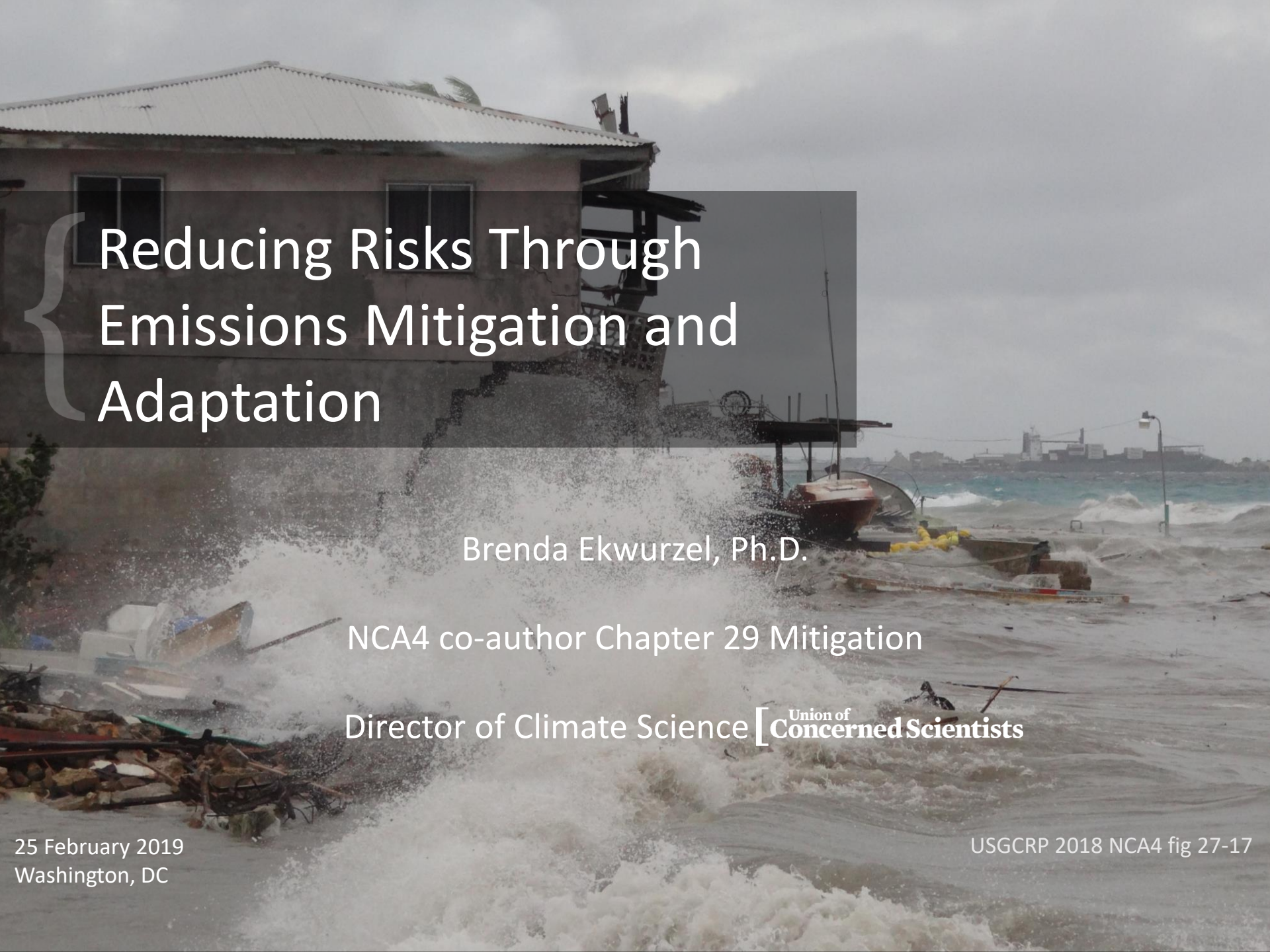


Reducing Risks Through Emissions Mitigation and Adaptation

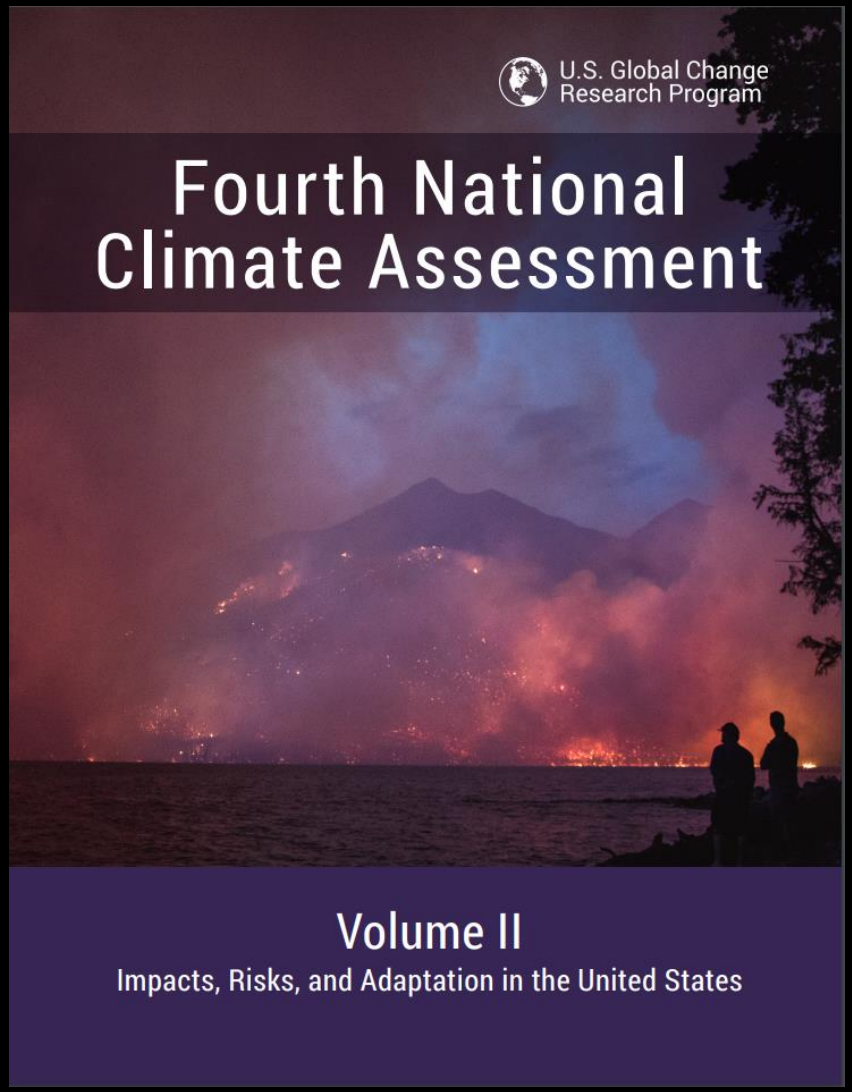
Brenda Ekwurzel, Ph.D.

