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# FIFTH NATIONAL CLIMATE ASSESSMENT

## *Chapter 1 | Overview*



# How the United States Is Addressing Climate Change

The effects of human-caused climate change are already far-reaching and worsening across every region of the United States. Rapidly reducing greenhouse gas emissions can limit future warming and associated increases in many risks. Across the country, efforts to adapt to climate change and reduce emissions have expanded since 2018, and US emissions have fallen since peaking in 2007. However, without deeper cuts in global net greenhouse gas emissions and accelerated adaptation efforts, severe climate risks to the United States will continue to grow.

# How the United States Is Experiencing Climate Change

As extreme events and other climate hazards intensify, harmful impacts on people across the United States are increasing. Climate impacts—combined with other stressors—are leading to ripple effects across sectors and regions that multiply harms, with disproportionate effects on underserved and overburdened communities.

# Current and Future Climate Risks to the United States

Climate changes are making it harder to maintain safe homes and healthy families; reliable public services; a sustainable economy; thriving ecosystems, cultures, and traditions; and strong communities. Many of the extreme events and harmful impacts that people are already experiencing will worsen as warming increases and new risks emerge.

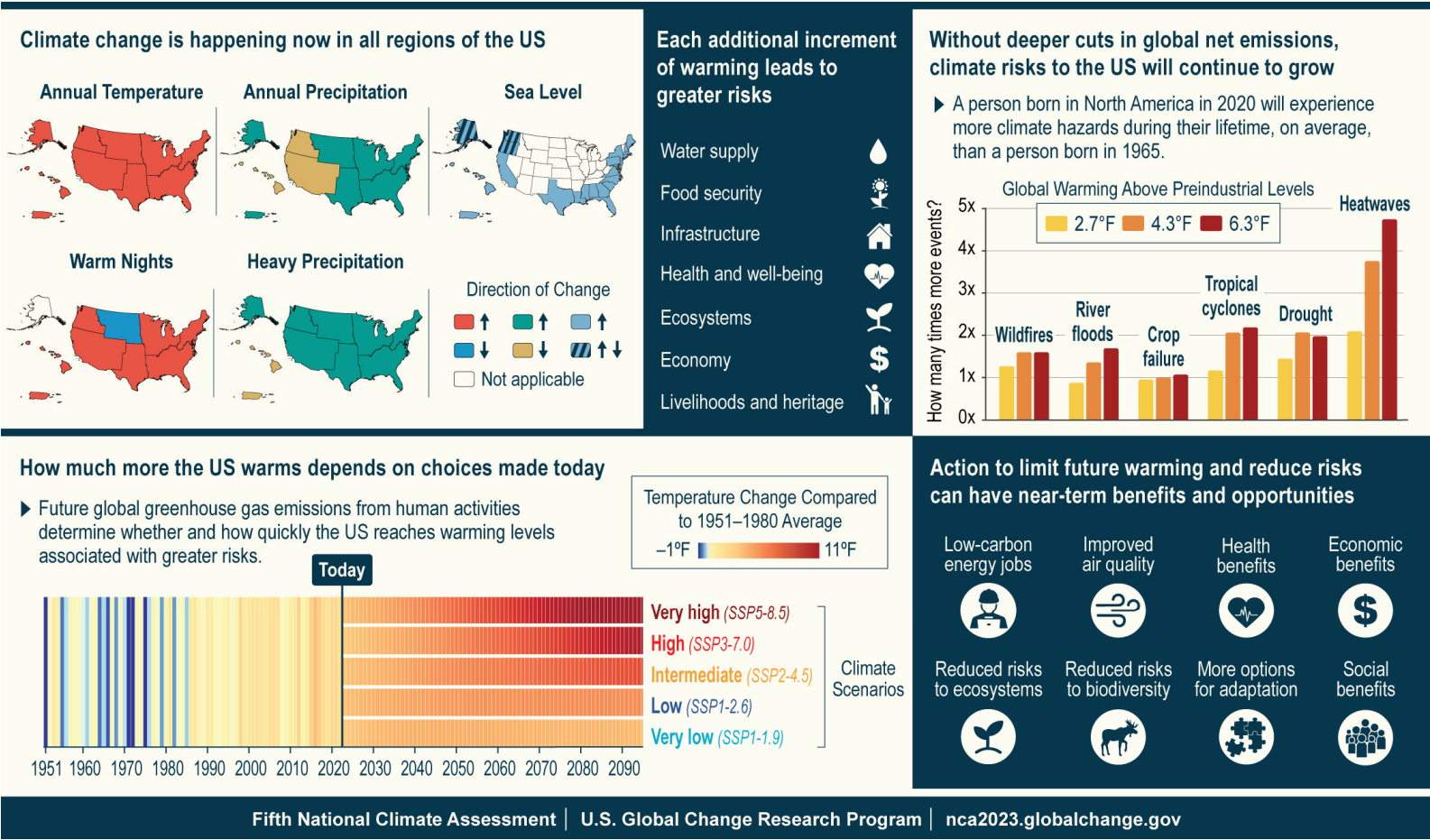
# The Choices That Will Determine the Future

