science for global insight

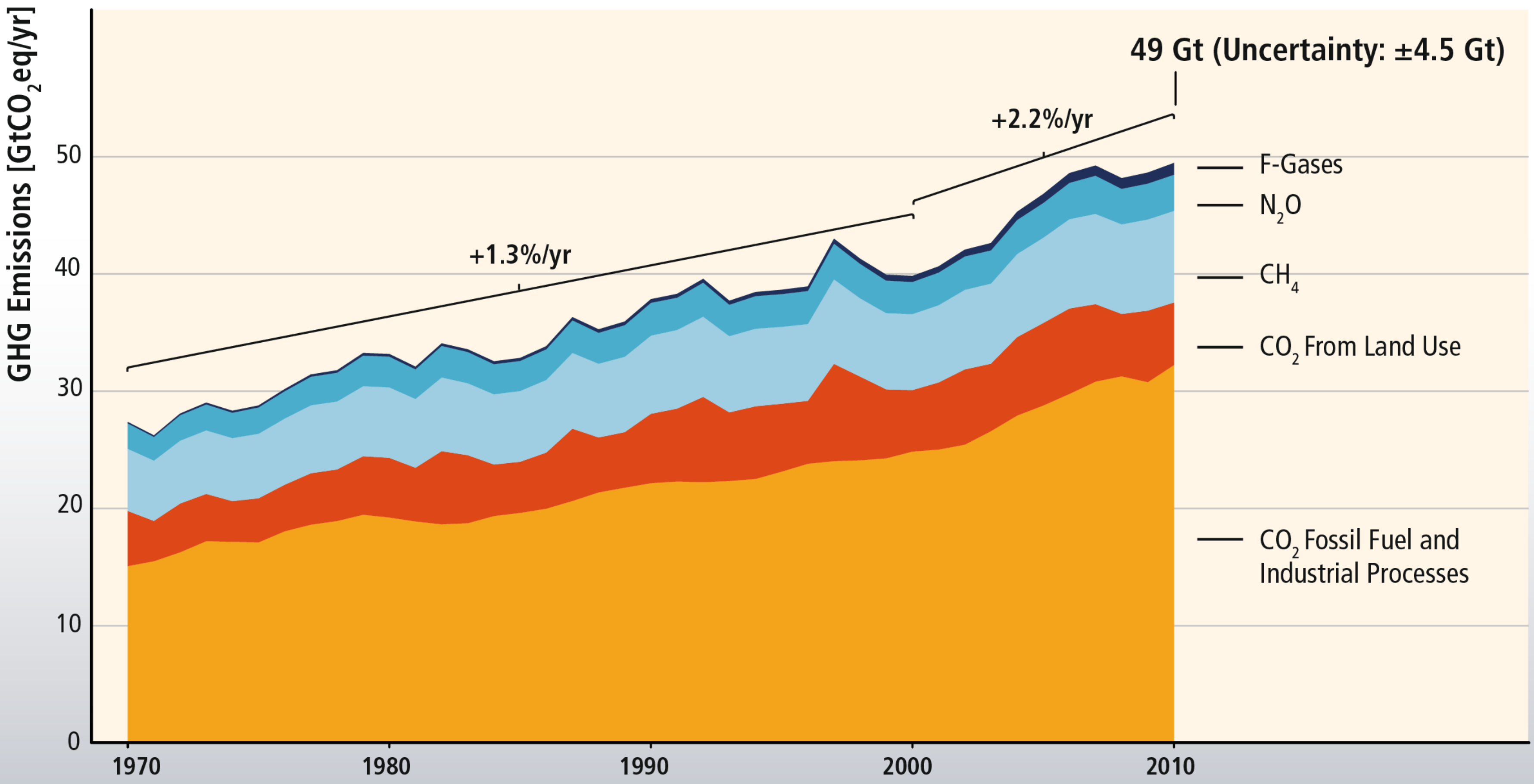
Mitigation of Climate Change Key Insights from IPCC AR5

Keywan Riahi
International Institute for Applied Systems Analysis
riahi@iiasa.ac.at

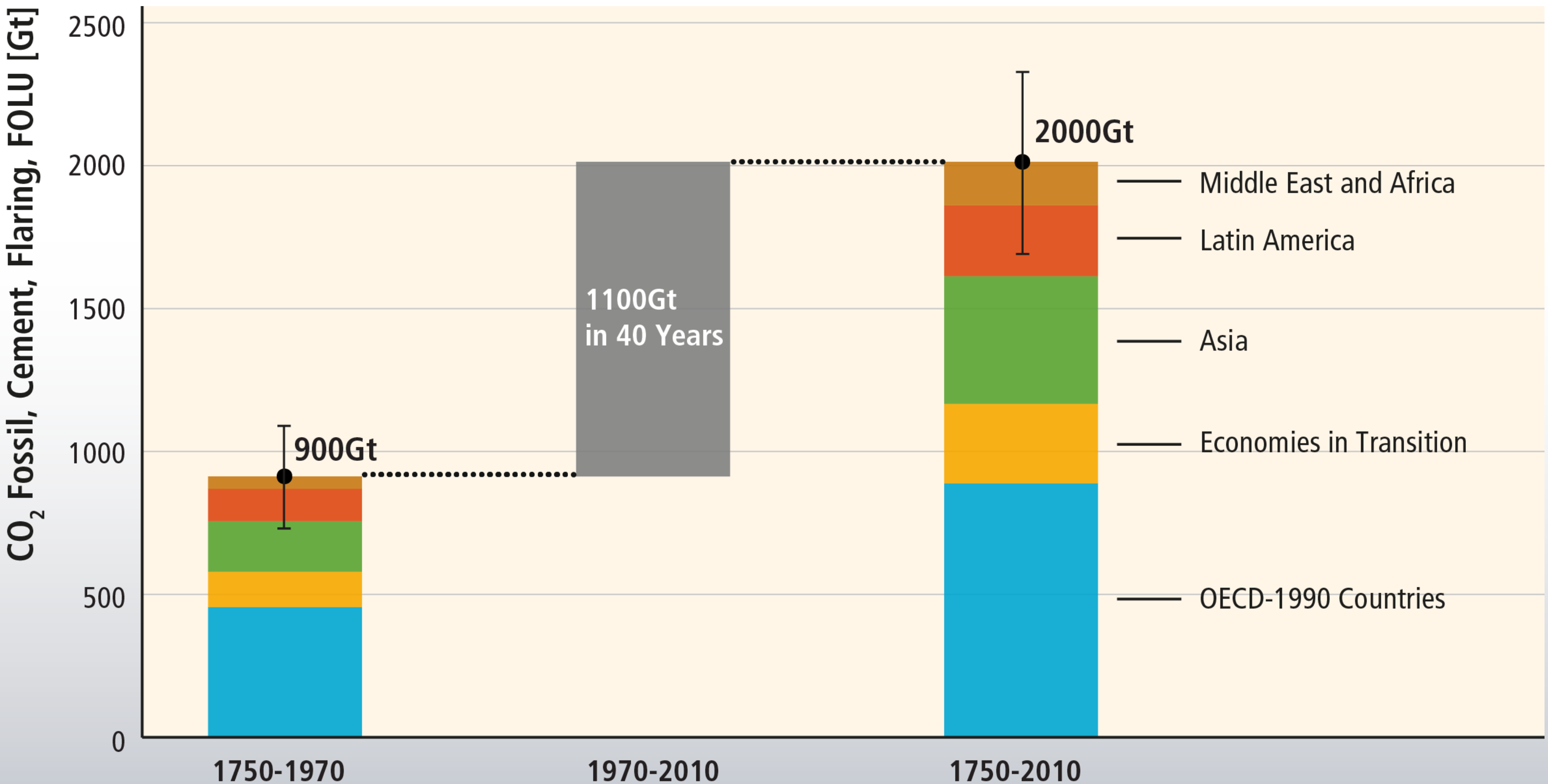
Osterreichische Akademie der Wissenschaften
Wien, 24 November 2014

GHG emissions growth has accelerated despite reduction efforts.

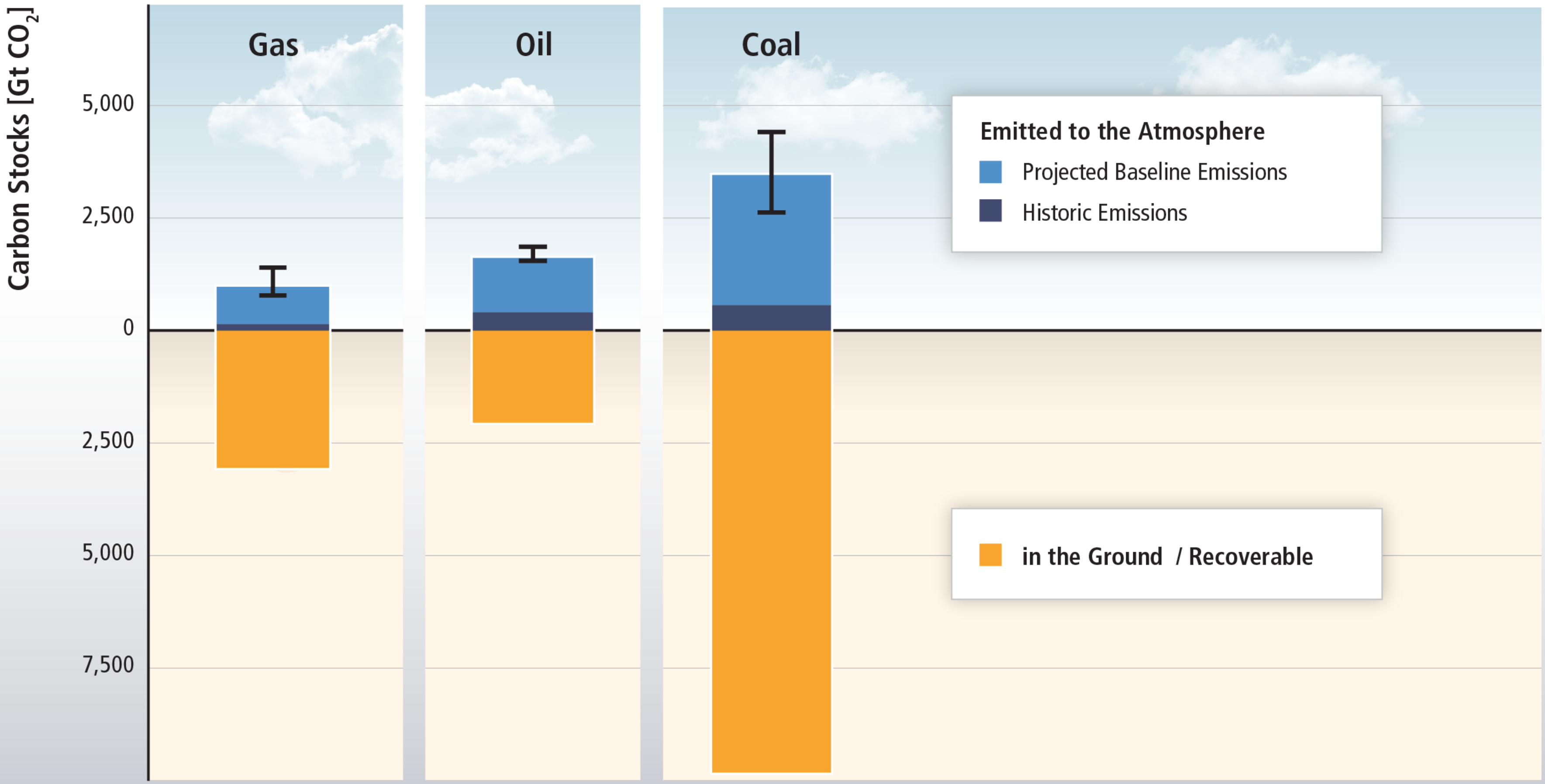
Most emission growth is CO_2 from fossil fuel combustion.