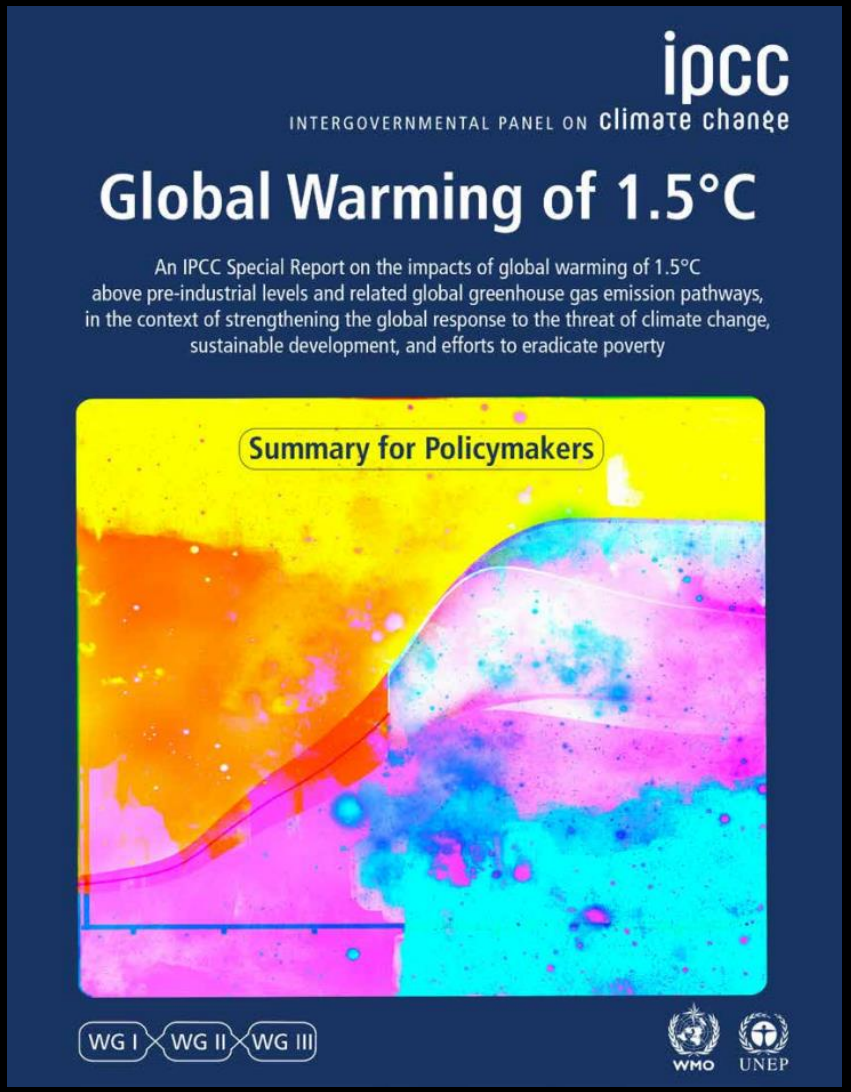
NCA4 co-author Chapter 29 Mitigation

Director of Climate Science [Union of Concerned Scientists

25 February 2019
Washington, DC

USGCRP 2018 NCA4 fig 27-17


U.S. Global Change Research Program
Fourth National Climate Assessment
Volume II
Impacts, Risks, and Adaptation in the United States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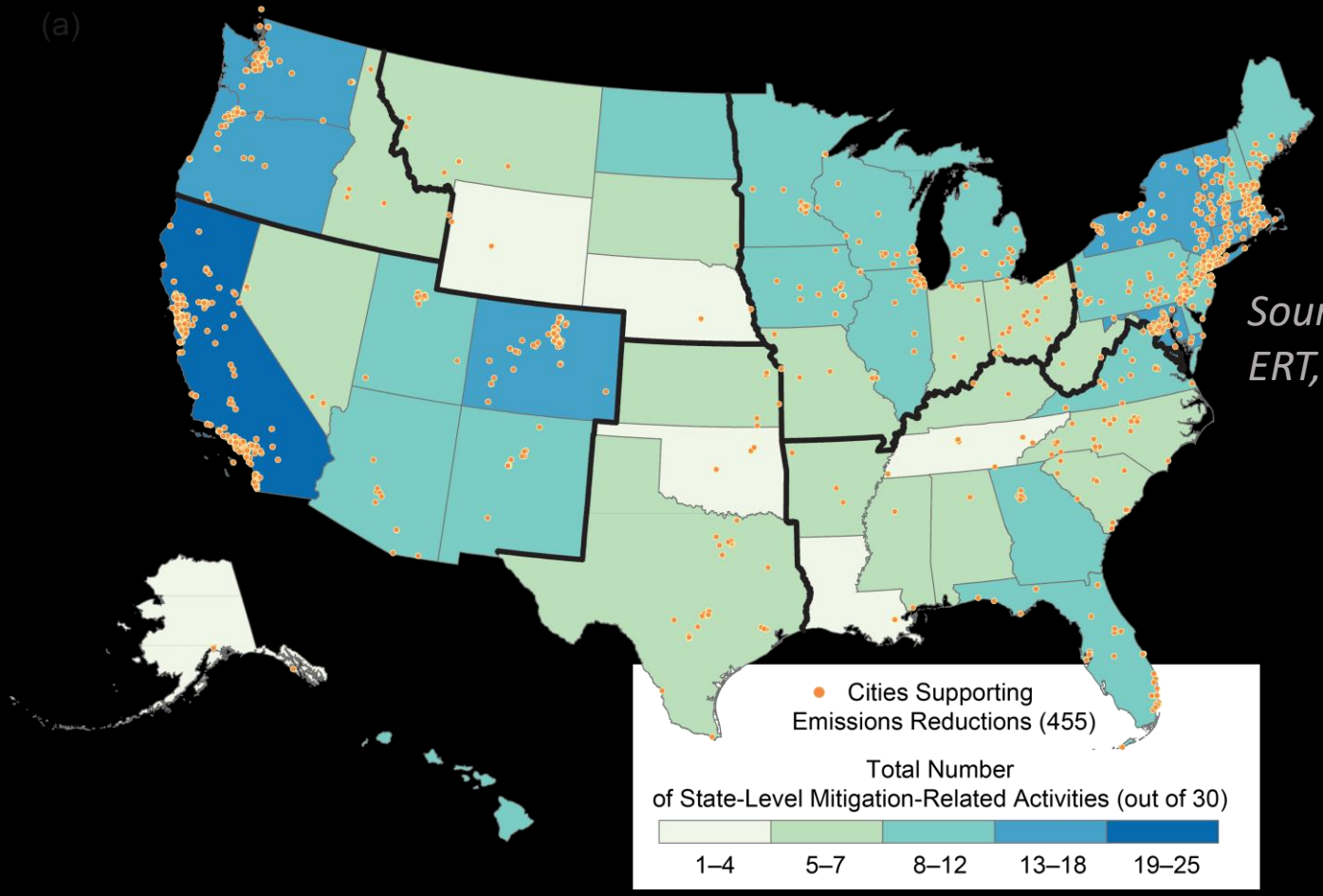
29