With each additional increment of warming, the consequences of climate change increase. The faster and further the world cuts greenhouse gas emissions, the more future warming will be avoided, increasing the chances of limiting or avoiding harmful impacts to current and future generations.

# How Climate Action Can Create a More Resilient and Just Nation

Large near-term cuts in greenhouse gas emissions are achievable through many currently available and cost-effective mitigation options. However, reaching net-zero emissions by midcentury cannot be achieved without exploring additional mitigation options. Even if the world decarbonizes rapidly, the Nation will continue to face climate impacts and risks. Adequately and equitably addressing these risks involves longer-term inclusive planning, investments in transformative adaptation, and mitigation approaches that consider equity and justice.

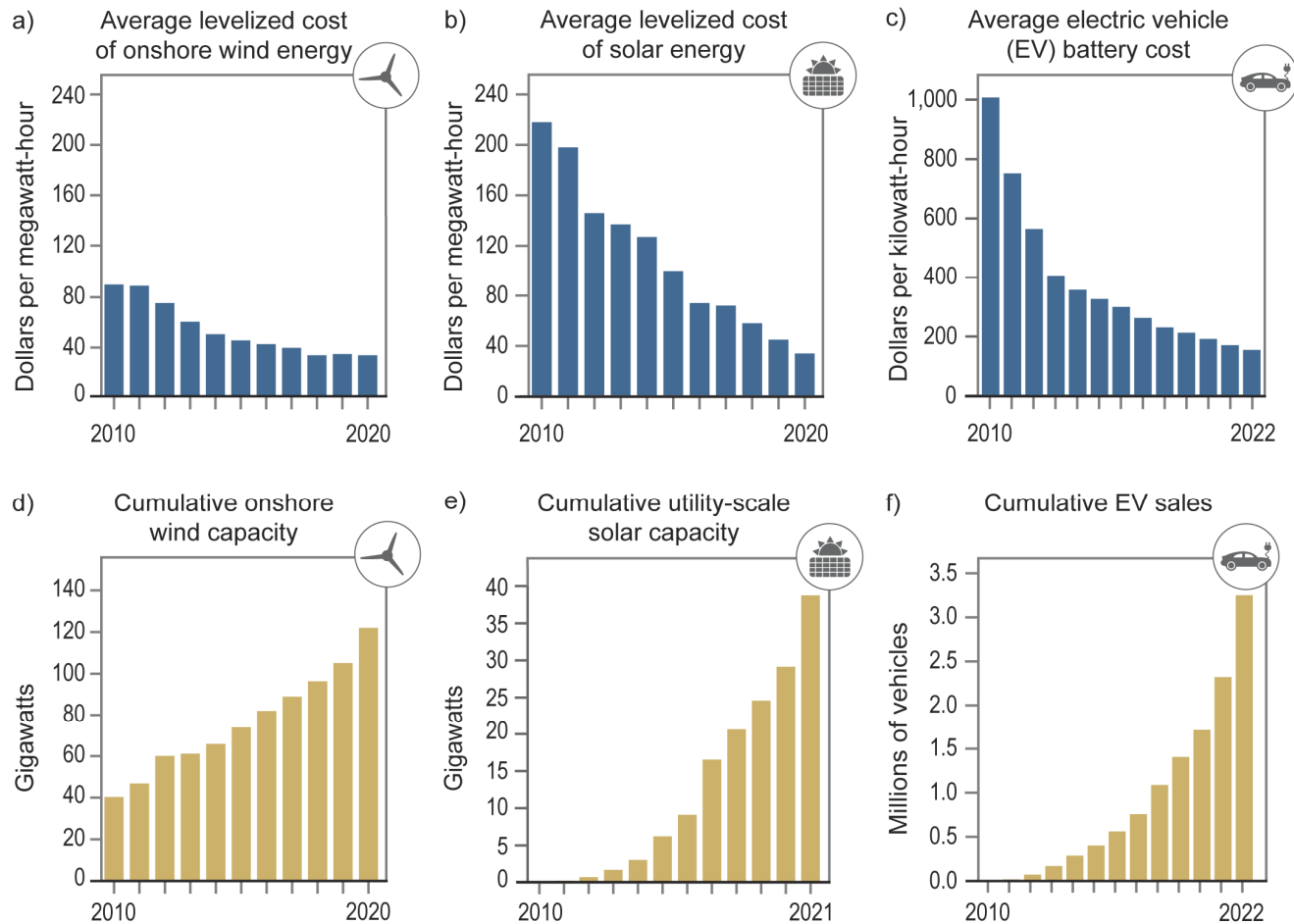
# Climate Change Risks and Opportunities in the US