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

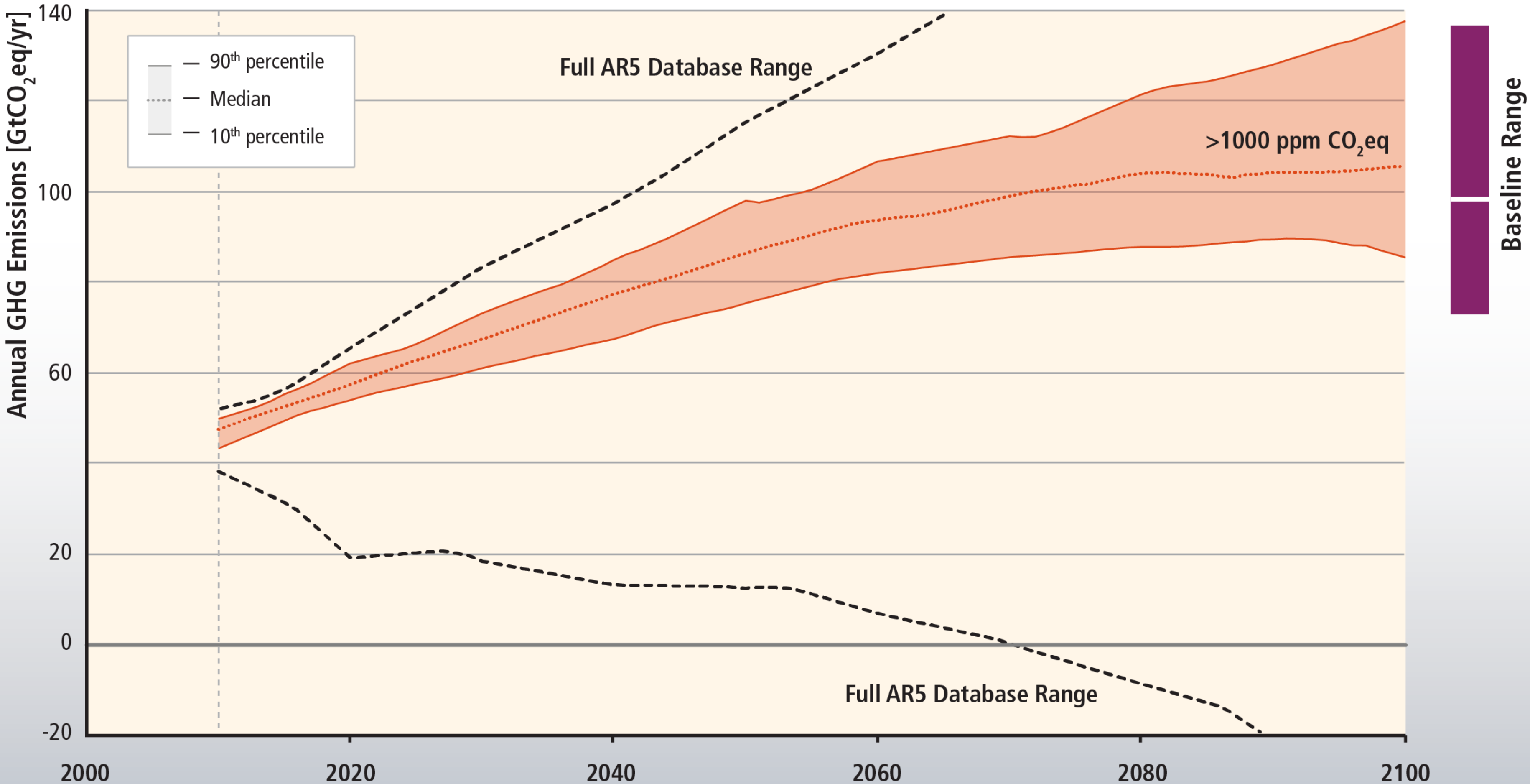


There is far more carbon in the ground than emitted in any baseline scenario.



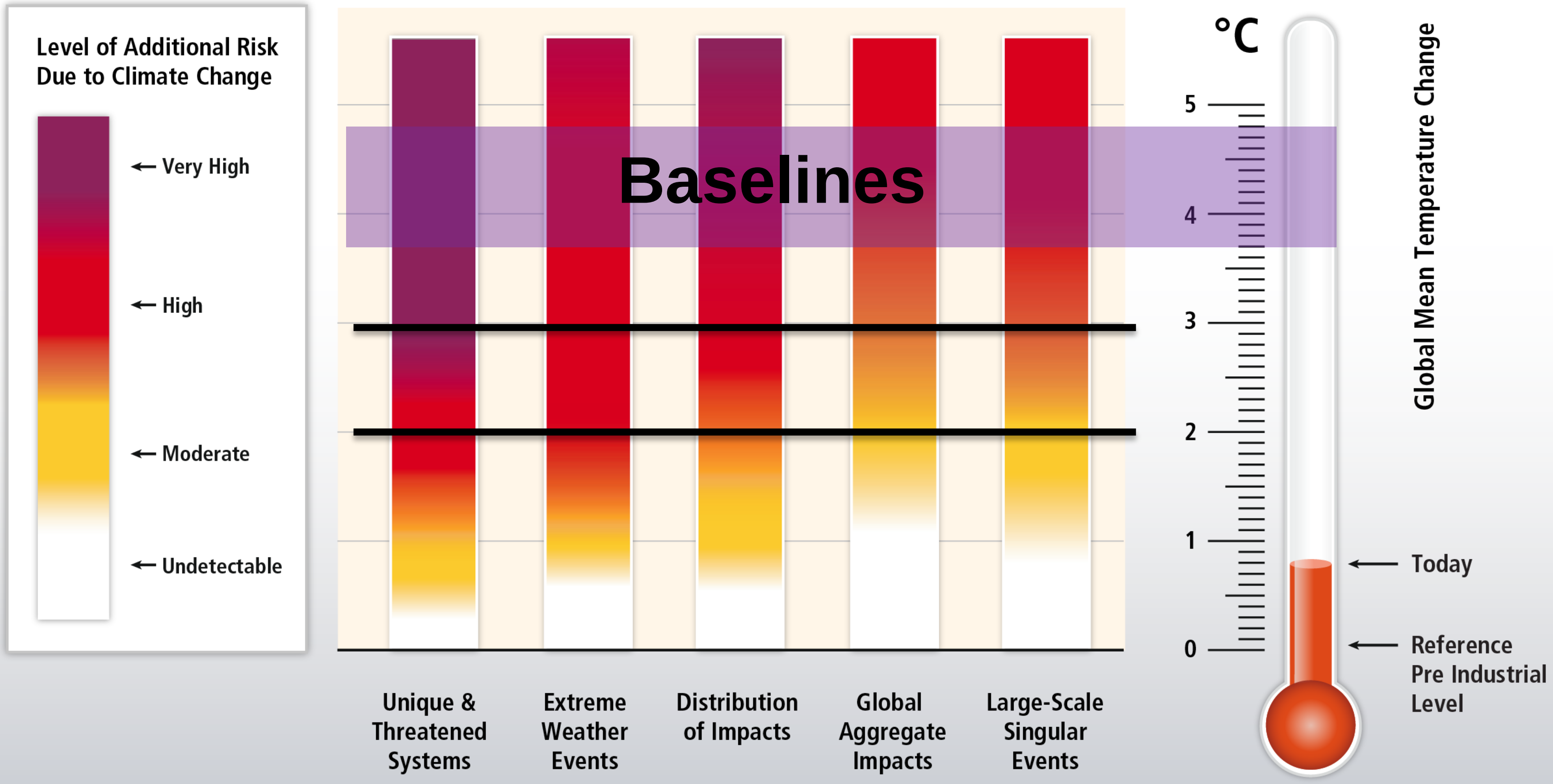

Limiting warming to 2°C involves substantial technological, economic and institutional challenges.

Without additional mitigation, GHG emissions continue to increase by a factor of about two compared to today.

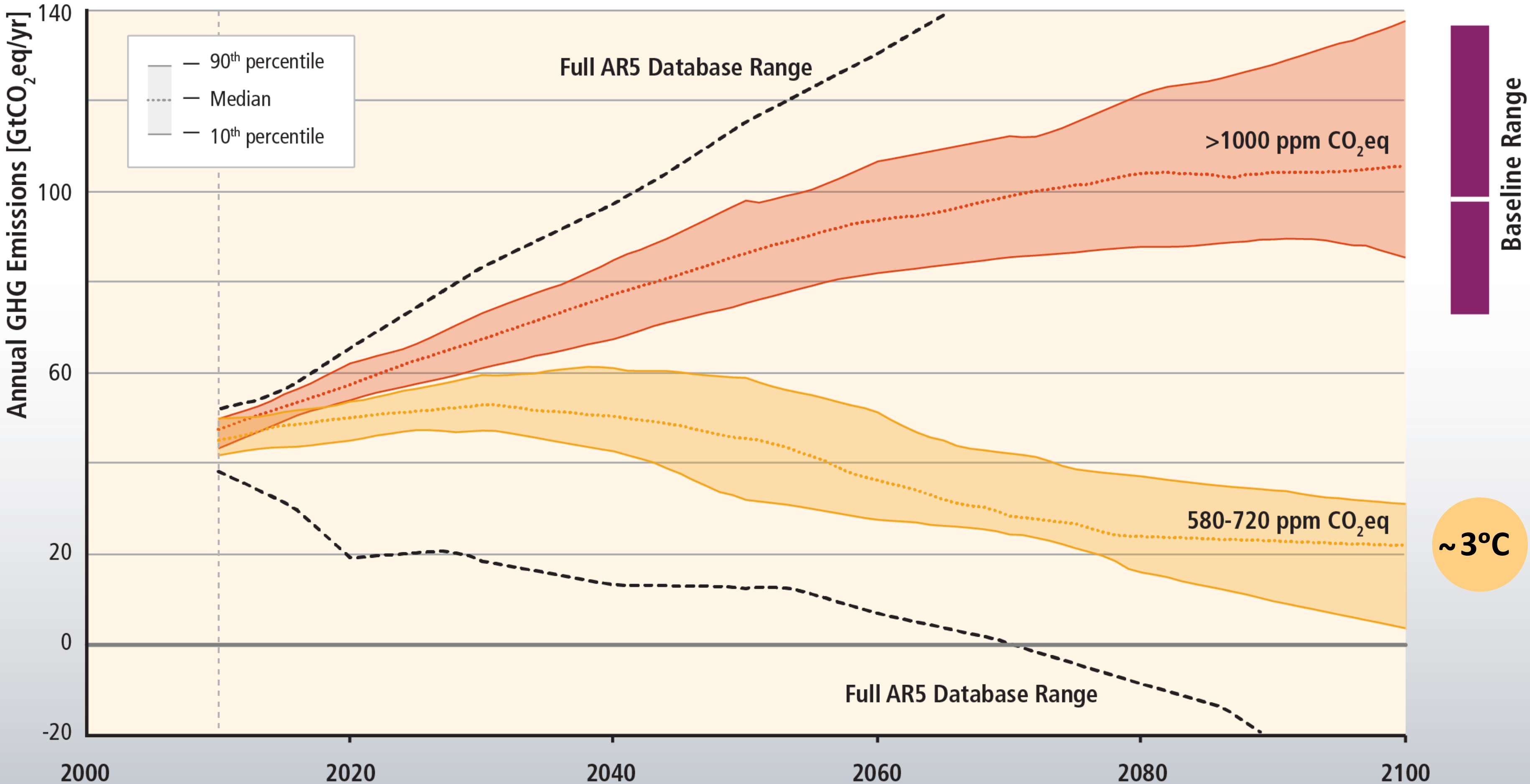


INTERGOVERNMENTAL PANEL ON climate change

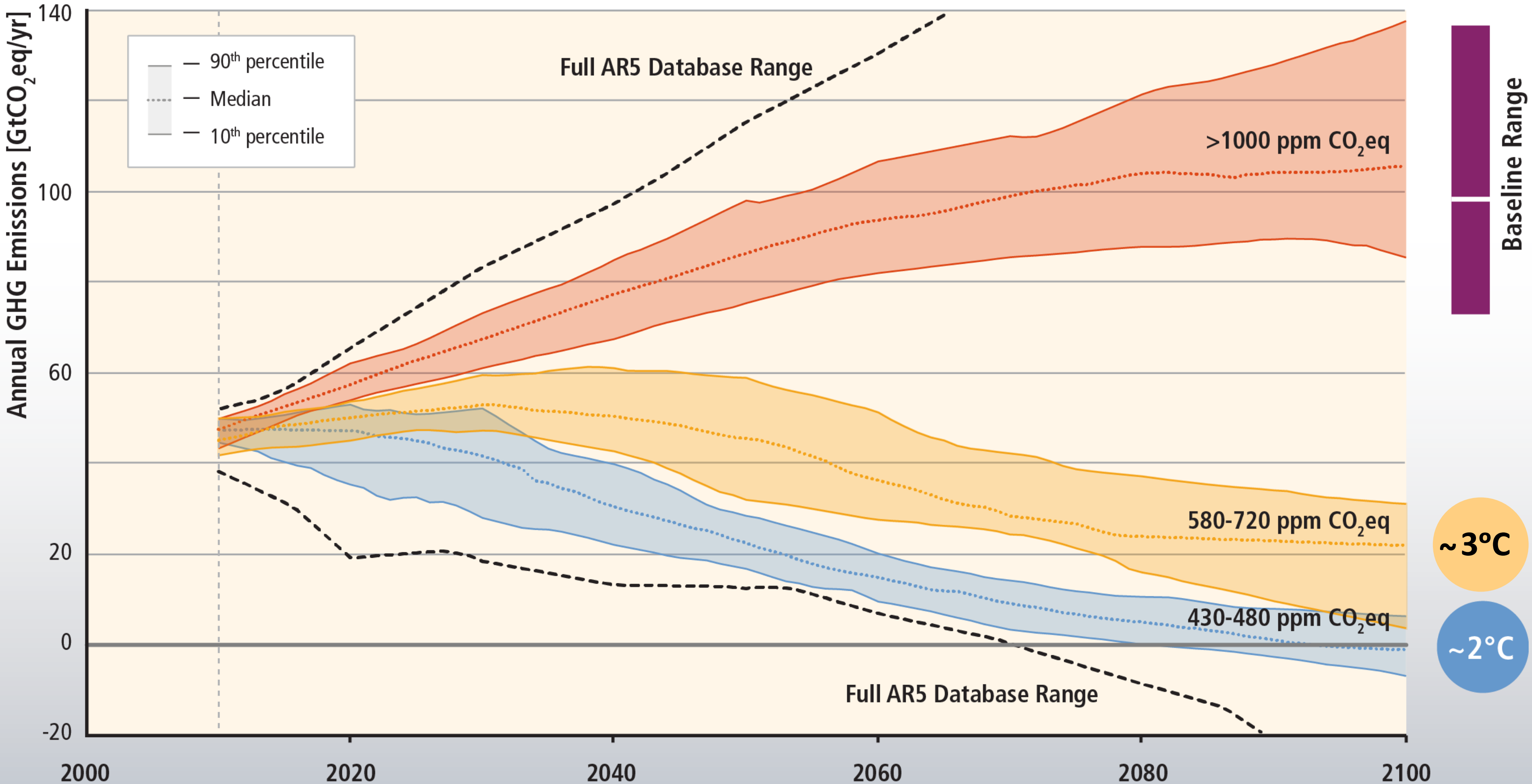
Without additional mitigation, global mean surface temperature is projected to increase by 3.7 to 4.8°C over the 21st century.