Key Message #1 Mitigation-Related Activities

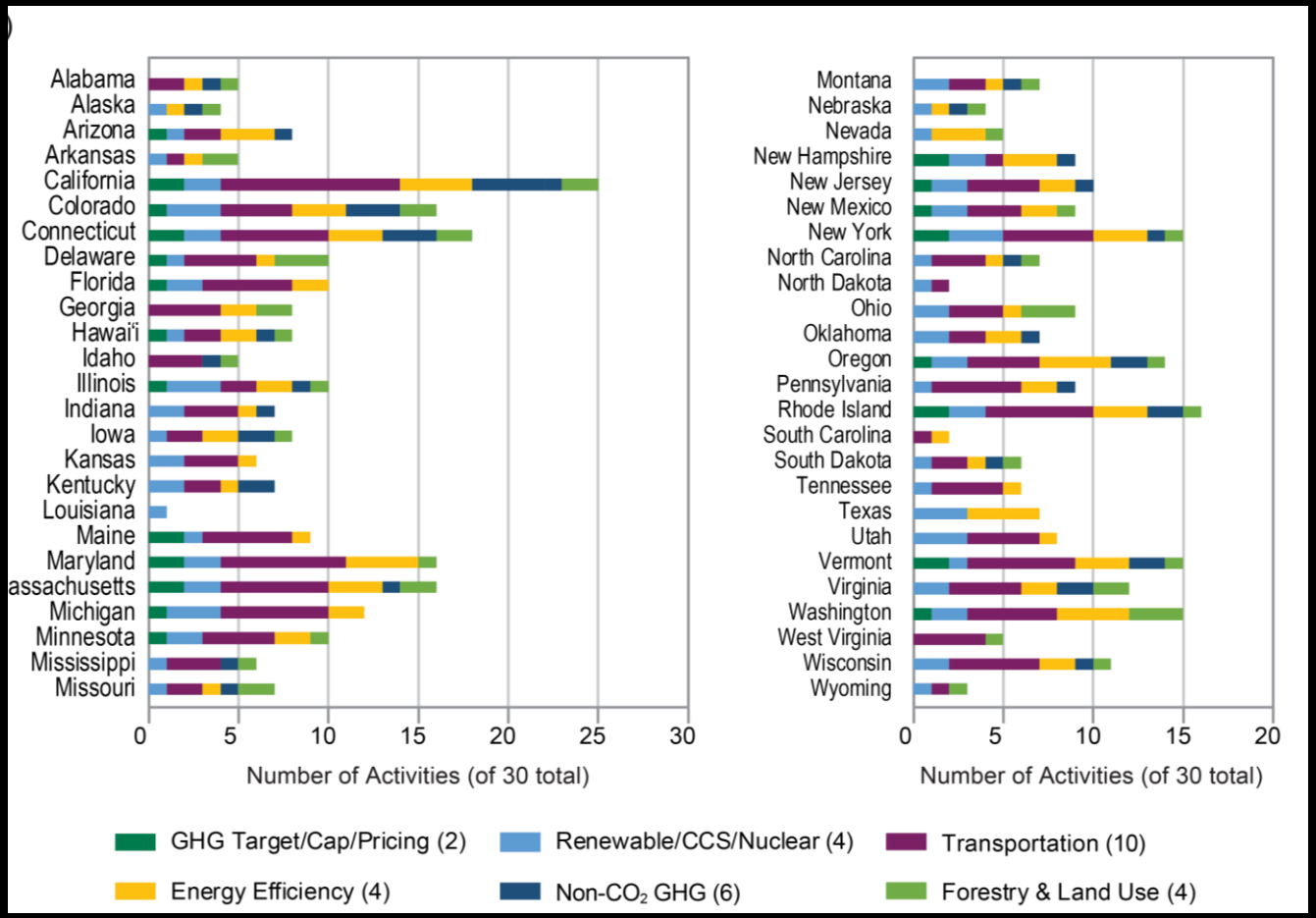
Mitigation-related activities are taking place across the United States at the federal, state, and local levels as well as in the private sector.



Sources: EPA and ERT, Inc.

29 Key Message #1 Mitigation-Related Activities

Since the Third National Climate Assessment, a growing number of states, cities, and businesses have pursued or deepened initiatives aimed at reducing emissions.

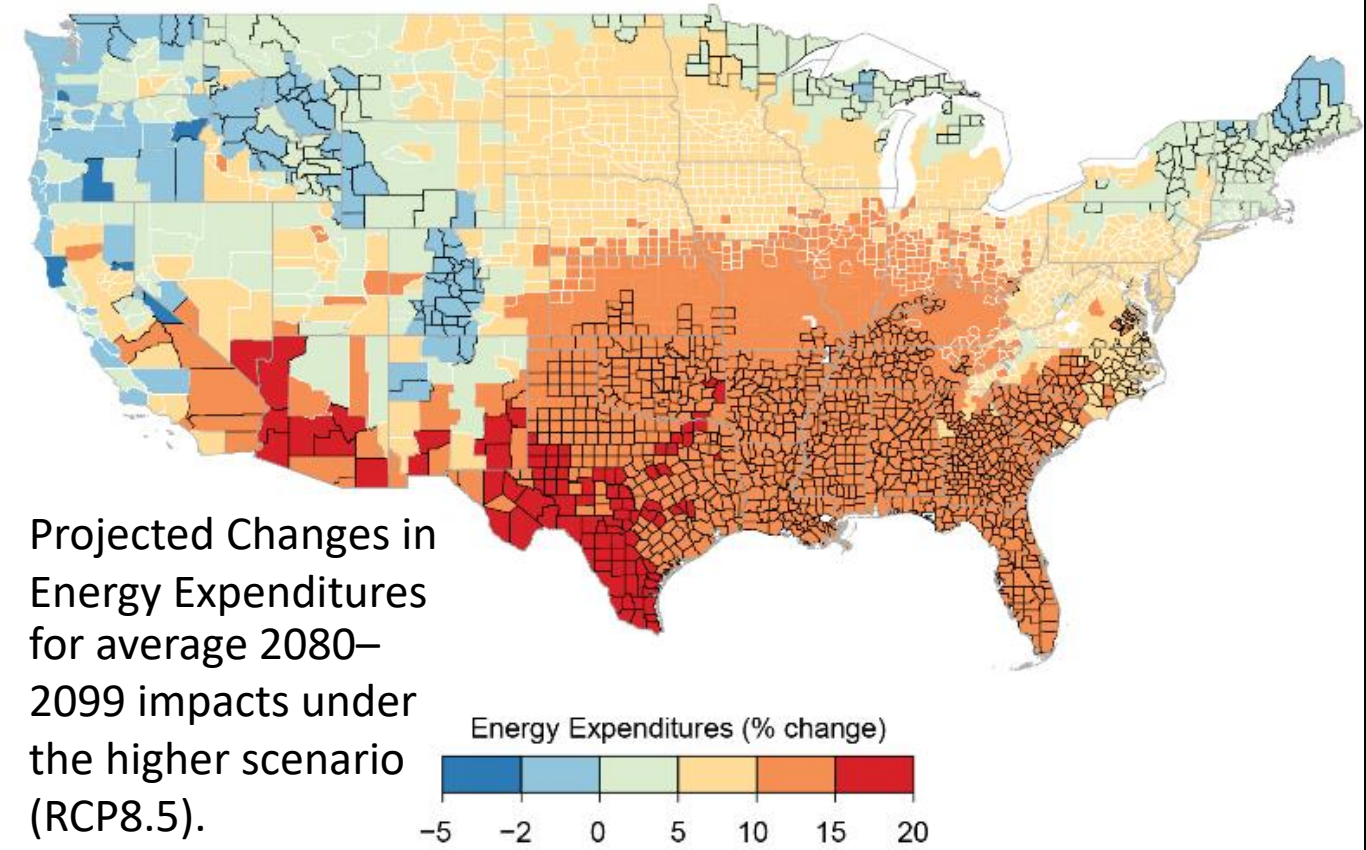


Sources: adapted from America's Pledge 2017

29

Key Message #2 The Risks of Inaction

In the absence of more significant global mitigation efforts, climate change is projected to impose substantial damages on the U.S. economy,



Projected Changes in Energy Expenditures for average 2080–2099 impacts under the higher scenario (RCP8.5).

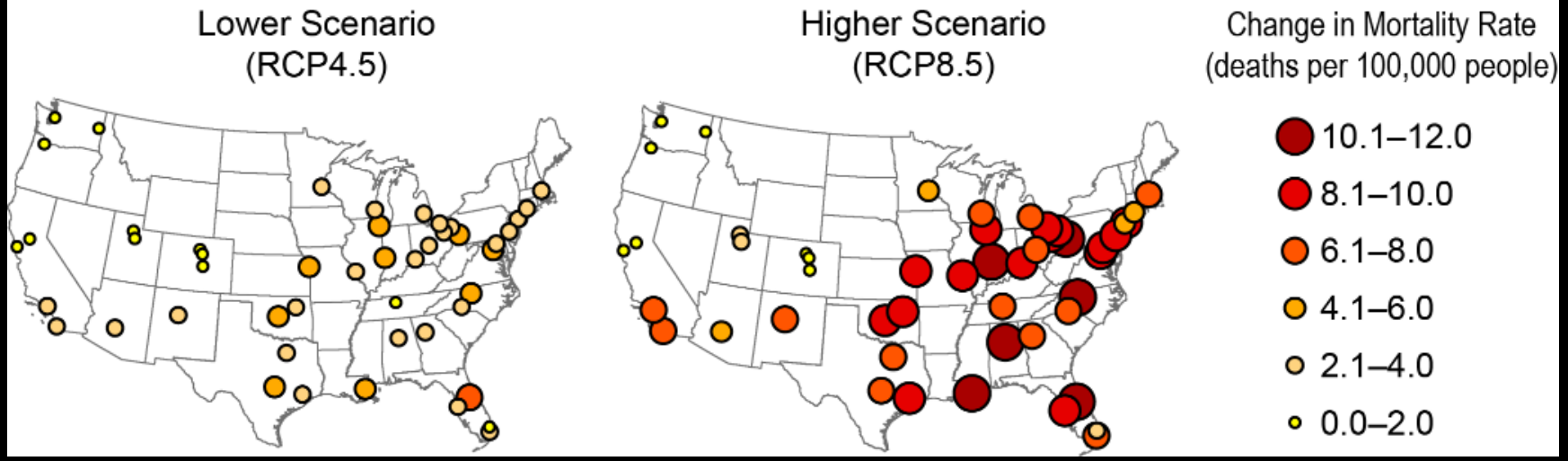
Source: Hsiang et al. 2017

29

Key Message #2 The Risks of Inaction

In the absence of more significant global mitigation efforts, climate change is projected to impose substantial damages on the U.S. economy, human health,

