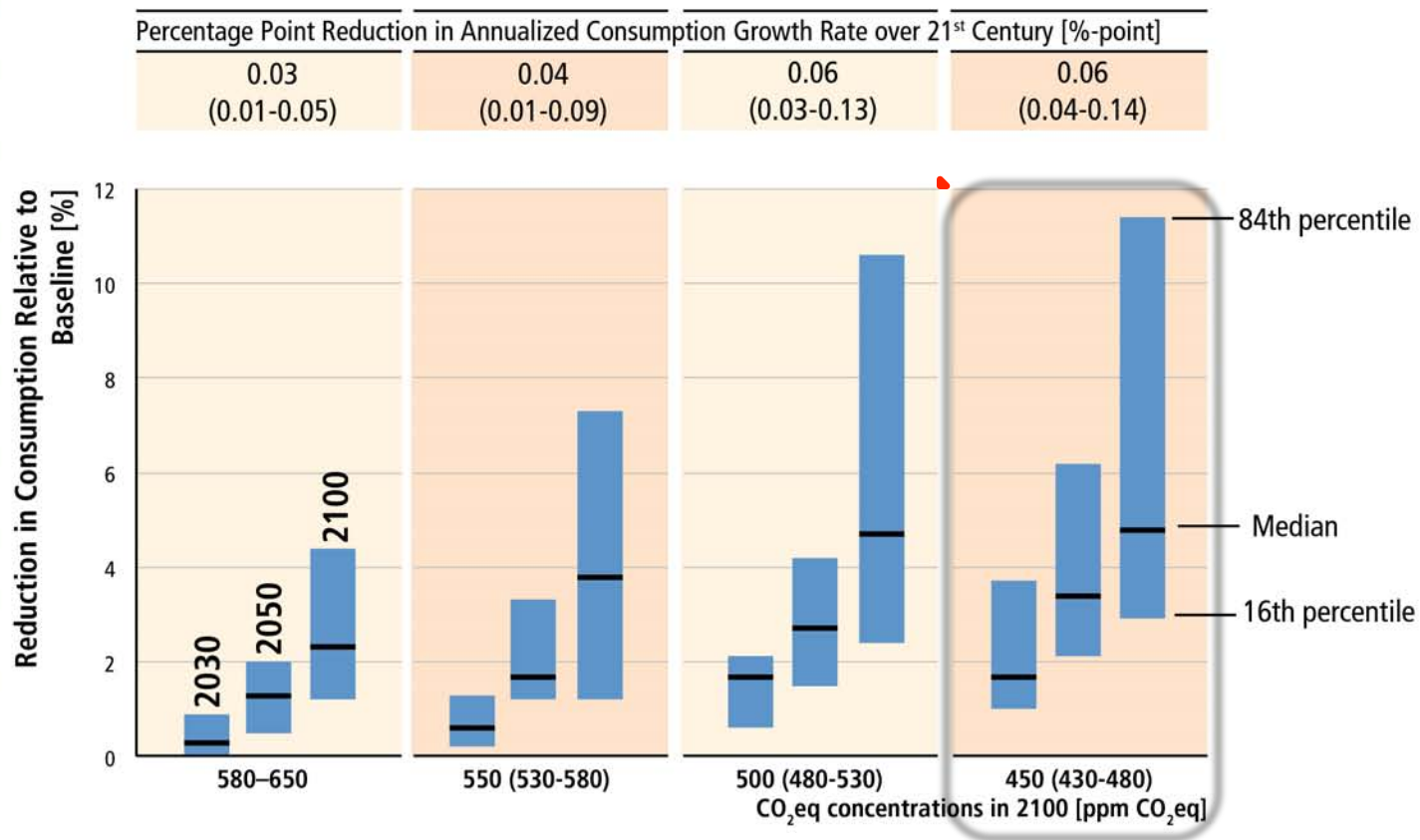
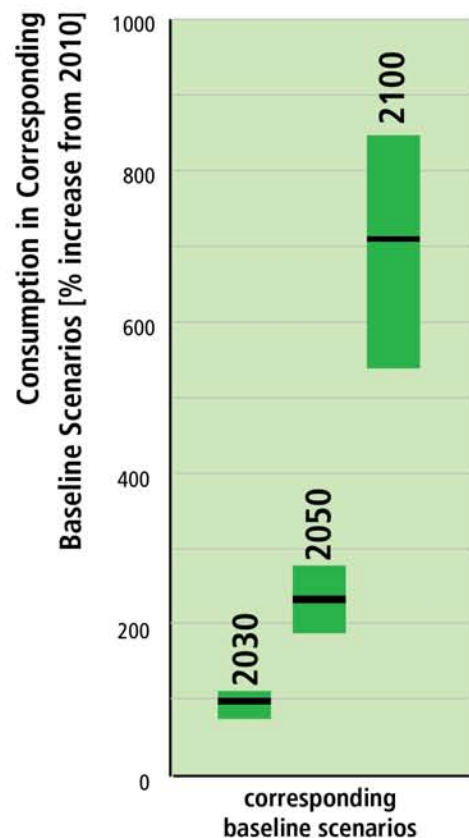