**Figure 1.1. Climate change presents risks while action to limit warming and reduce risks presents opportunities for the US.**

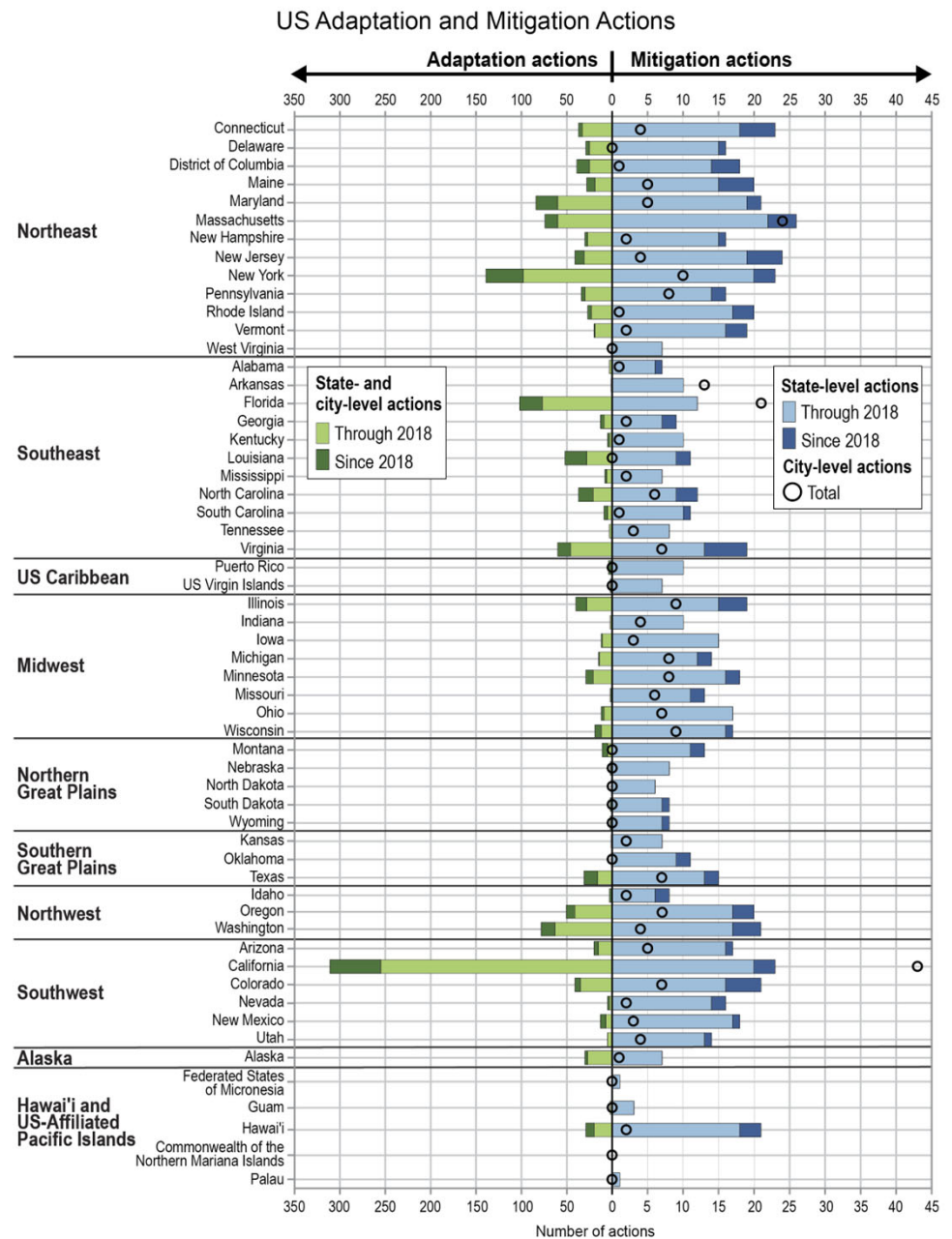


## Historical Trends in Costs and Capacity of Low-Carbon