Net mortality due to extremely hot and cold days in 49 U.S. cities for 2080–2099 as compared to 1989–2000



+3,900 deaths each year

+9,300 deaths each year

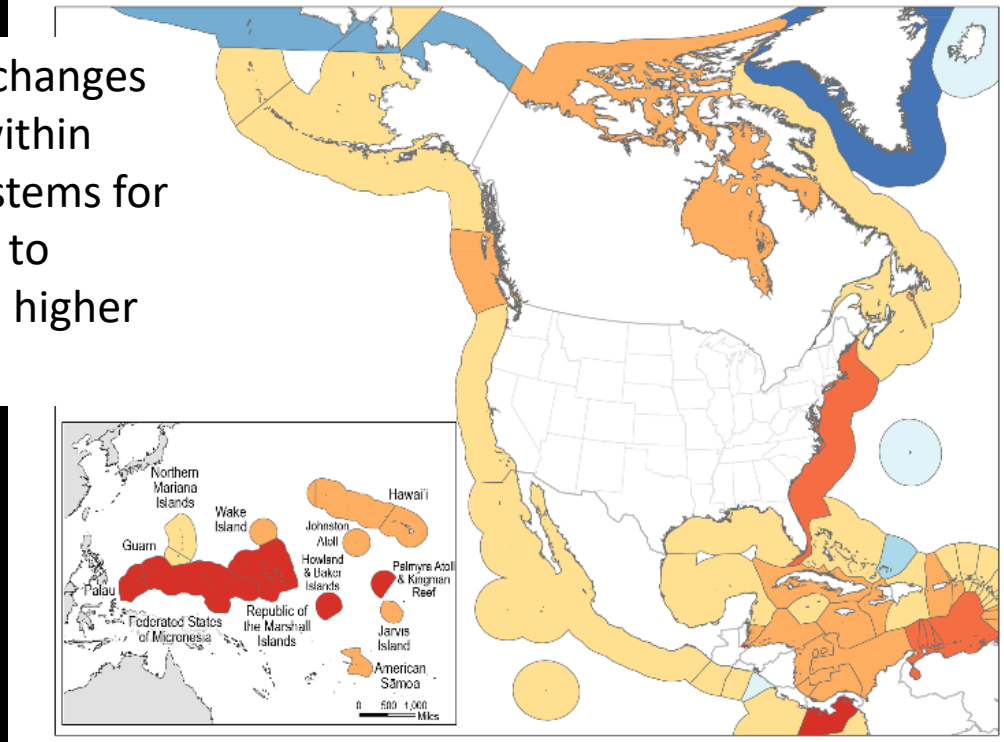
Source: adapted from EPA 2017

29

Key Message #2 The Risks of Inaction

In the absence of more significant global mitigation efforts, climate change is projected to impose substantial damages on the U.S. economy, human health, and the environment.

Average projected changes in fishery catches within large marine ecosystems for 2041–2060 relative to 1991–2010 under a higher scenario (RCP8.5).



Source: adapted from Lam et al. 2016

29

Key Message #2

The Risks of Inaction

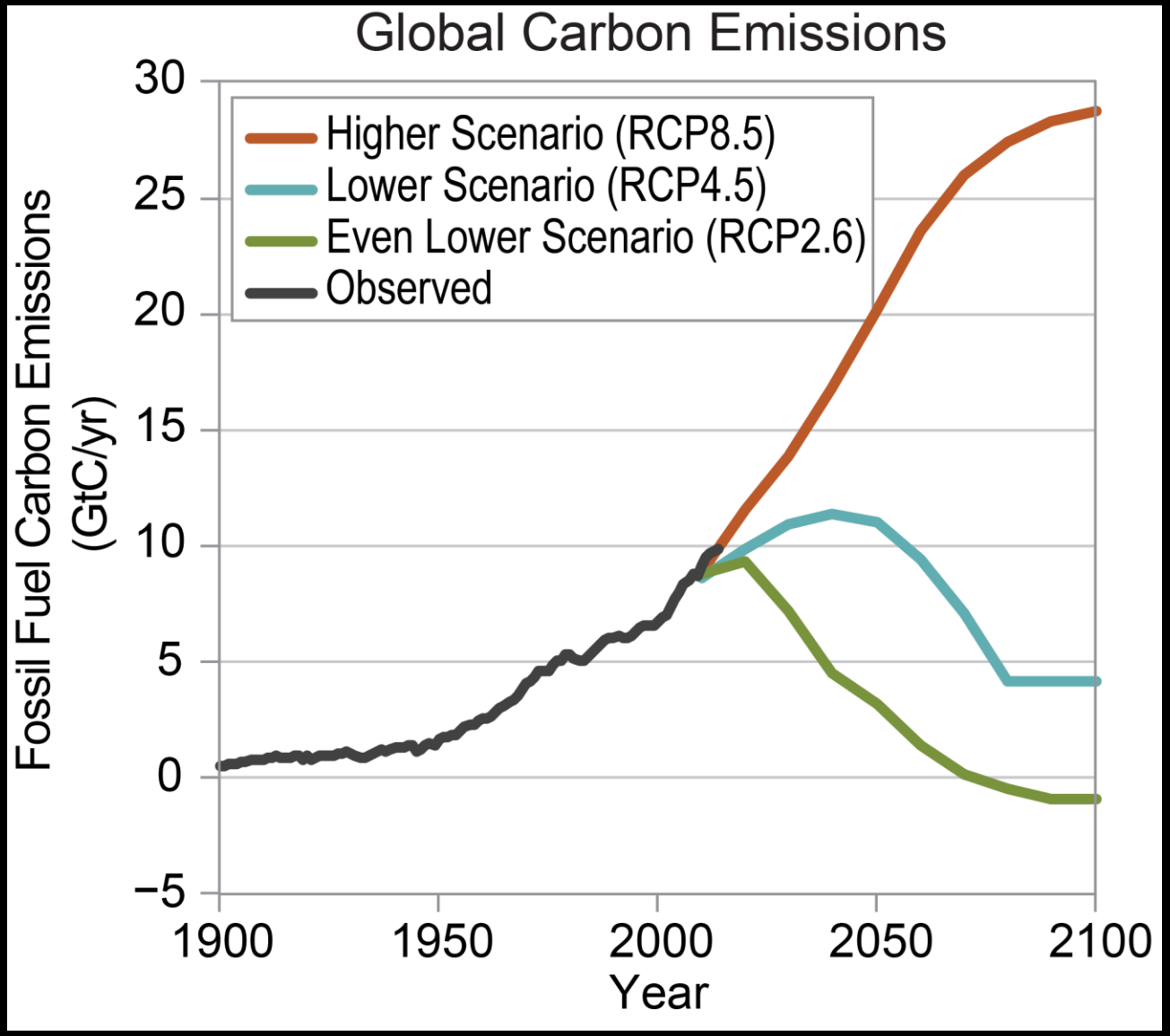
Under scenarios with high emissions and limited or no adaptation, annual losses in some sectors are estimated to grow to hundreds of billions of dollars by the end of the century.