# Estimates of aggregate global mitigation costs vary widely, even under idealized assumptions; they increase with mitigation.

Both higher and lower costs have been estimated based on less idealized circumstances

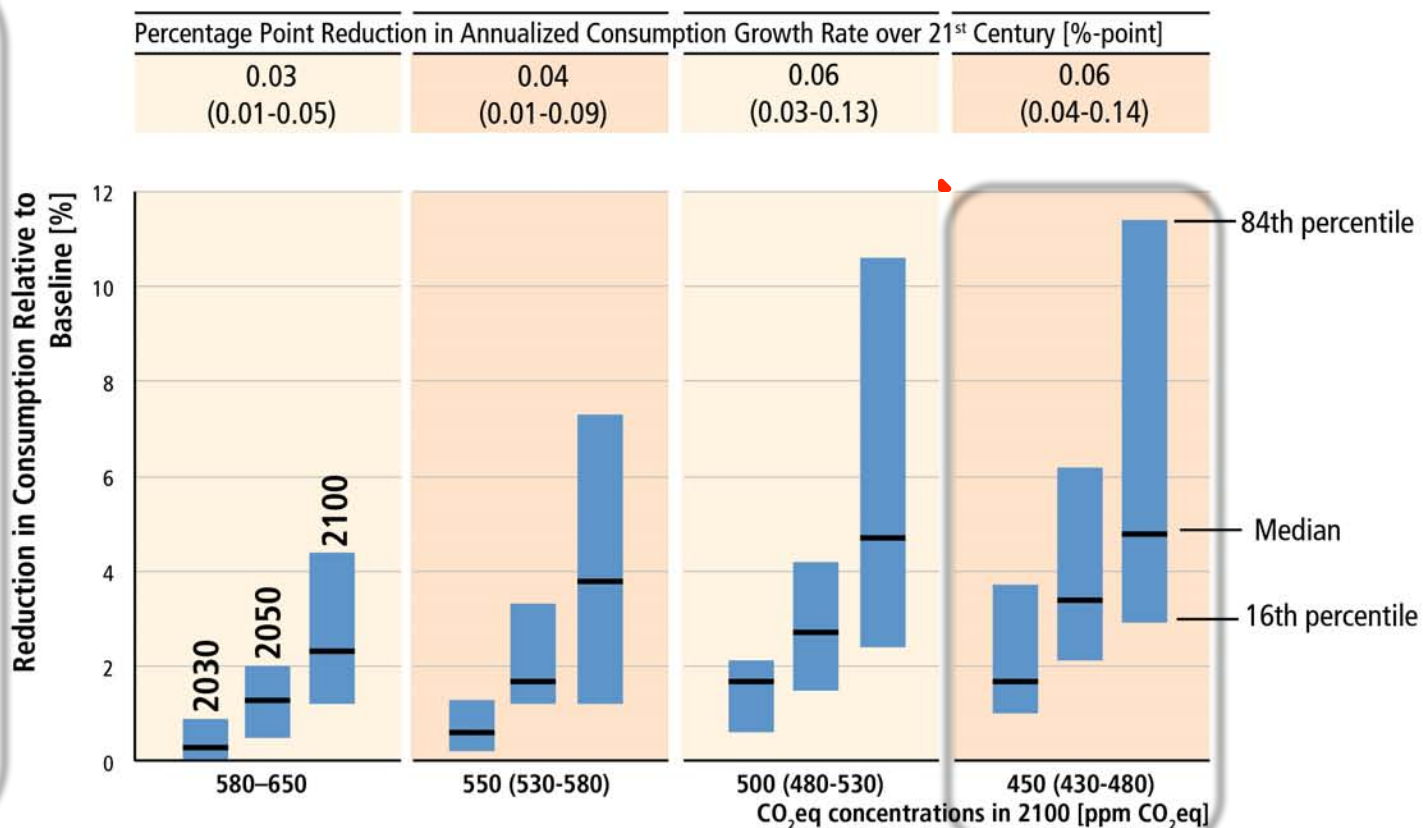
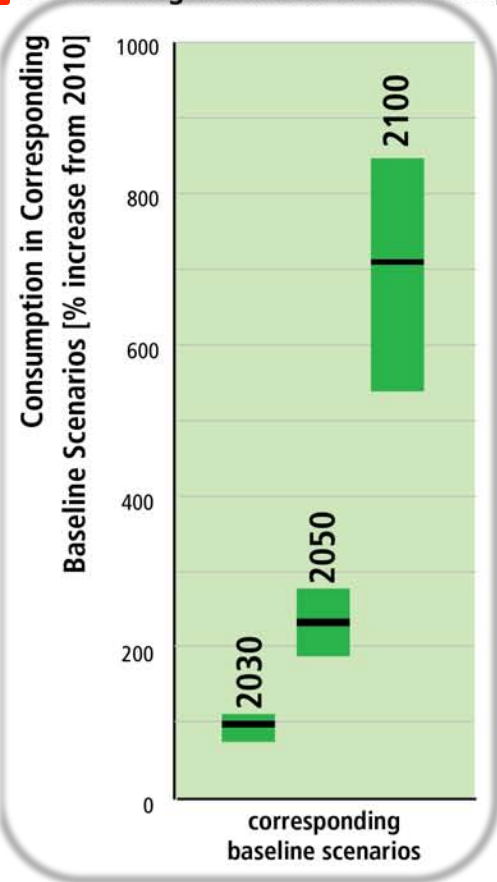
Global Mitigation Costs and Consumption Growth in Baseline Scenarios