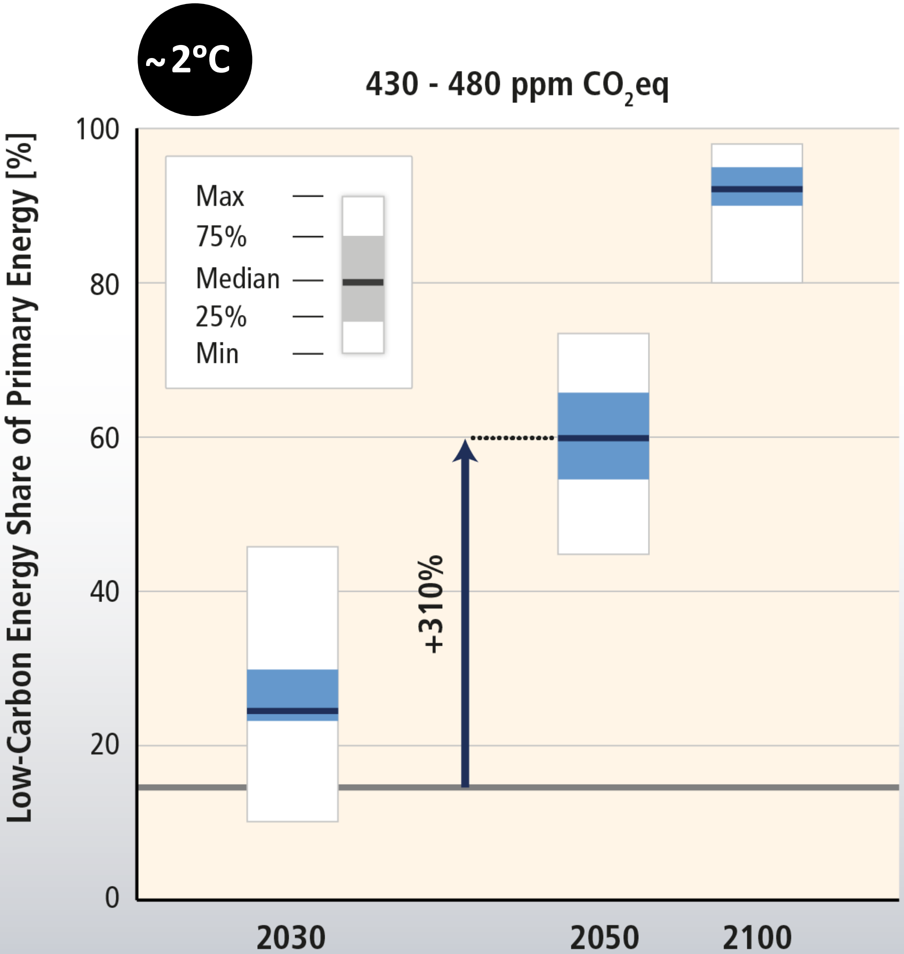
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.



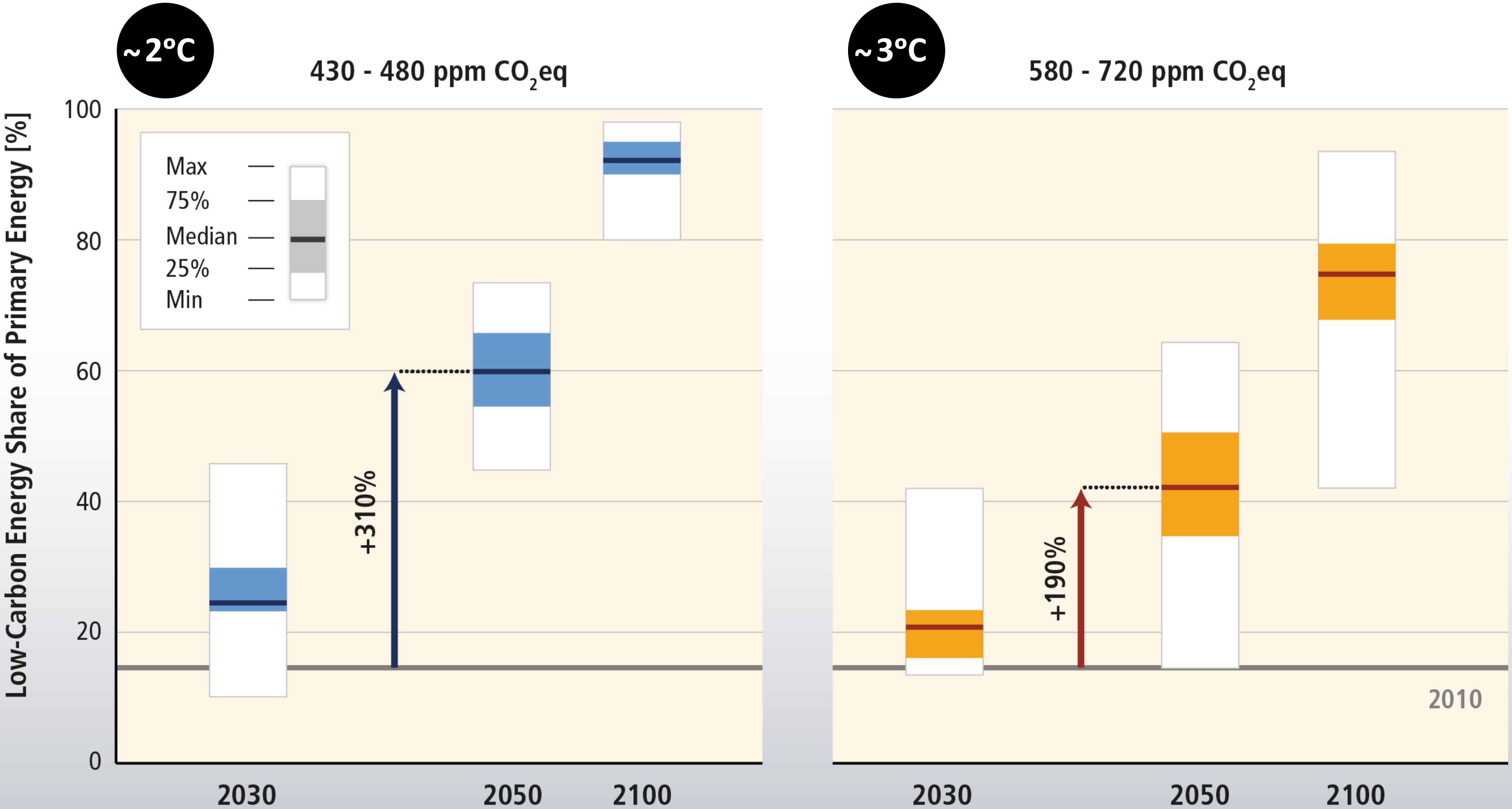
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.



Mitigation involves substantial upscaling of low-carbon energy.

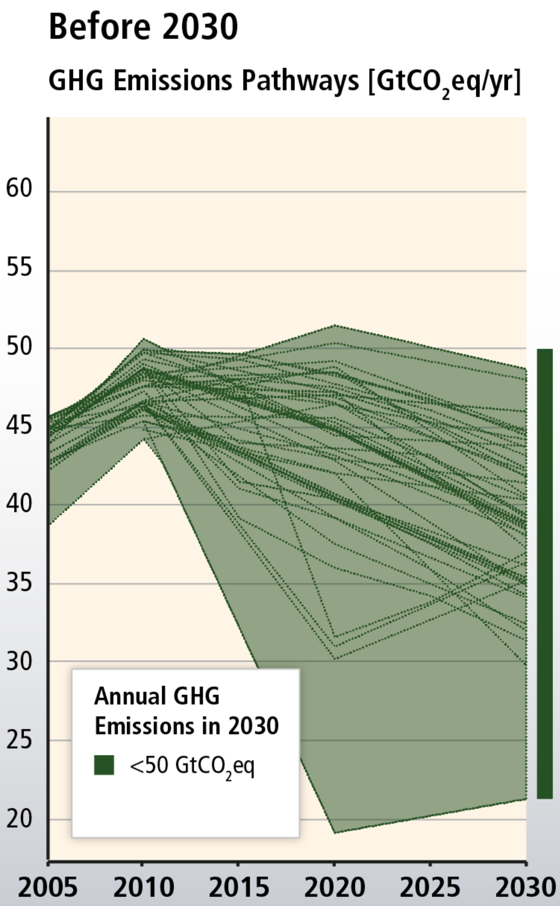


Mitigation involves substantial upscaling of low-carbon energy.