Energy Technologies in the United States

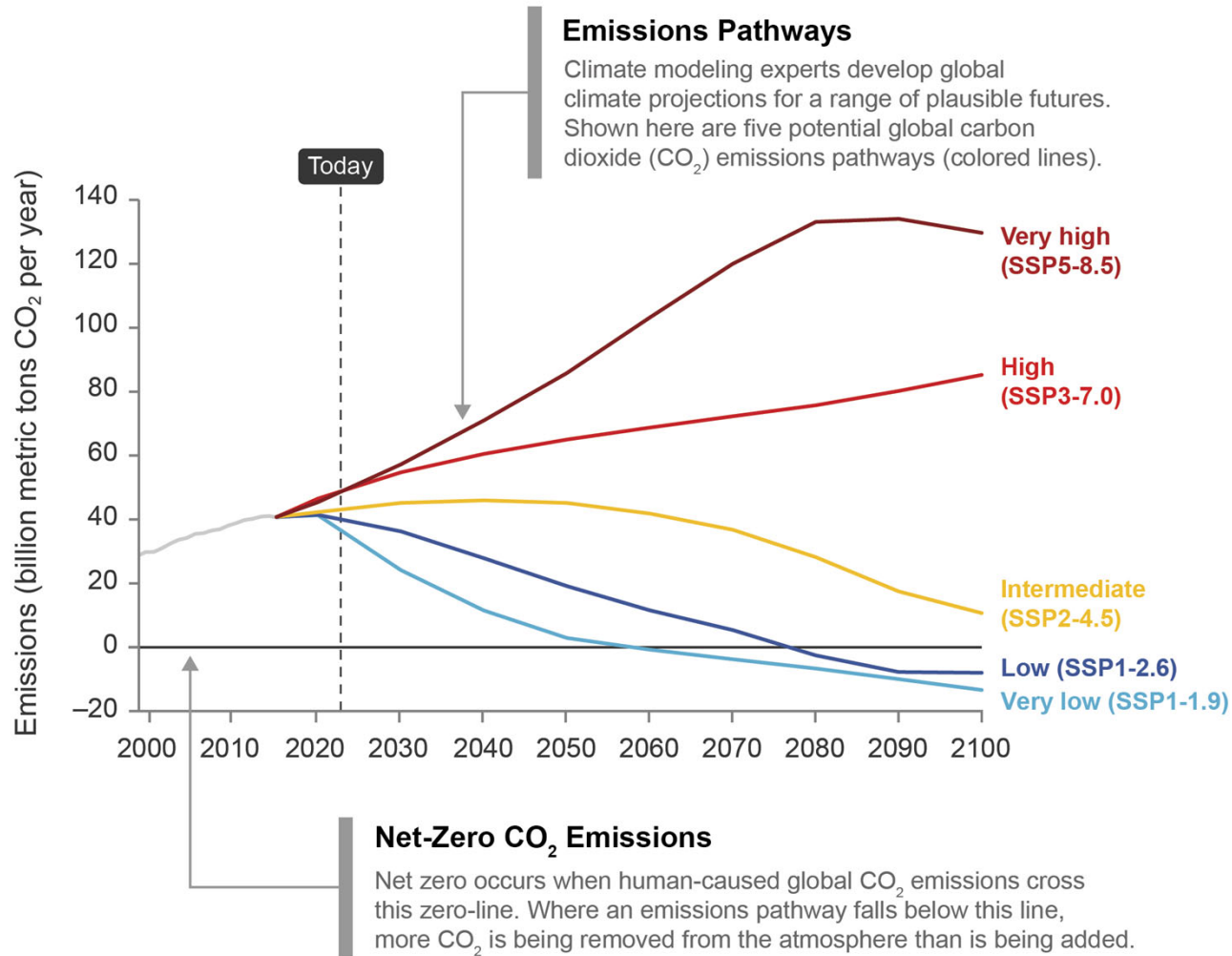


**Figure 1.2. Increasing capacities and decreasing costs of low-carbon energy technologies are supporting efforts to further reduce emissions.**