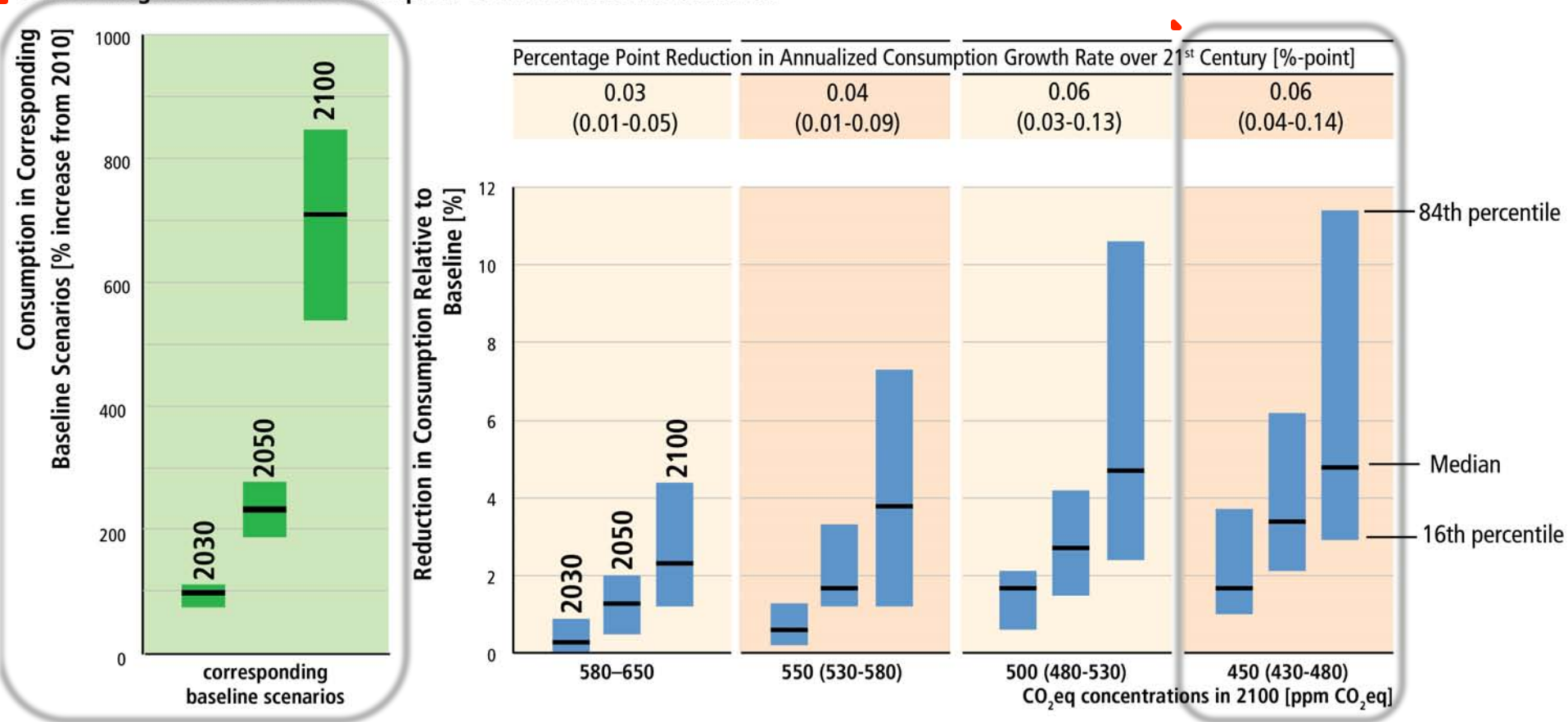
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Global Mitigation Costs and Consumption Growth in Baseline Scenarios