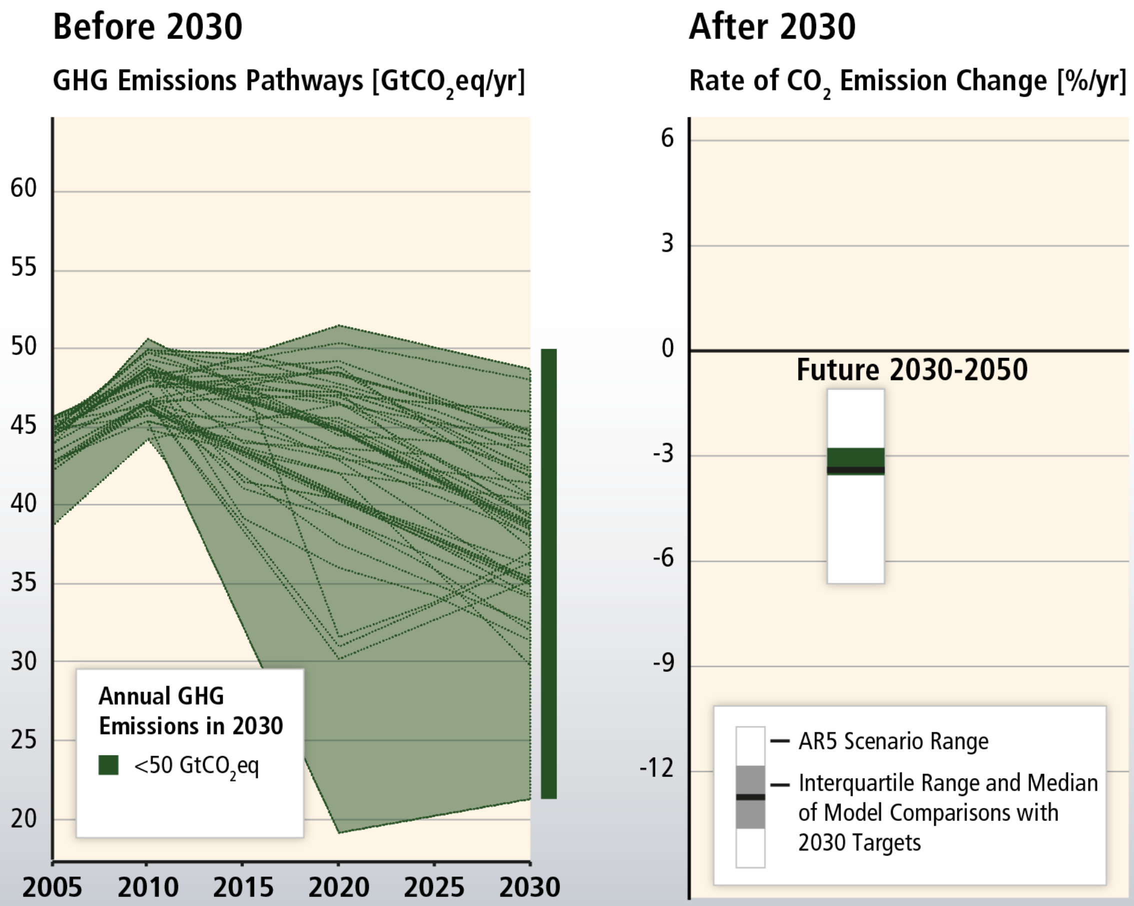



Actions over the next 5-15 years
will be critical

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

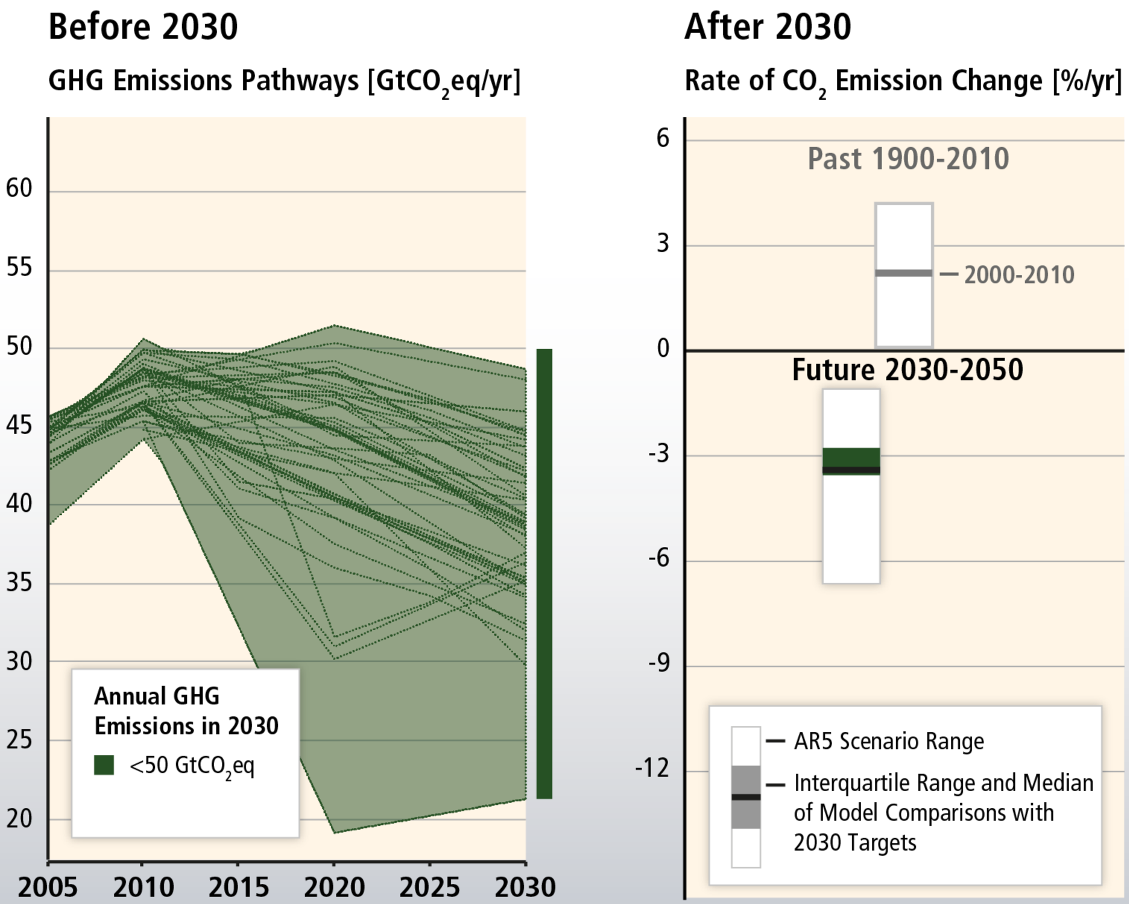


Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.



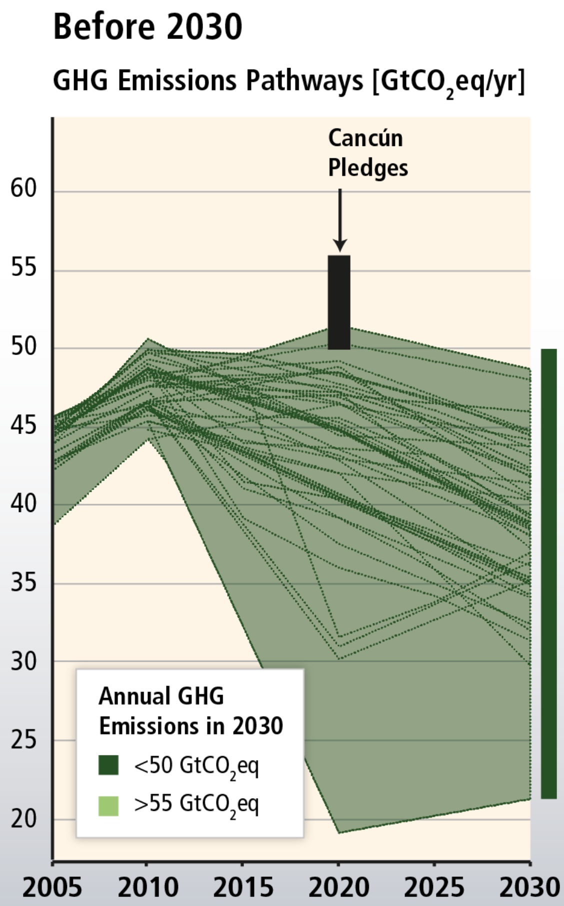
INTERGOVERNMENTAL PANEL ON climate change

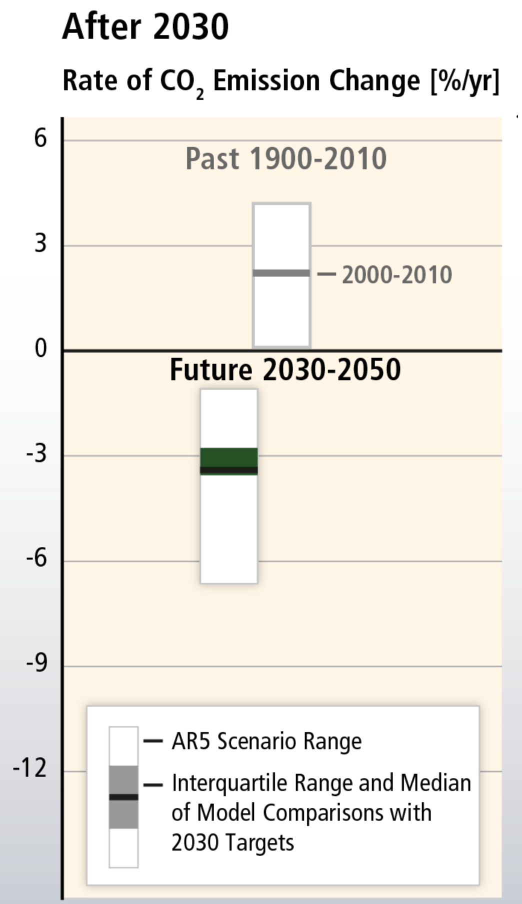
Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.



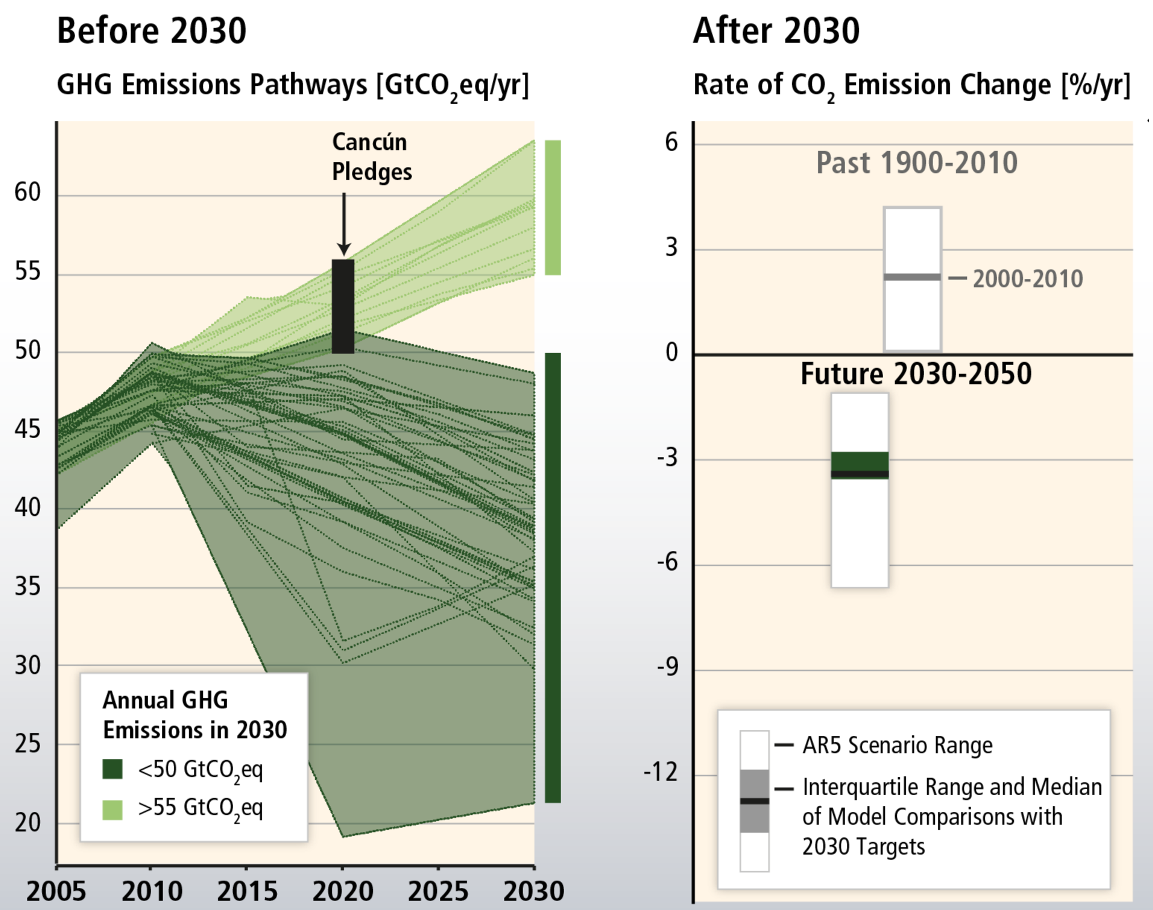
INTERGOVERNMENTAL PANEL ON climate change

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

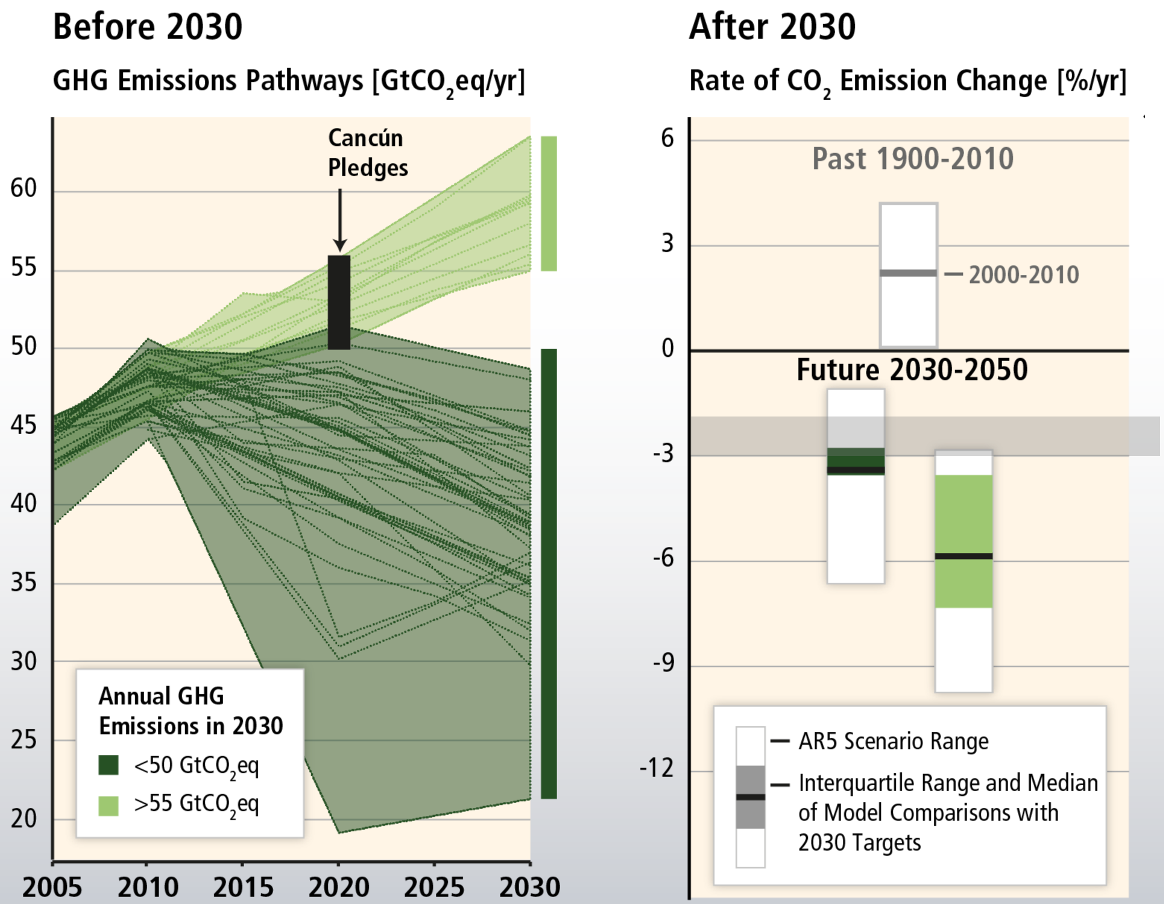




Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.