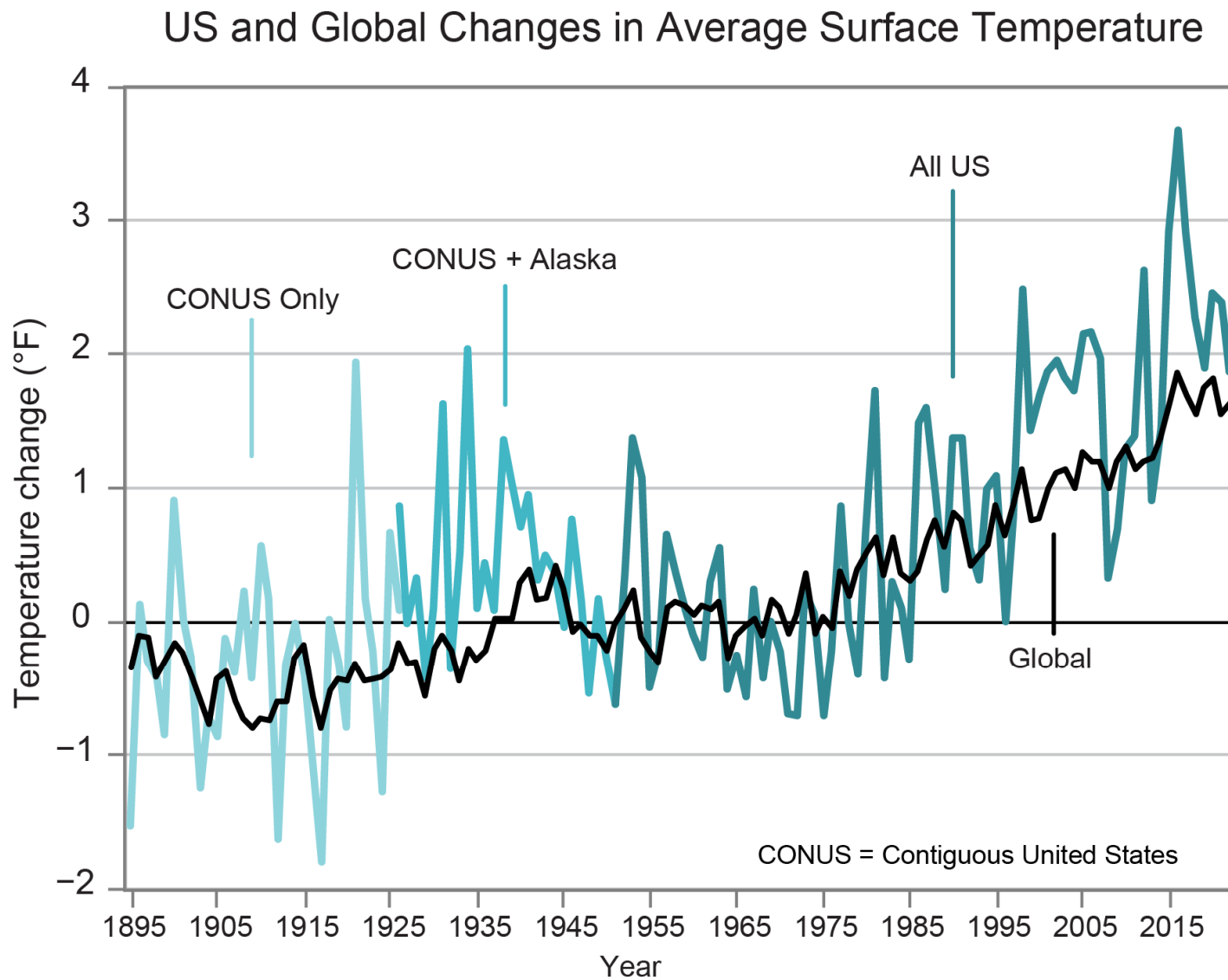
**Figure 1.3. Cities and states are acting on climate change, with a substantial increase in new activities underway since 2018.**