Annual Economic Damages in 2090	
Sector	**Annual damages under RCP8.5**
Labor	$155B
Extreme Temperature Mortality◊	$141B
Coastal Property◊	$118B
Air Quality	$26B
Roads◊	$20B
Electricity Supply and Demand	$9B
Inland Flooding	$8B
Urban Drainage	$6B
Rail◊	$6B
Water Quality	$5B
Coral Reefs	$4B
West Nile Virus	$3B
Freshwater Fish	$3B
Winter Recreation	$2B
Bridges	$1B
Munic. and Industrial Water Supply	$316M
Harmful Algal Blooms	$199M
Alaska Infrastructure◊	$174M
Shellfish*	$23M
Agriculture*	$12M
Aeroallergens*	$1M

(in 2015 dollars)

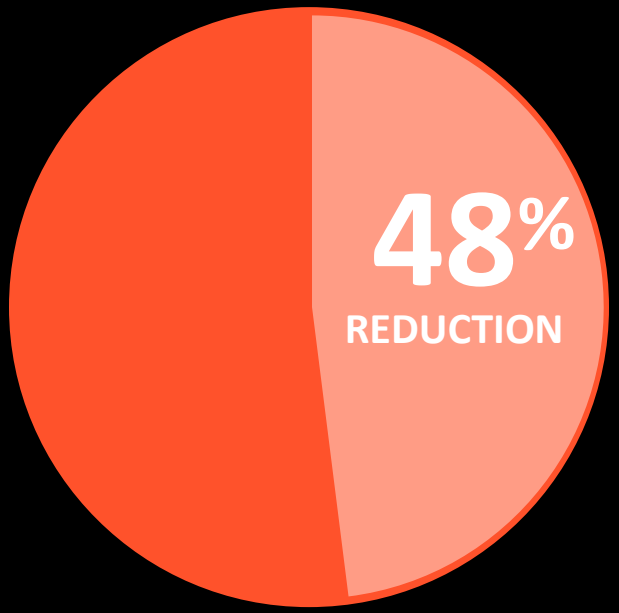
Source: adapted from EPA 2017

Projections based on future emissions scenarios

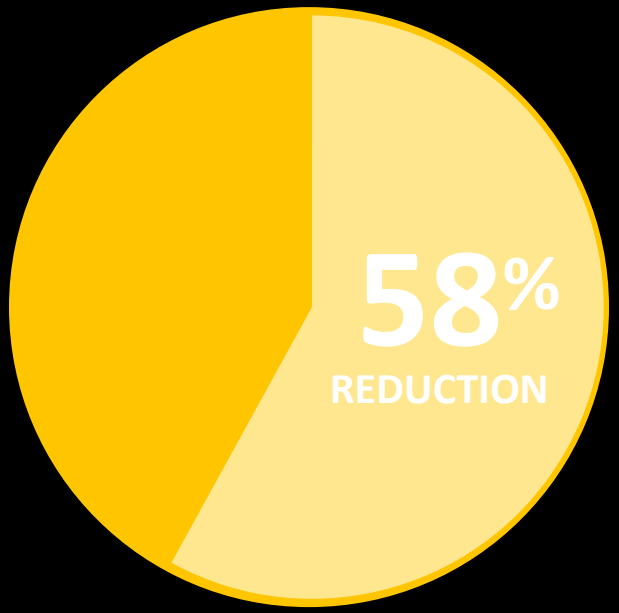


Adapted from Wuebbles et al. 2017

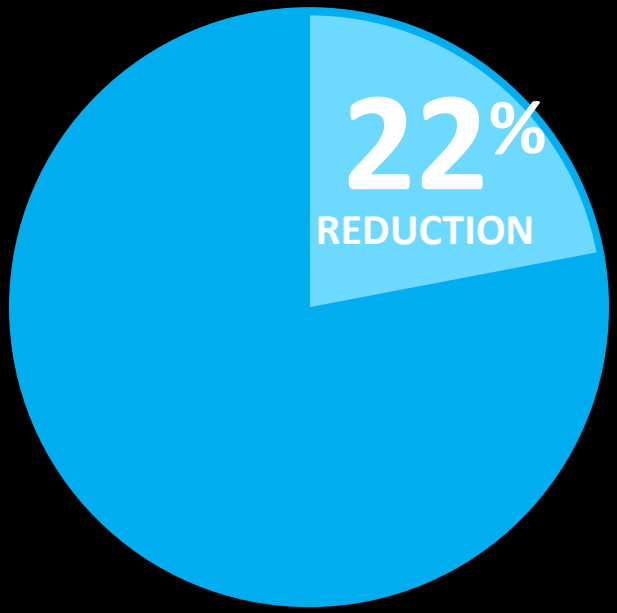
LABOR