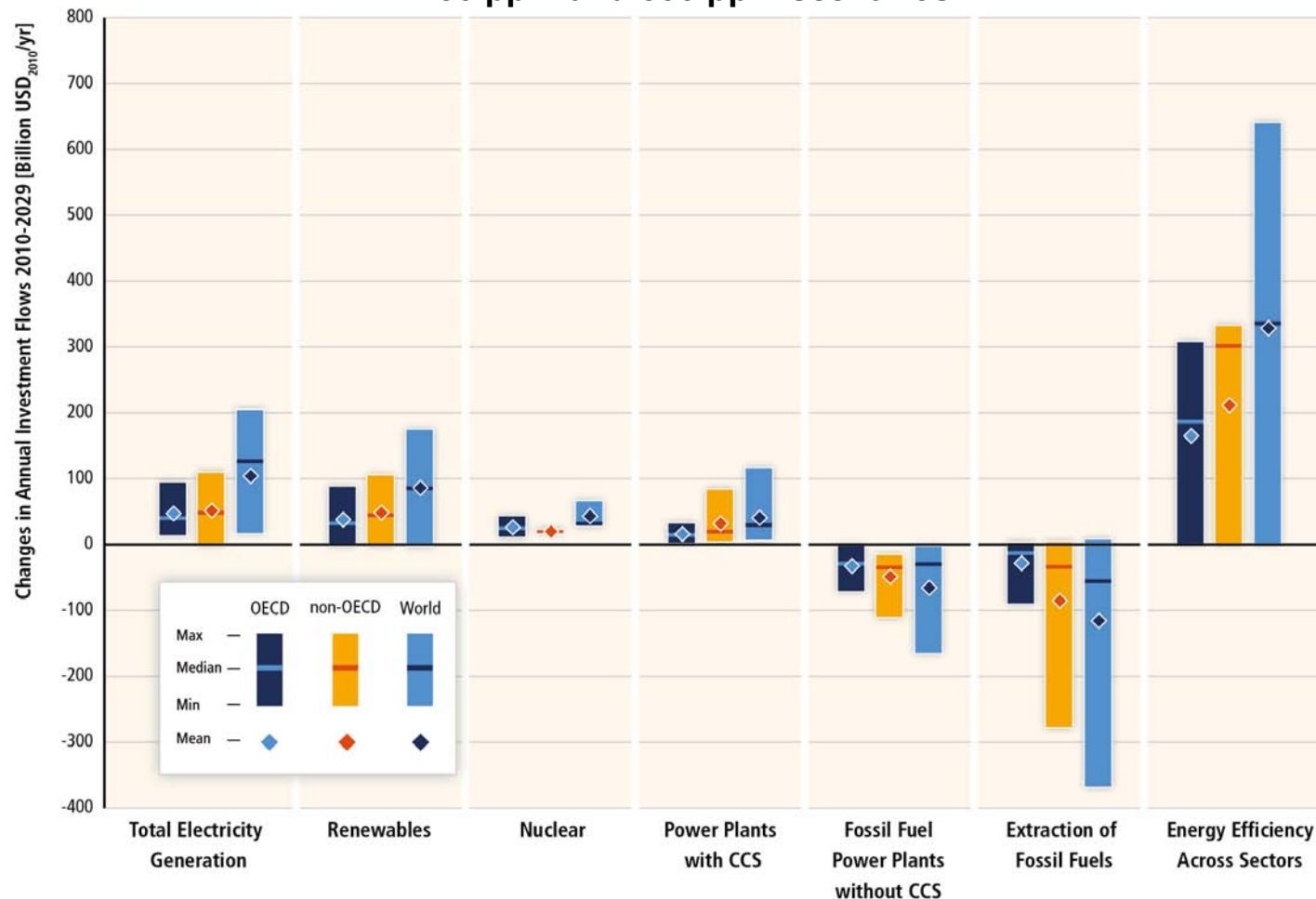
# Estimates of aggregate global mitigation costs vary widely, even under idealized assumptions; they increase with mitigation.