## Future Global Carbon Dioxide Emissions Pathways



**Figure 1.4. Different scenarios of future carbon dioxide emissions are used to explore the range of possible climate futures.**



**Figure 1.5. The US has warmed rapidly since the 1970s.**

## Rapid and Unprecedented Changes

**800k**  
years

Present-day levels of greenhouse gases in the atmosphere are higher than at any time in at least the past 800,000 years, with most of these emissions occurring since 1970.

**3,000**  
years

The rate of sea level rise in the 20th century was faster than in any other century in at least the last 3,000 years.

**2,000**  
years

Global temperature has increased faster in the past 50 years than at any time in at least the past 2,000 years.

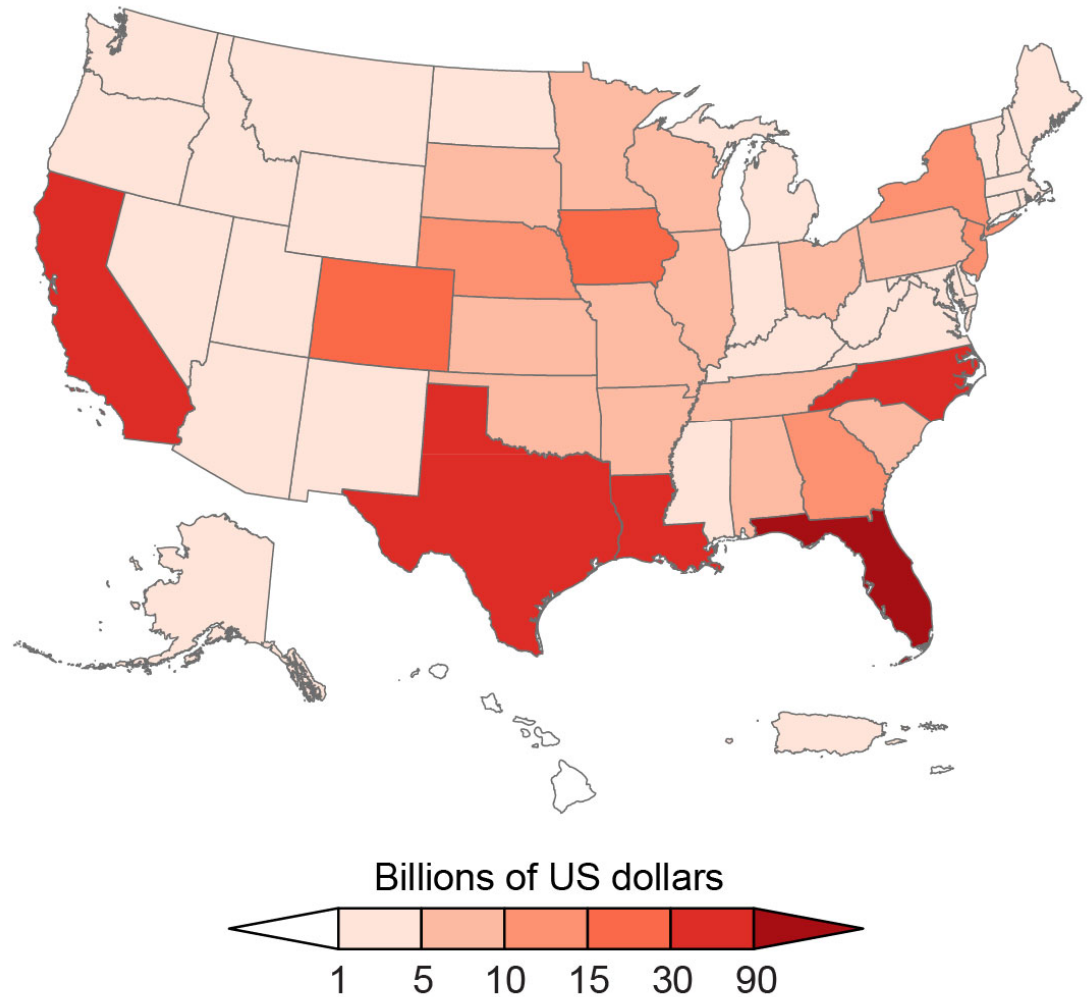
**1,200**  
years

The current drought in the western US is now the most severe drought in at least 1,200 years and has persisted for decades.