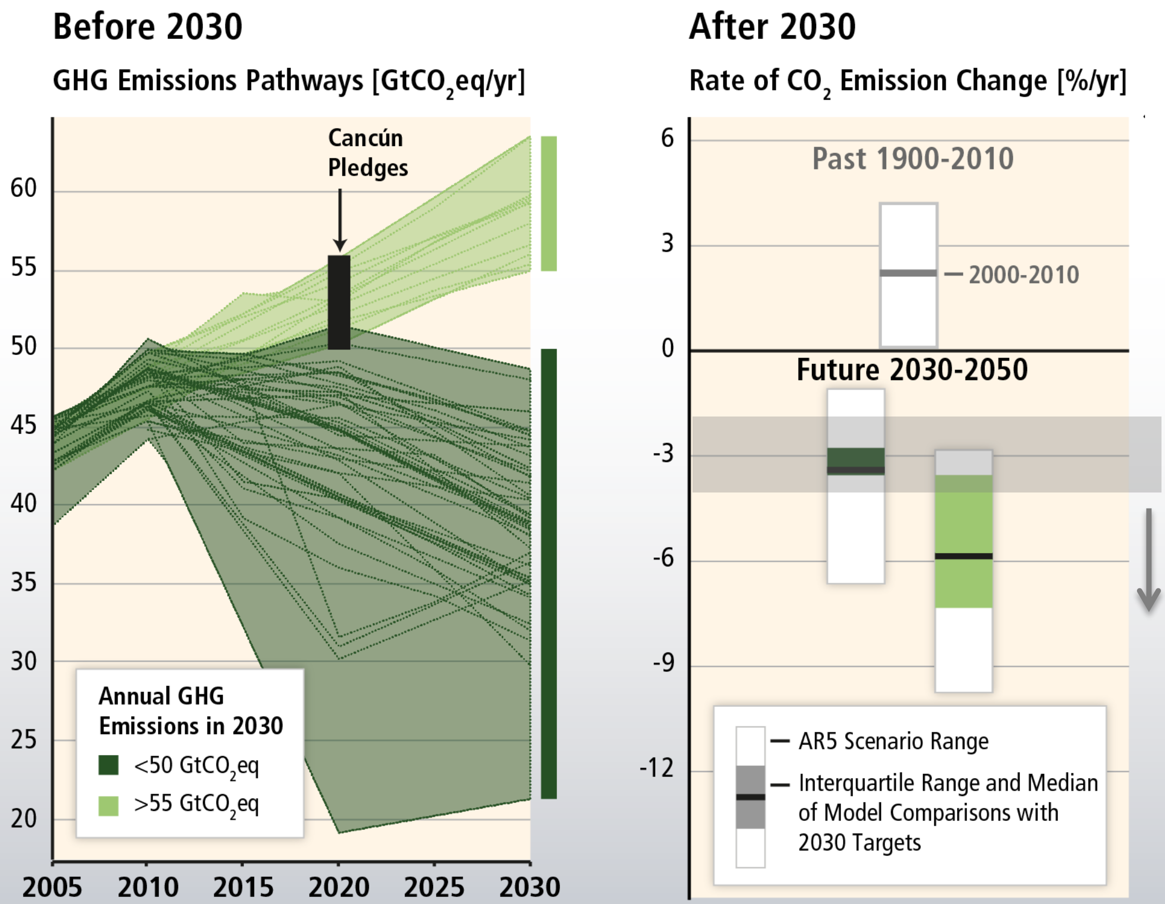


Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.



Sweden & France after the oil crisis

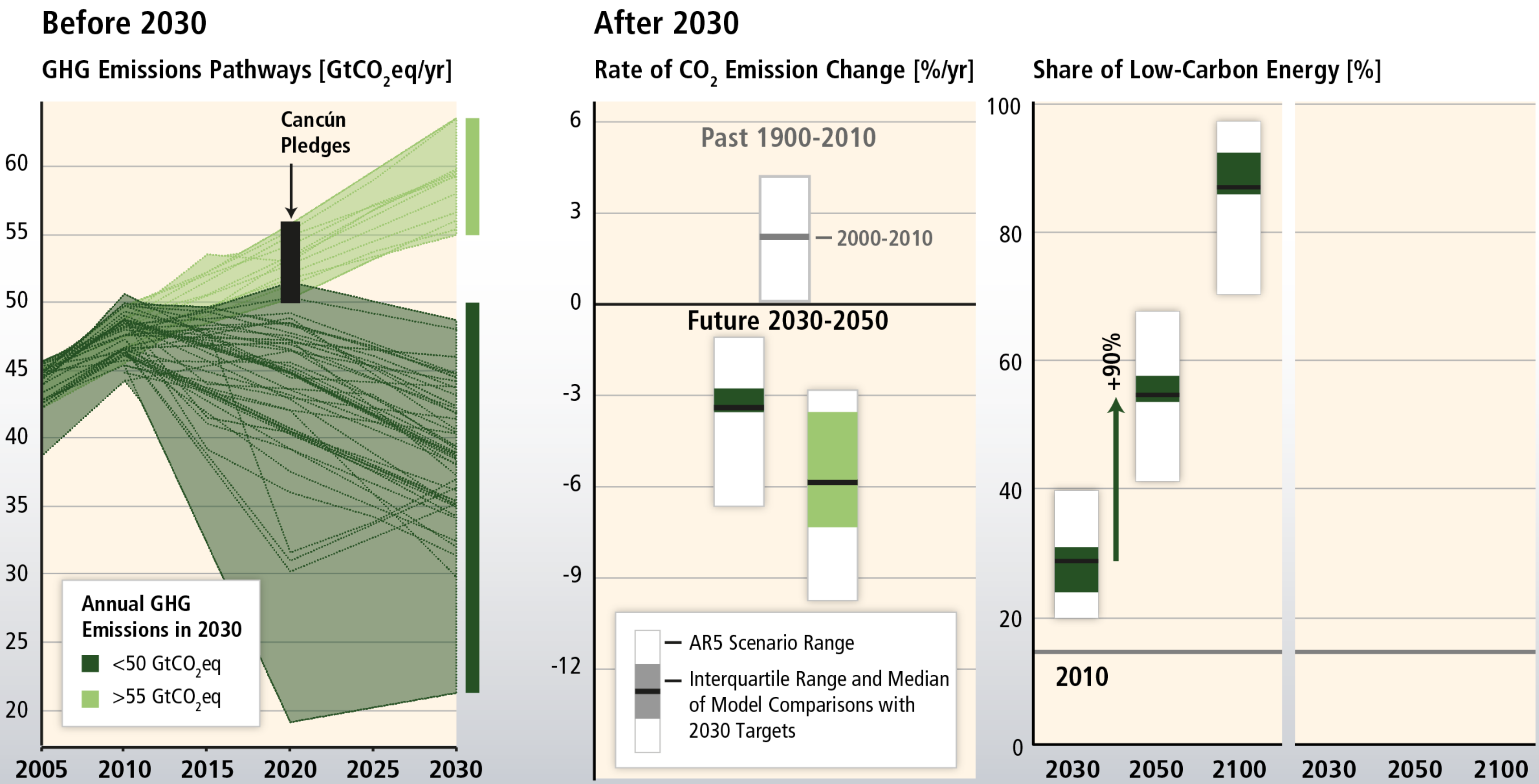
Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.



Collapse of the former Soviet Union

Europe WWI & II (>4%)

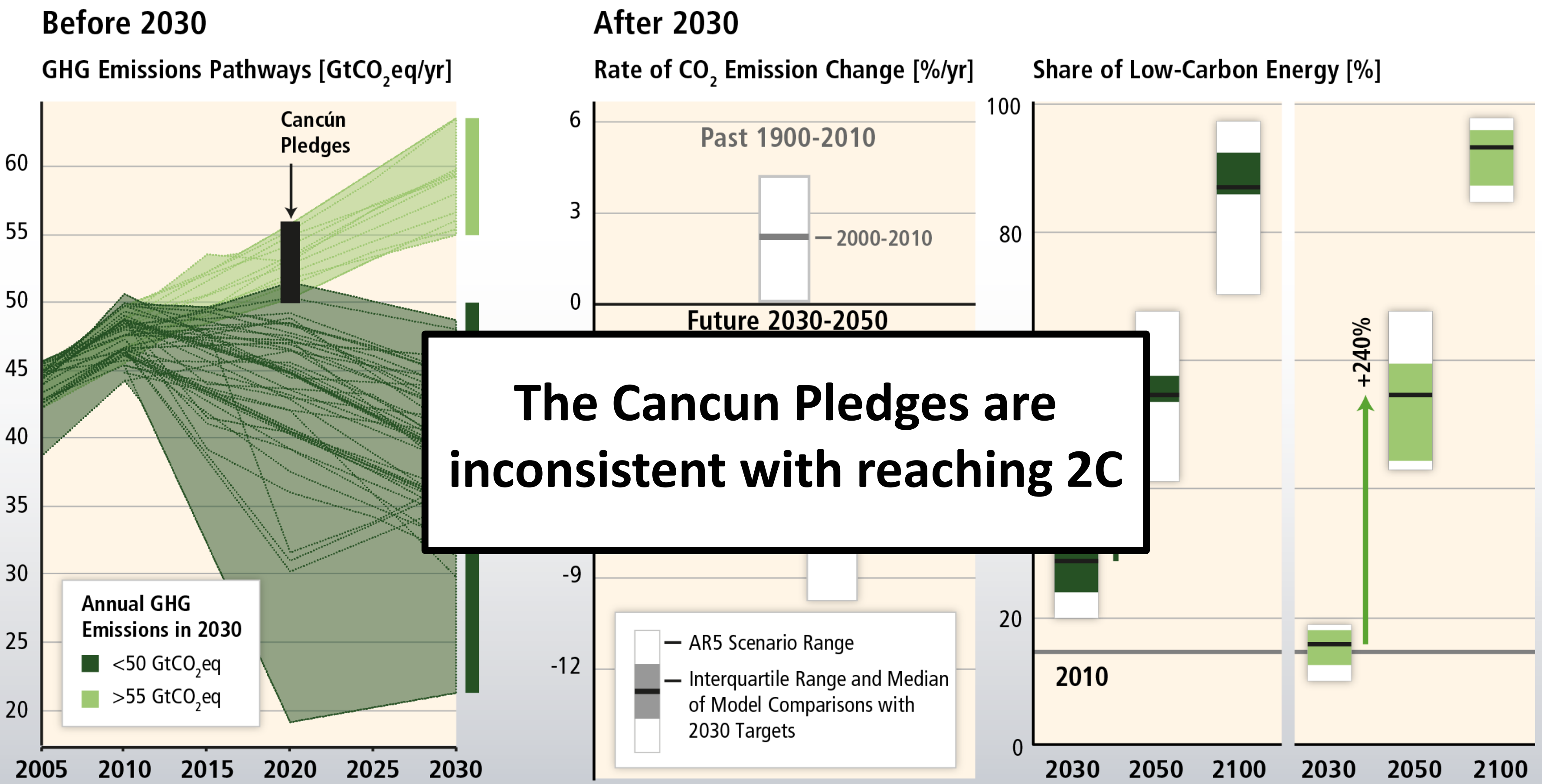
Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.