Global Mitigation Costs and Consumption Growth in Baseline Scenarios



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

Change of average annual investment in mitigation scenarios (2010–2029)  
450 ppm and 500 ppm scenarios

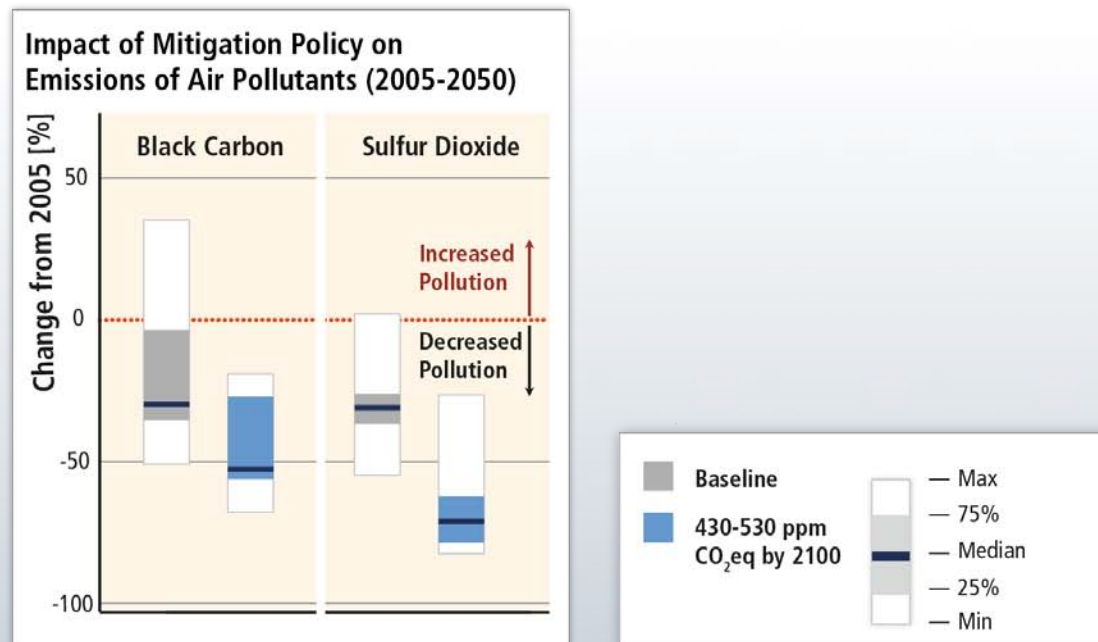




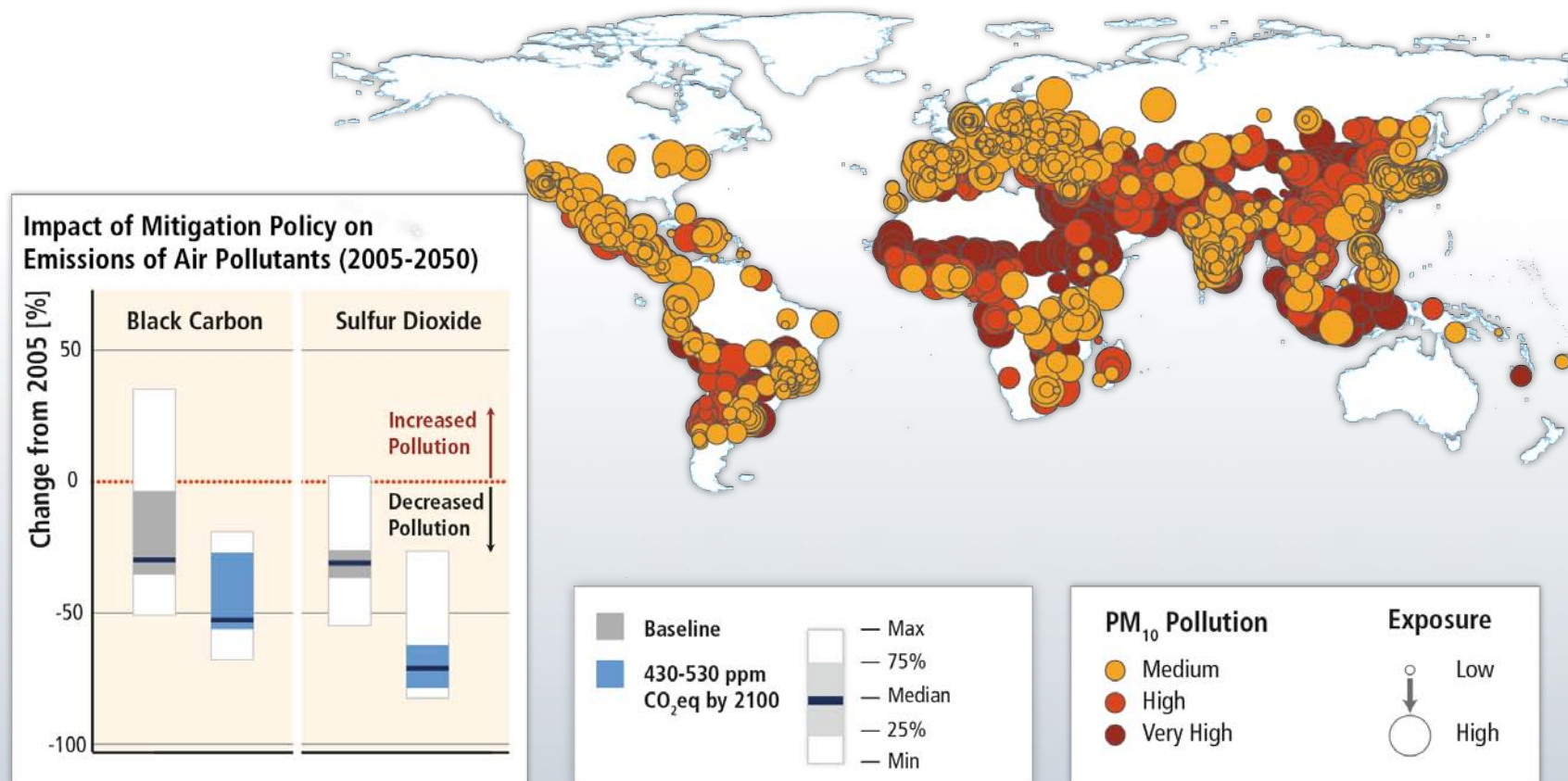
How does mitigation interact with other societal goals?