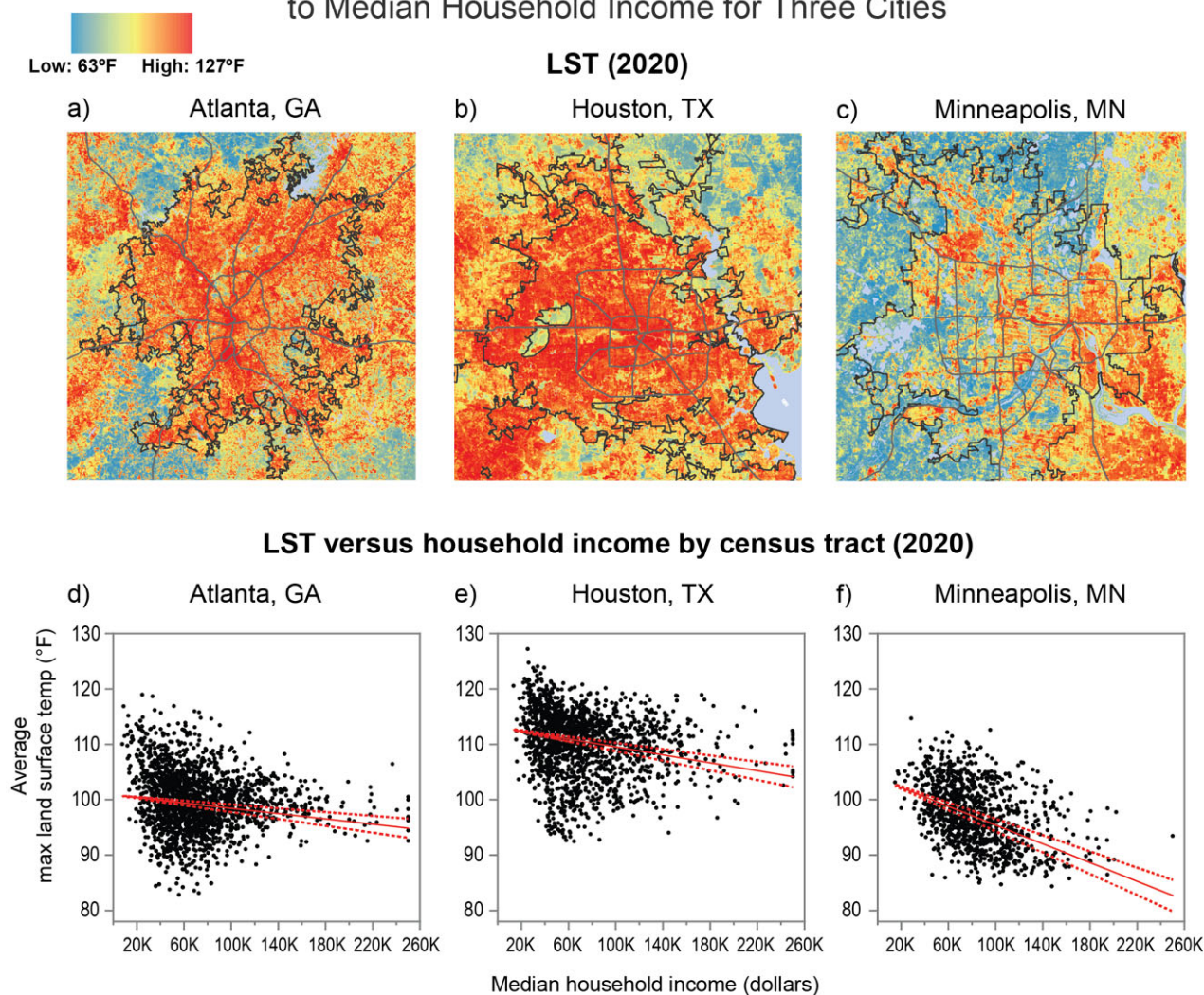
**Figure 1.6. Current climate conditions are unprecedented for thousands of years.**