ipcc INTERGOVERNMENTAL PANEL ON climate change

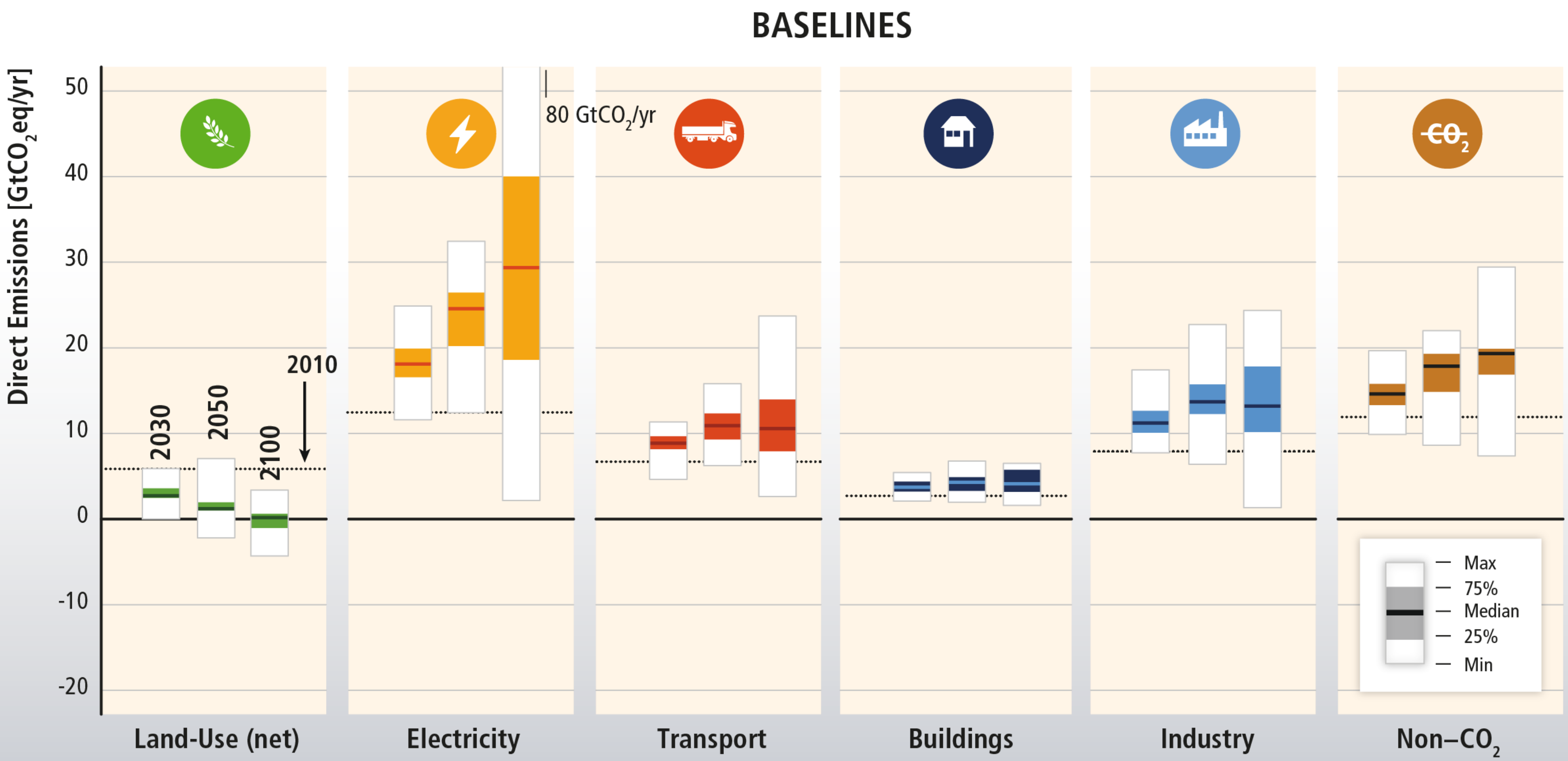
WMO UNEP

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

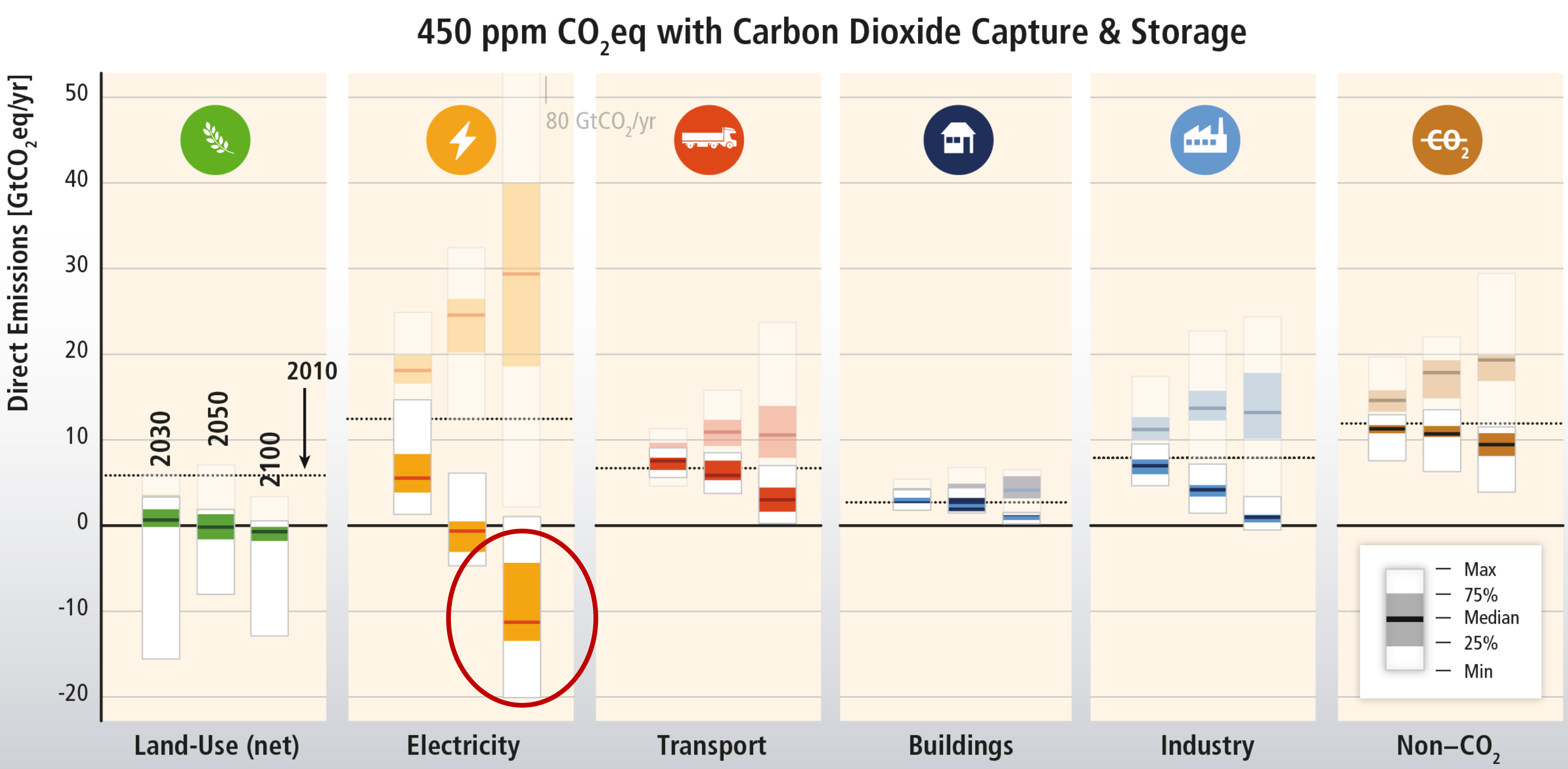


Reaching low stabilization requires rapid decarbonization of energy supply + efforts across all sectors

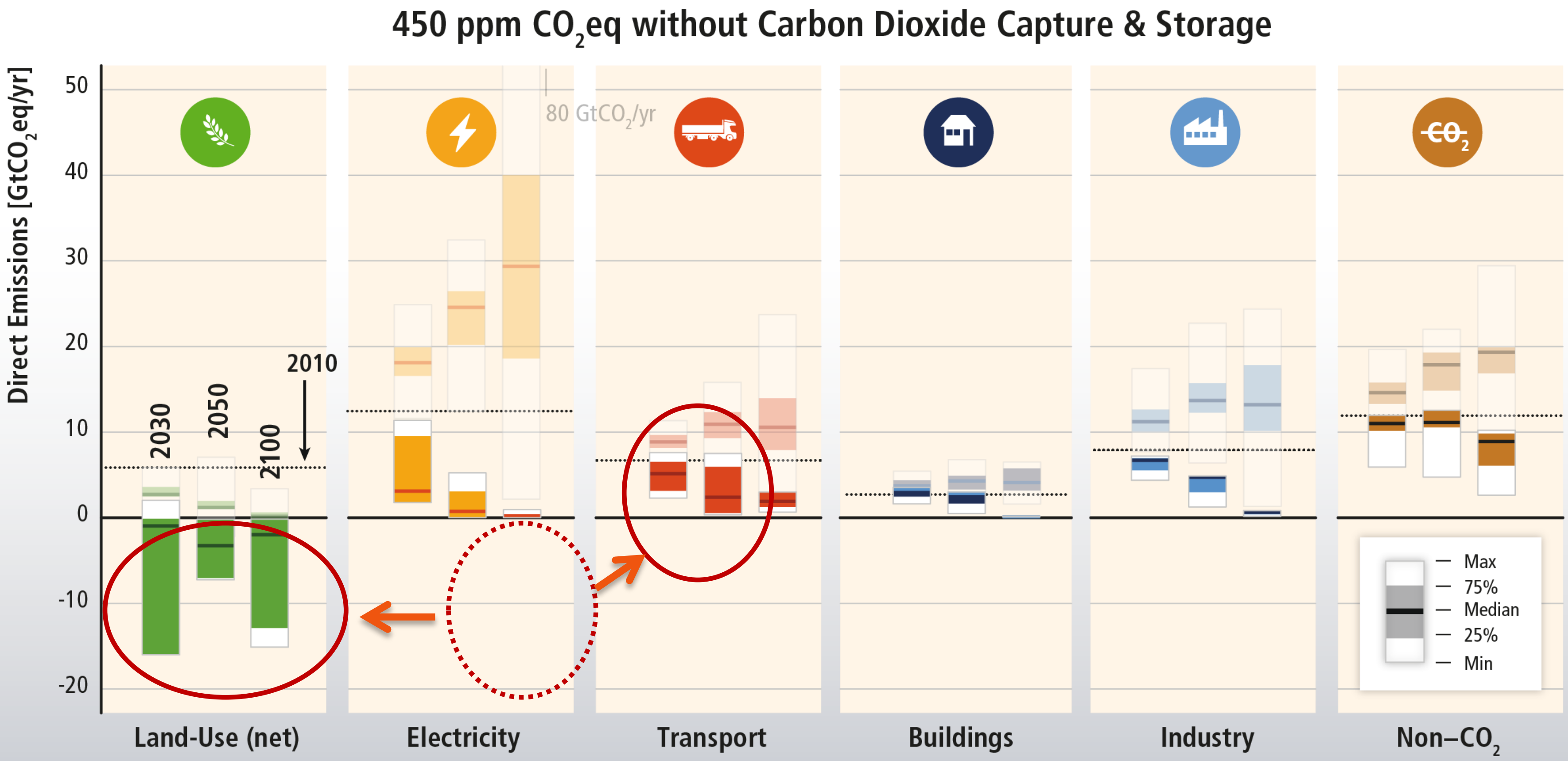
Mitigation requires changes throughout the economy. Efforts in one sector determine mitigation efforts in others.



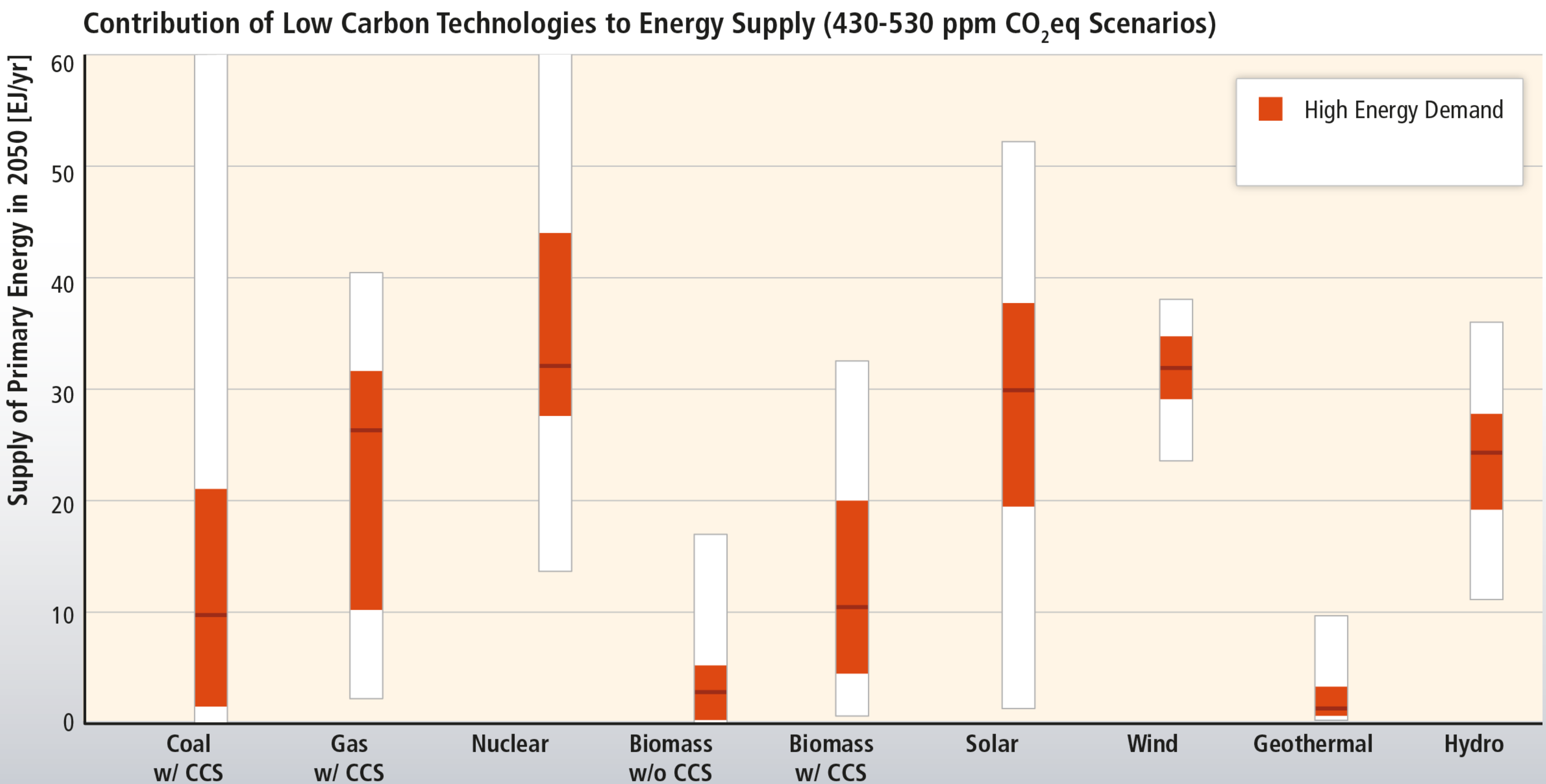
Mitigation requires changes throughout the economy. Efforts in one sector determine mitigation efforts in others.