# 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



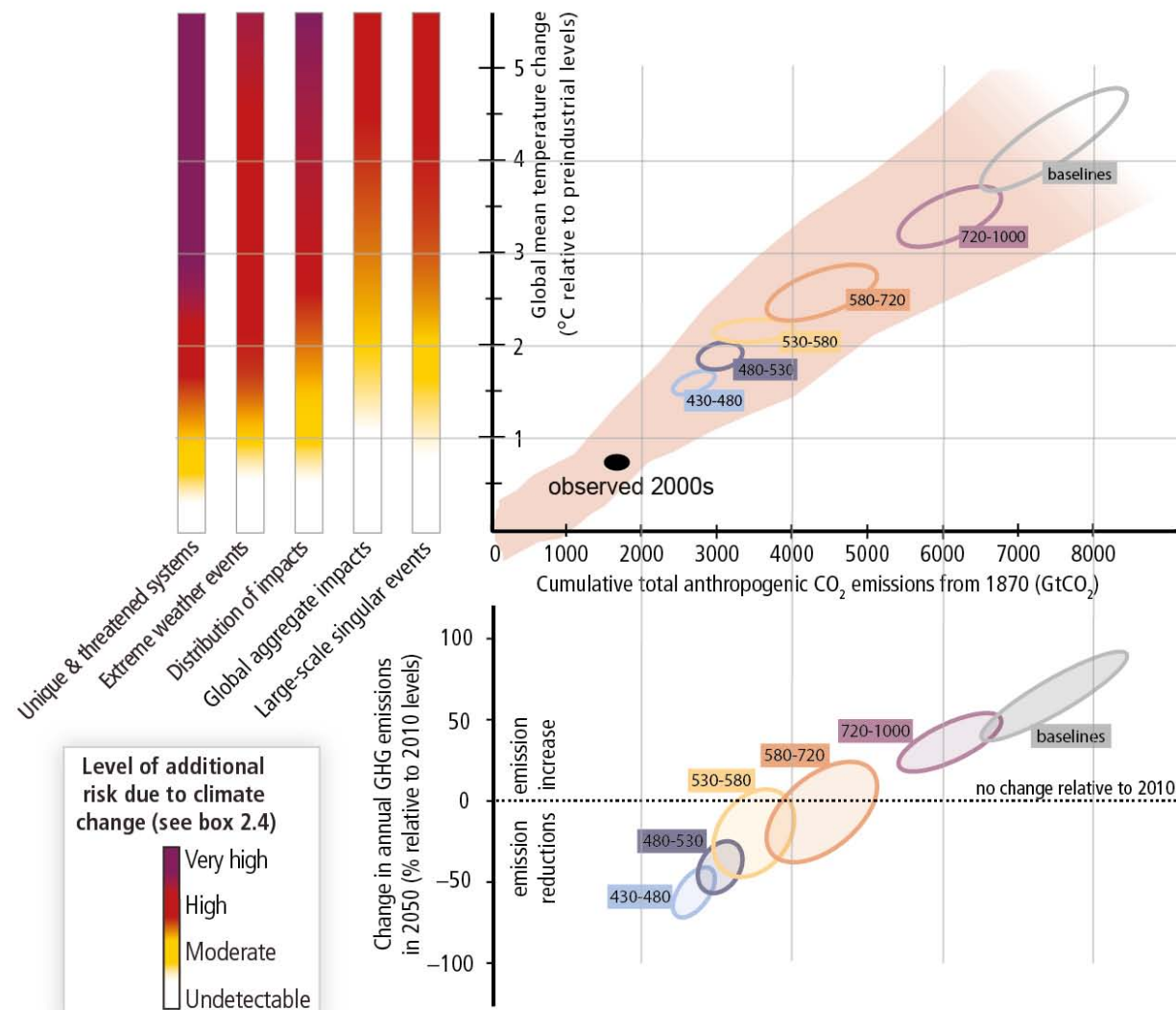
# Linking from impacts to emissions reductions



# Figure SPM.10

## Linking across Working Groups

(A) Risks from climate change... (B) ...depend on cumulative CO<sub>2</sub> emissions...



(C) ...which in turn depend on annual GHG emissions over the next decades



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[www.mitigation2014.org](http://www.mitigation2014.org)