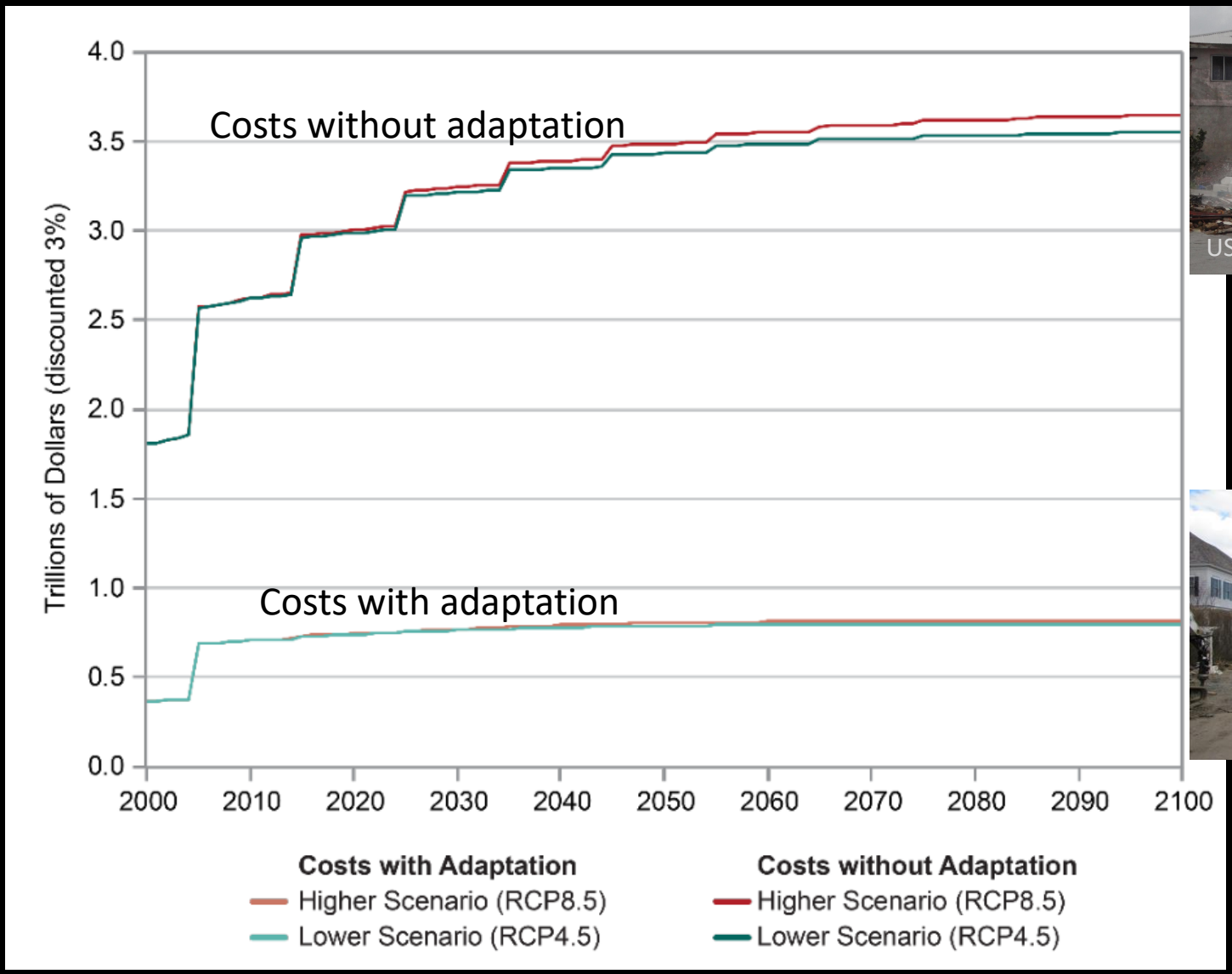
EXTREME TEMPERATURE MORTALITY



COASTAL PROPERTY



Cumulative costs of sea level rise and storm surge

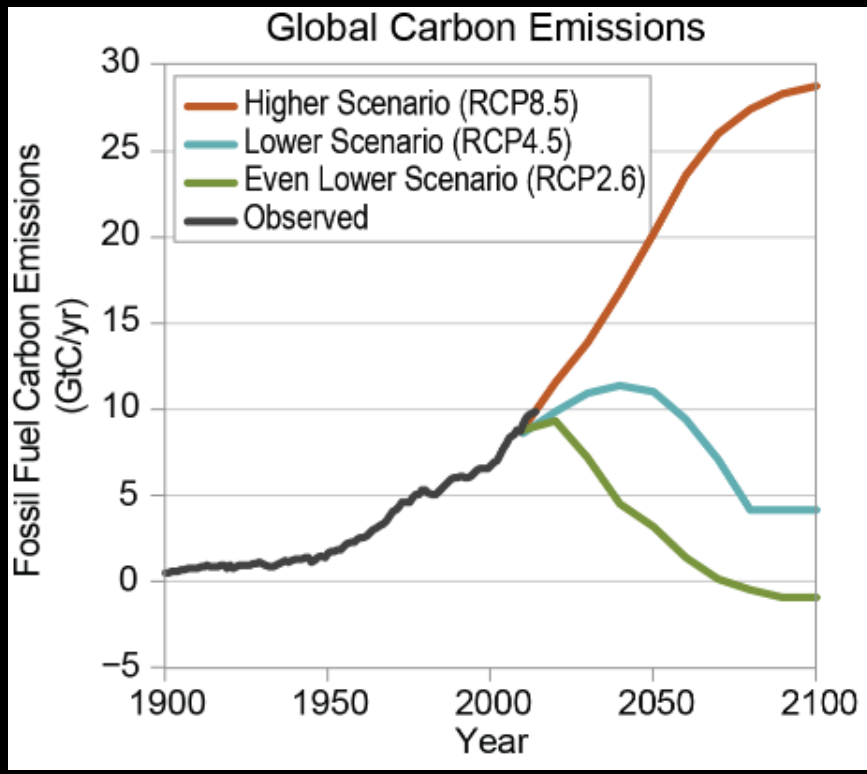


NCA4; Volume II, Ch. 8

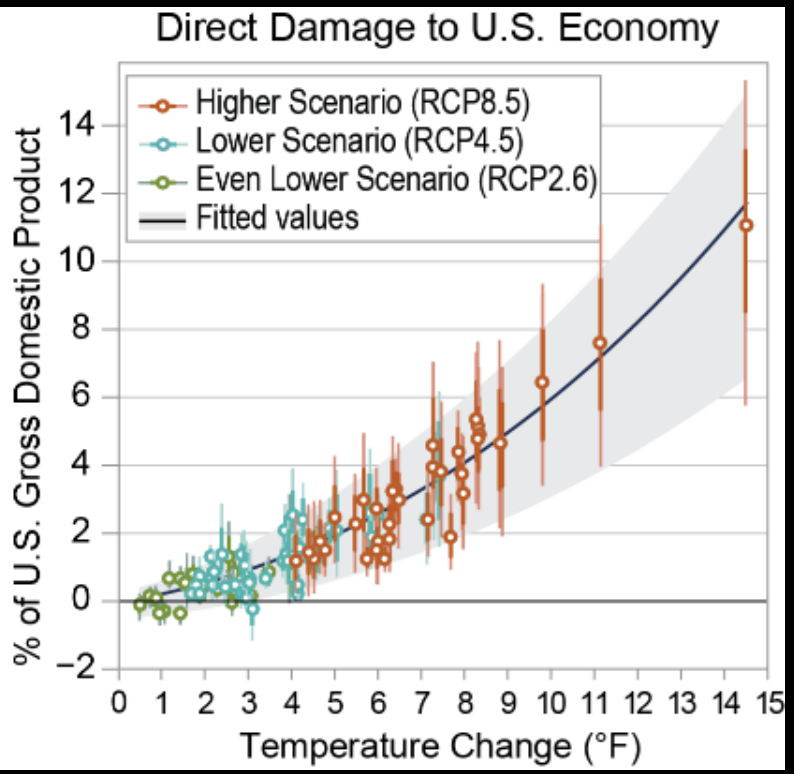
29

Key Message #3 Avoided or Reduced Impacts

The effect of near-term emissions mitigation on reducing risks is expected to become apparent by mid-century and grow substantially thereafter.



Adapted from Wuebbles et al. 2017

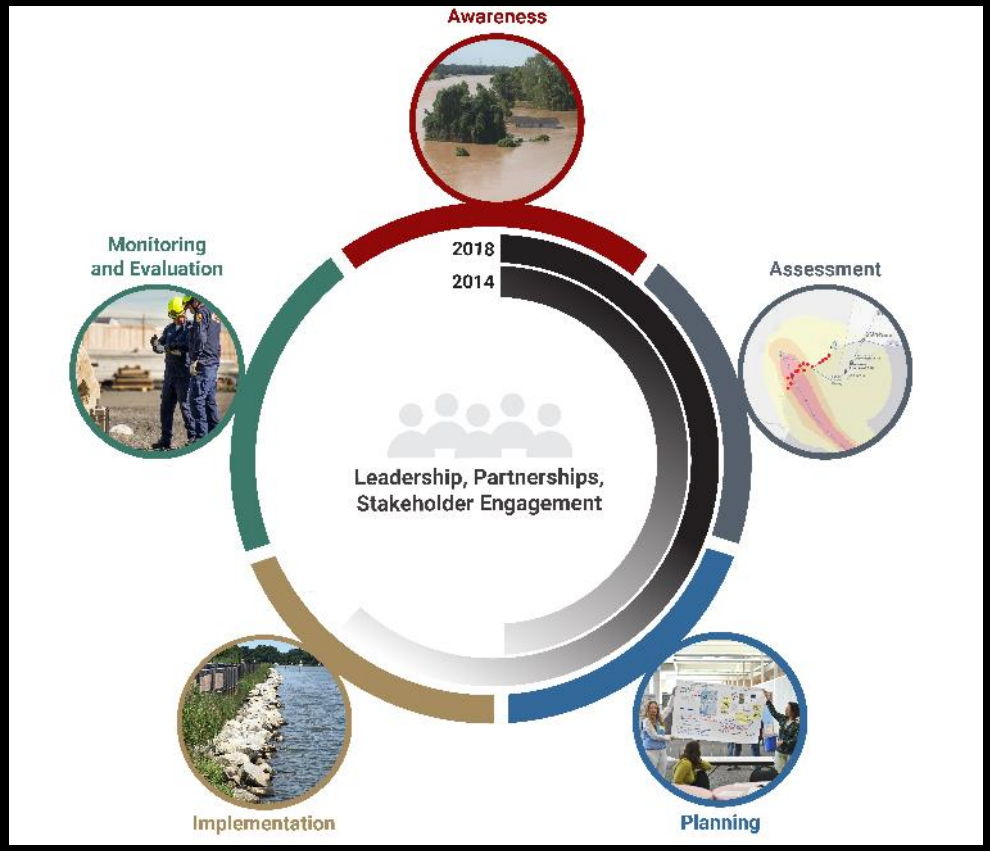


Adapted from Hsiang et al. 2017[3] and republished with permission AAAS

29 Key Message #4

Interactions Between Mitigation and Adaptation

Interactions between mitigation and adaptation are complex and can lead to benefits, but they also have the potential for adverse consequences.