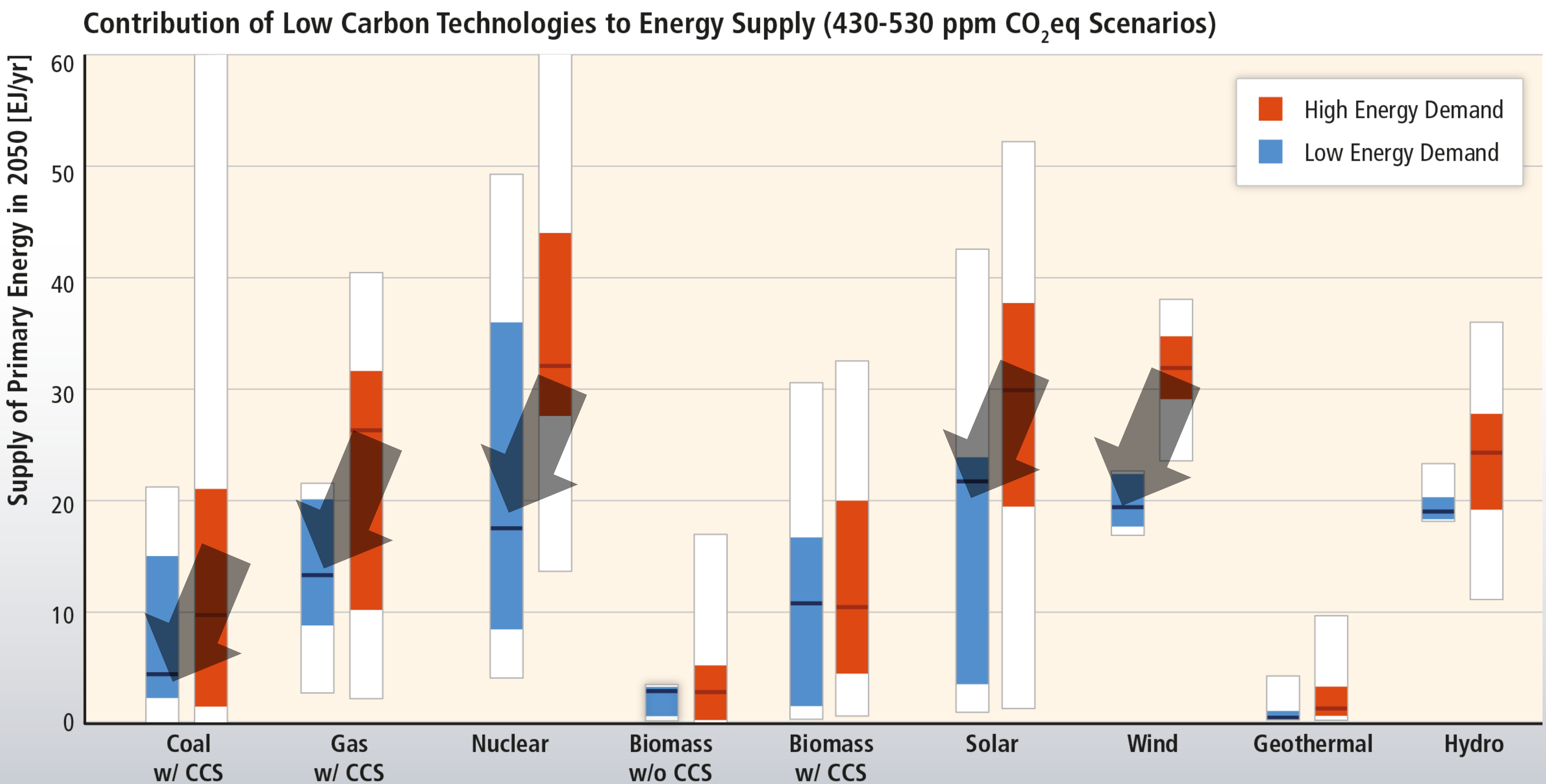
Mitigation requires changes throughout the economy. Efforts in one sector determine mitigation efforts in others.



Decarbonization of energy supply is a key requirement for stabilizing atmospheric CO_2eq concentrations below 580 ppm.

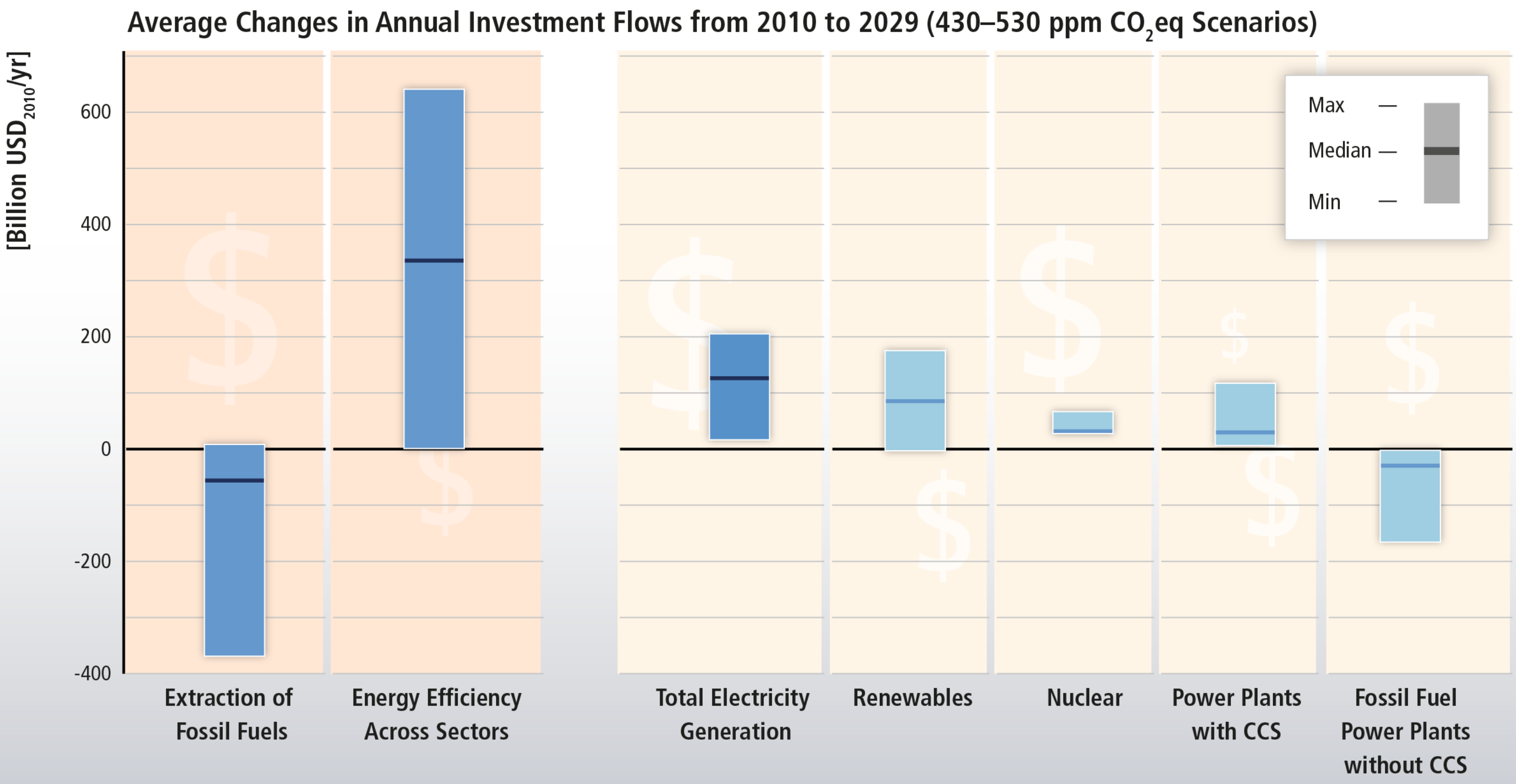


Decarbonization of energy supply is a key requirement for stabilizing atmospheric CO_2eq concentrations below 580 ppm.



Achieving low stabilization requires substantial investments, which can lead to co-benefits for other local or national policy objectives

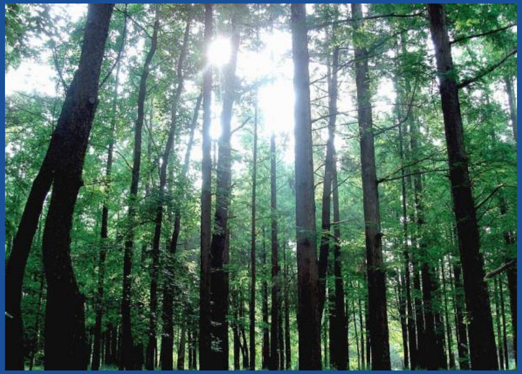
Substantial reductions in emissions would require large changes in investment patterns and appropriate policies.



Sustainable development means overcoming several energy challenges

Energy Poverty

Energy Security



Land Use & Forests

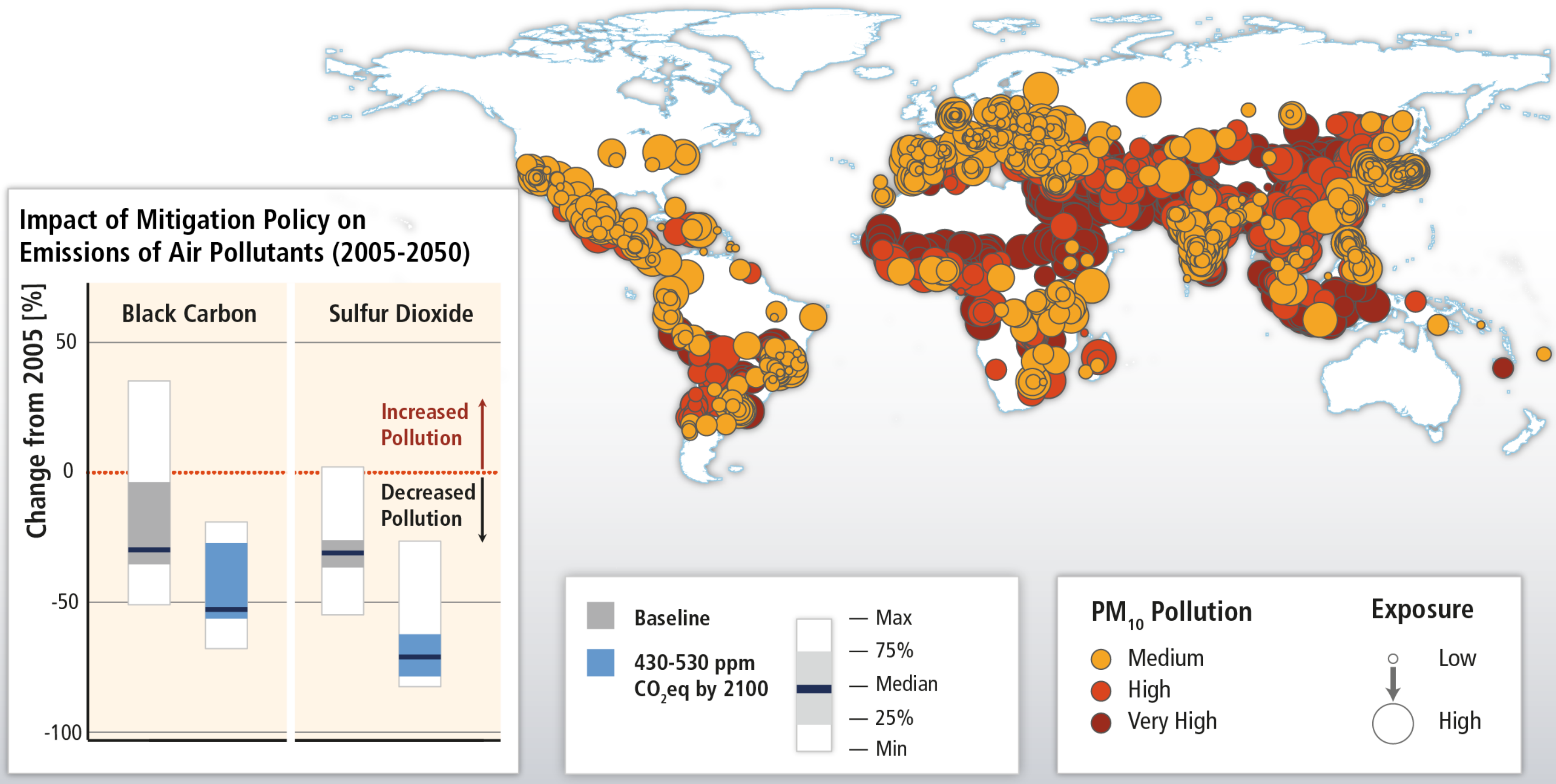
Climate Change

Water

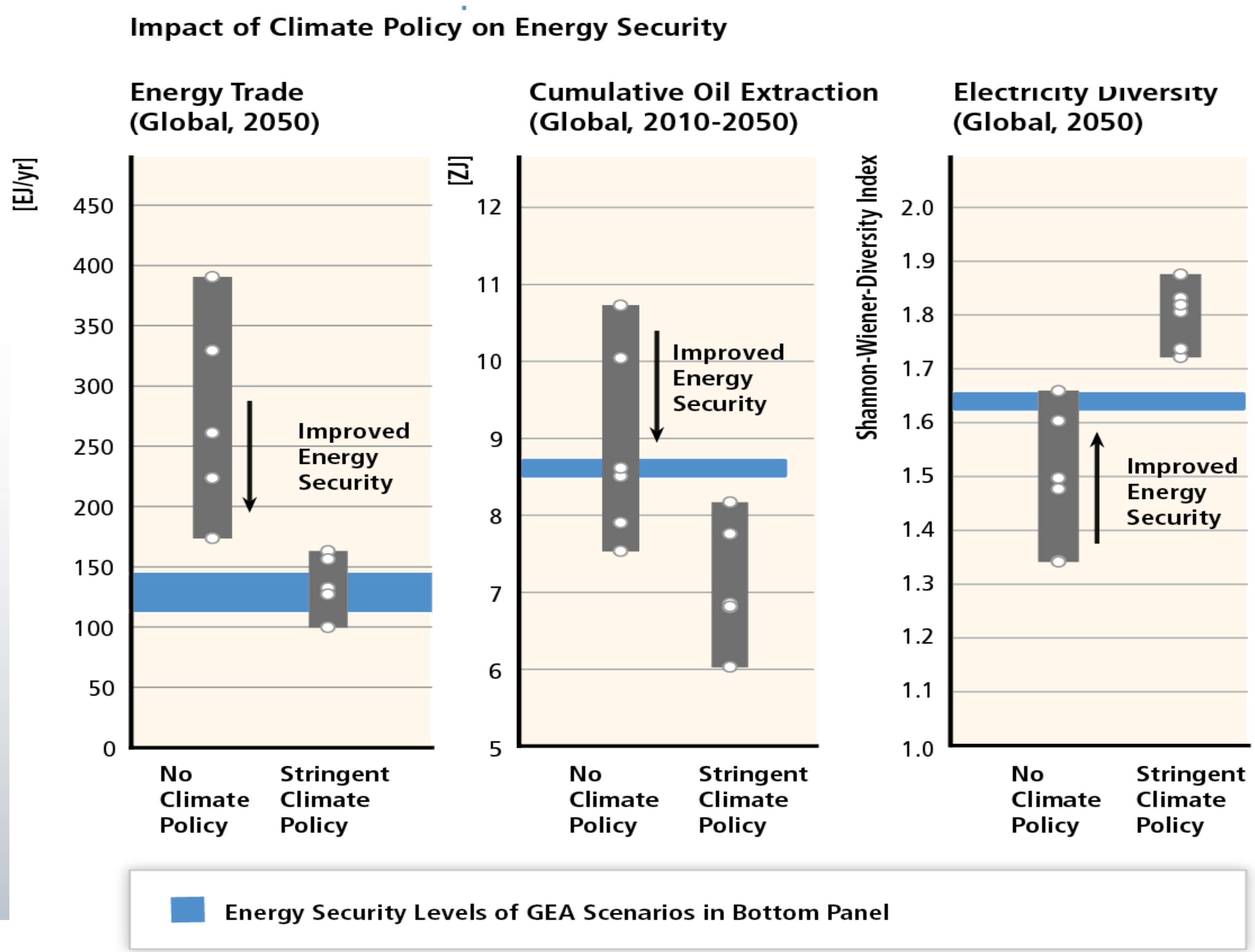
Air Pollution

Image sources: NASA, http://www.powernewsnetwork.com/white-house-releases-plan-to-cut-oil-imports-by-13-by-2025/1798/, http://wheresmyamerica.wordpress.com/2007/08/26/i-cant-see-my-america/, http://www.americanprogress.org/issues/green/report/2009/05/14/6142/energy-poverty-101/, http://today.uconn.edu/blog/2010/12/reclaiming-water-a-green-leap-forward/, http://te.wikipedia.org/wiki/%E0%B0%A6%E0%B0%B8%E0%B1%8D%E0%B0%A4%E0%B1%8D%E0%B0%B0%E0%B0%82:Forest_Osaka_Japan.jpg

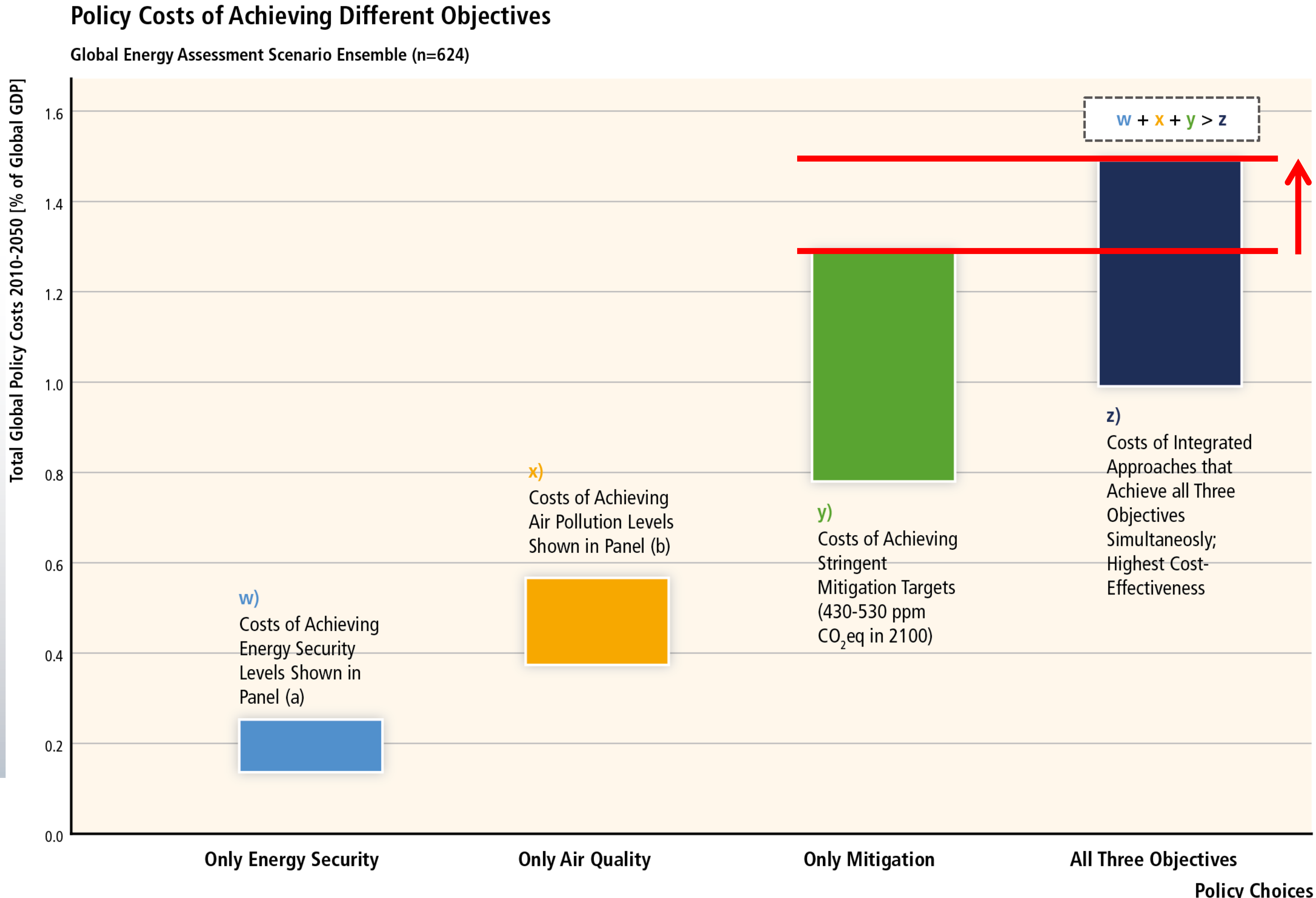
Mitigation can result in large co-benefits for human health and other societal goals.



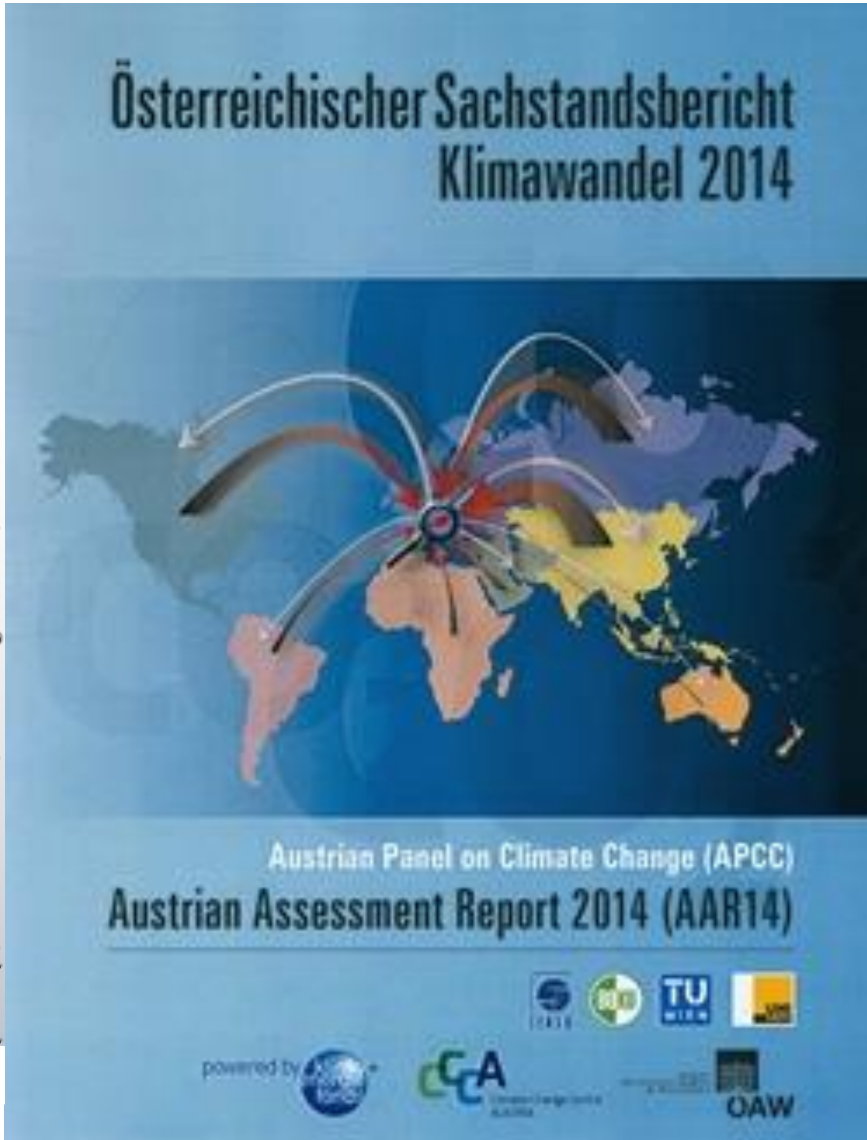
Mitigation can help to reduce energy security concerns

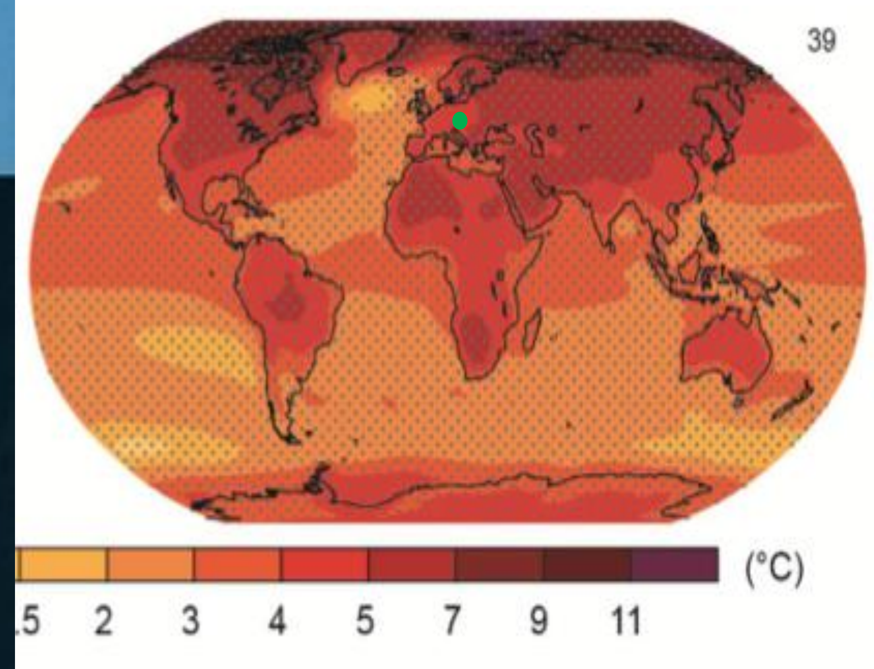


Integration across climate and other objectives is key for cost-effectivly addressing environmental challenges



APCC-AAR14: Austria in the context of global climate change





Change in average surface temperature
in case of high emissions
(1986–2005 to 2081–2100)

Kromp-Kolp, Nakicenovic, Steininger et al, 2014

Thank you!

riahi@iiasa.ac.at

IIASA-IPCC database:

https://secure.iiasa.ac.at/web-apps/ene/AR5DB