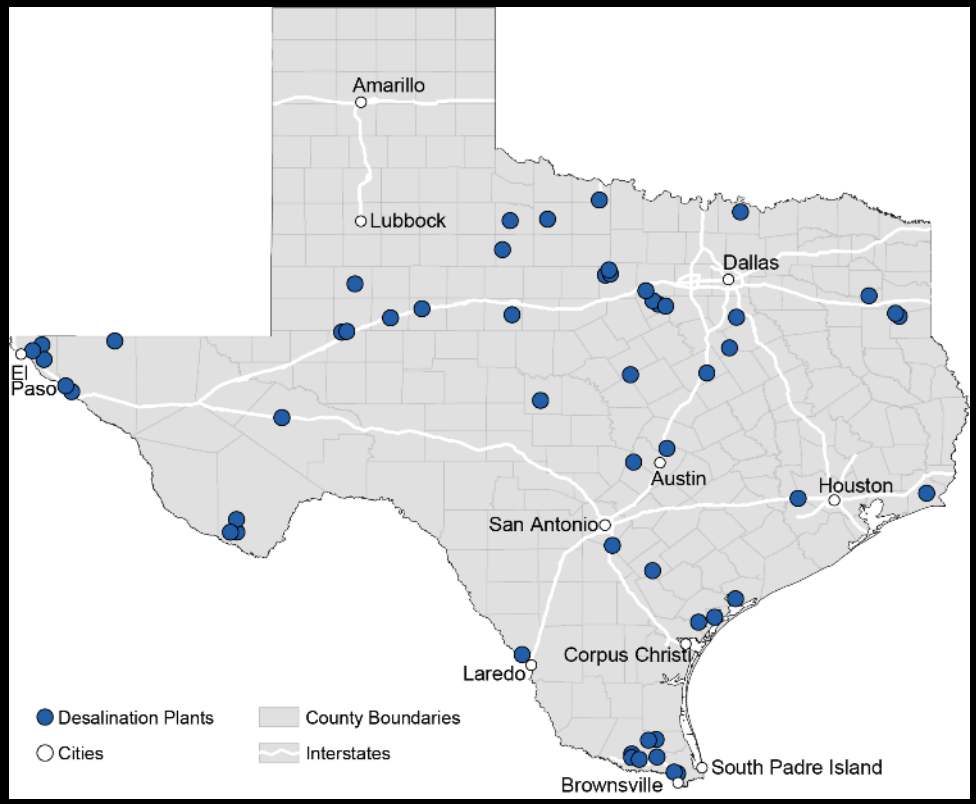
Source: adapted from National Research Council, 2010.[1] Used with permission from the National Academies Press, ©2010, National Academy of Sciences. Image credits, clockwise from top: National Weather Service; USGS; Armando Rodriguez, Miami-Dade County; Dr. Neil Berg, MARISA; Bill Ingalls, NASA.

29 Key Message #4

Interactions Between Mitigation and Adaptation

Adaptation can complement mitigation to substantially reduce exposure and vulnerability to climate change in some sectors.

Texas Desalination Plants



Source: adapted from Texas Water Development Board 2017.

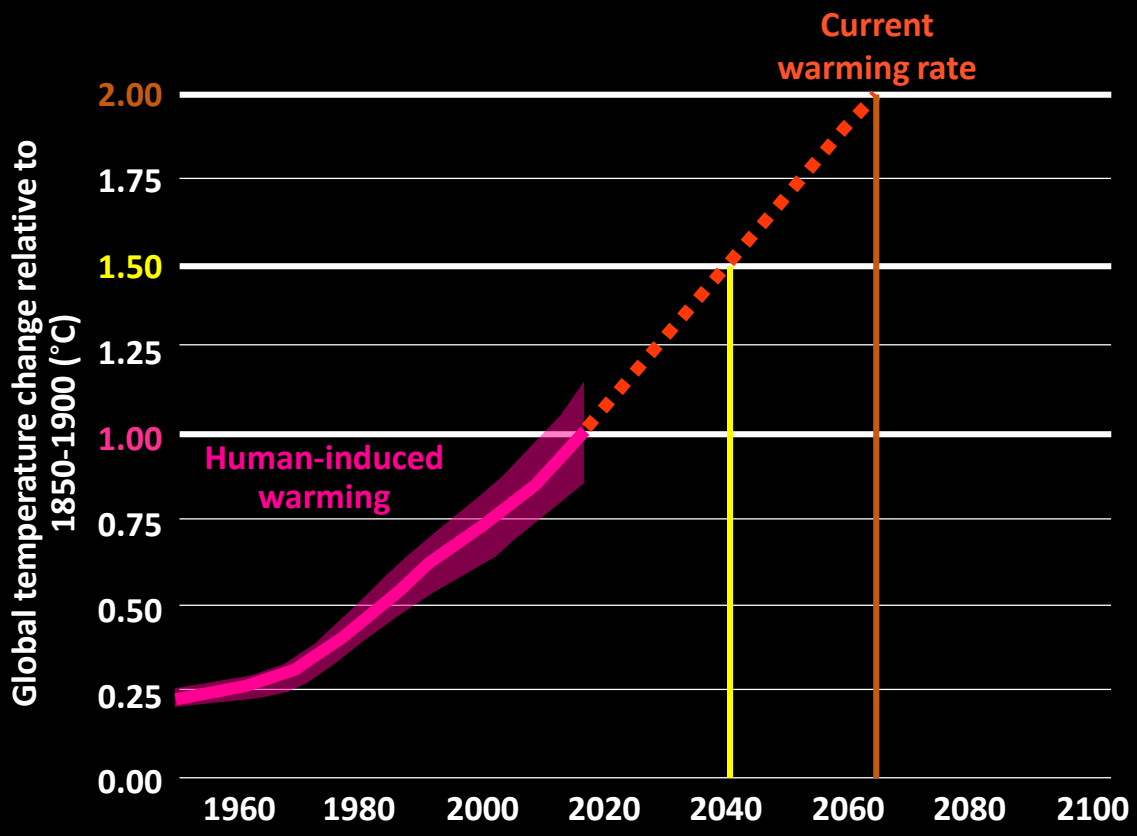
29 Key Message #4

Interactions Between Mitigation and Adaptation

This complementarity is especially important given that a certain degree of climate change due to past and present emissions is unavoidable.

Photo credit: Marshall Islands Journal

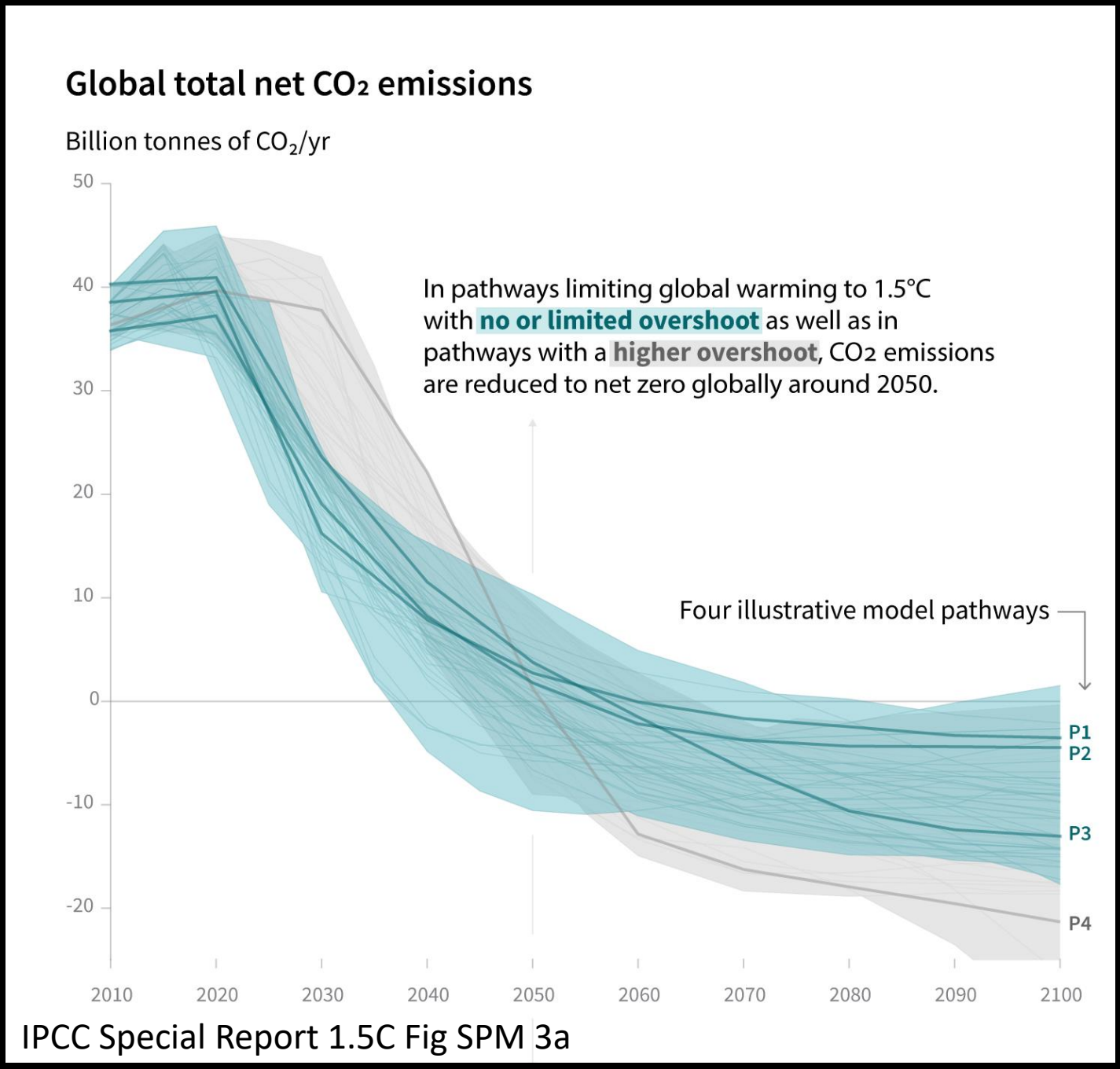
1.5 ℃ or 2 ℃ World



IPCC 2018 SR15 Fig FAQ 1.2


ultramarinfoto / Getty Images

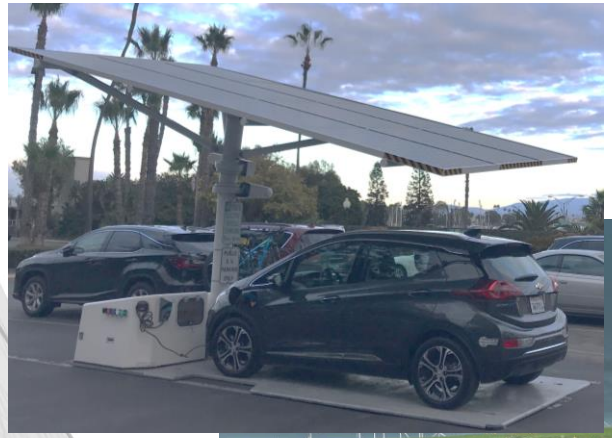

Chasing Coral



IPCC Special Report 1.5C Fig SPM 3a

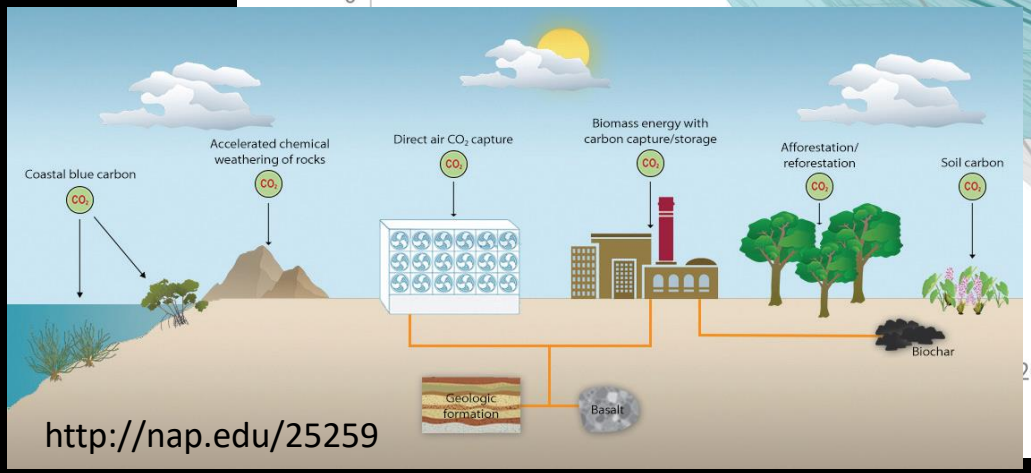
Global total net CO_2 emissions

Billion tonnes of CO_2/yr



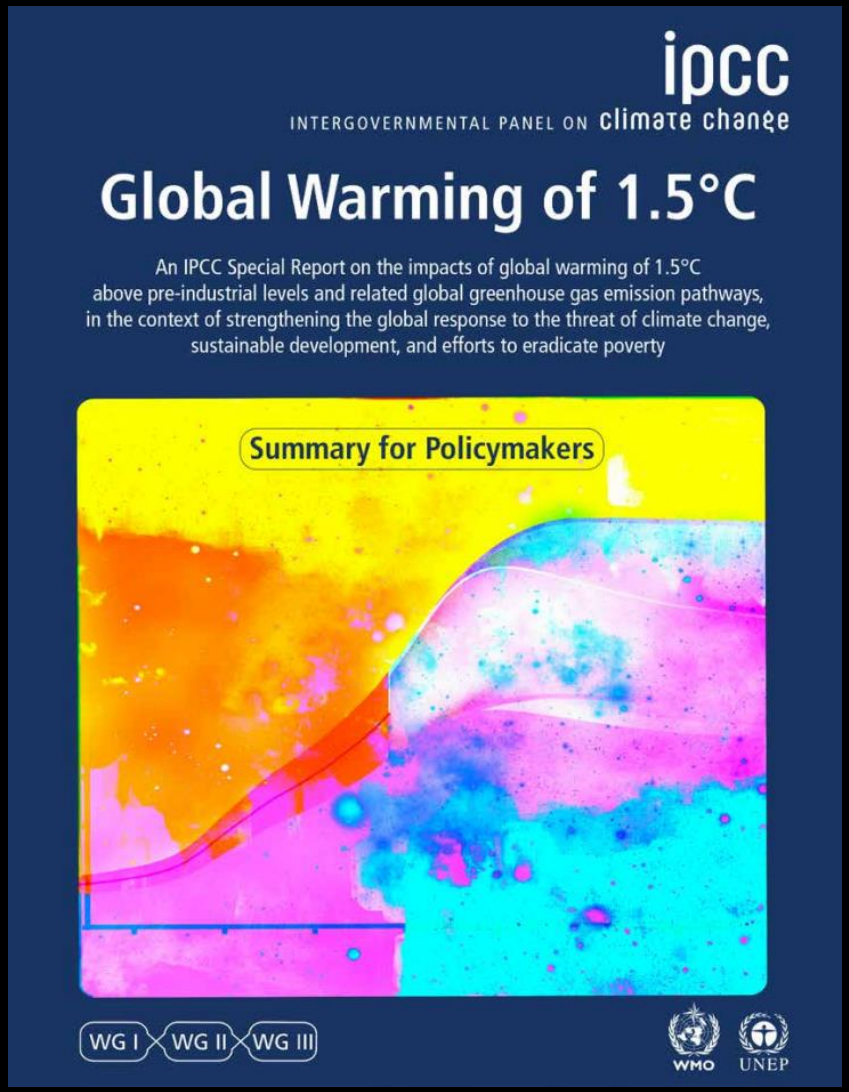
USGCR 2018 NCA4 fig 23-12

Deep Decarbonization



http://nap.edu/25259

Carbon dioxide removal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