**Figure 1.7. The US now experiences, on average, a billion-dollar weather or climate disaster every three weeks.**

**Damages by State from Billion-Dollar Disasters (2018–2022)**

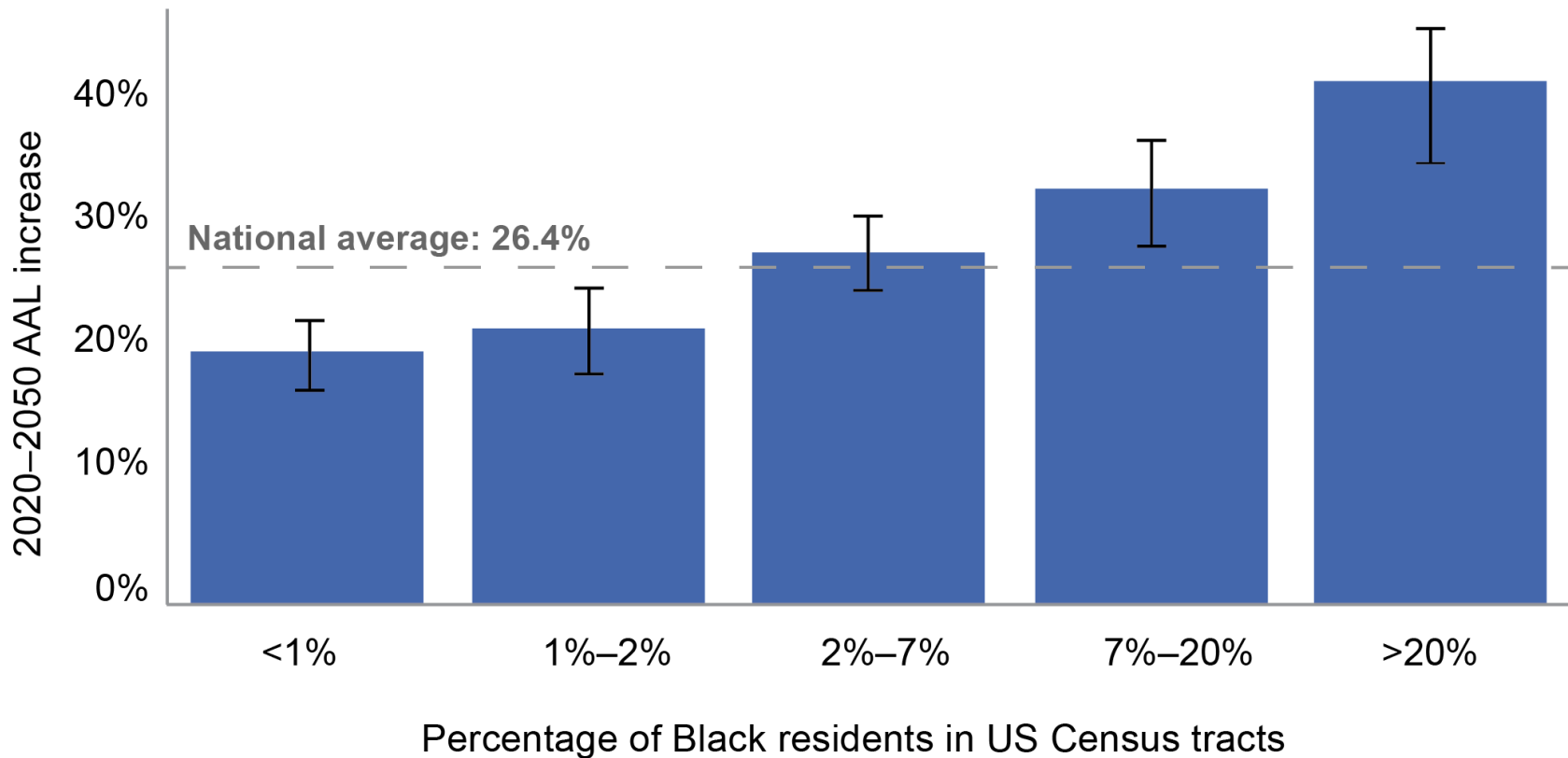


## Land Surface Temperature and Its Relationship to Median Household Income for Three Cities



**Figure 1.8. Lower-income urban neighborhoods experience higher surface temperatures.**

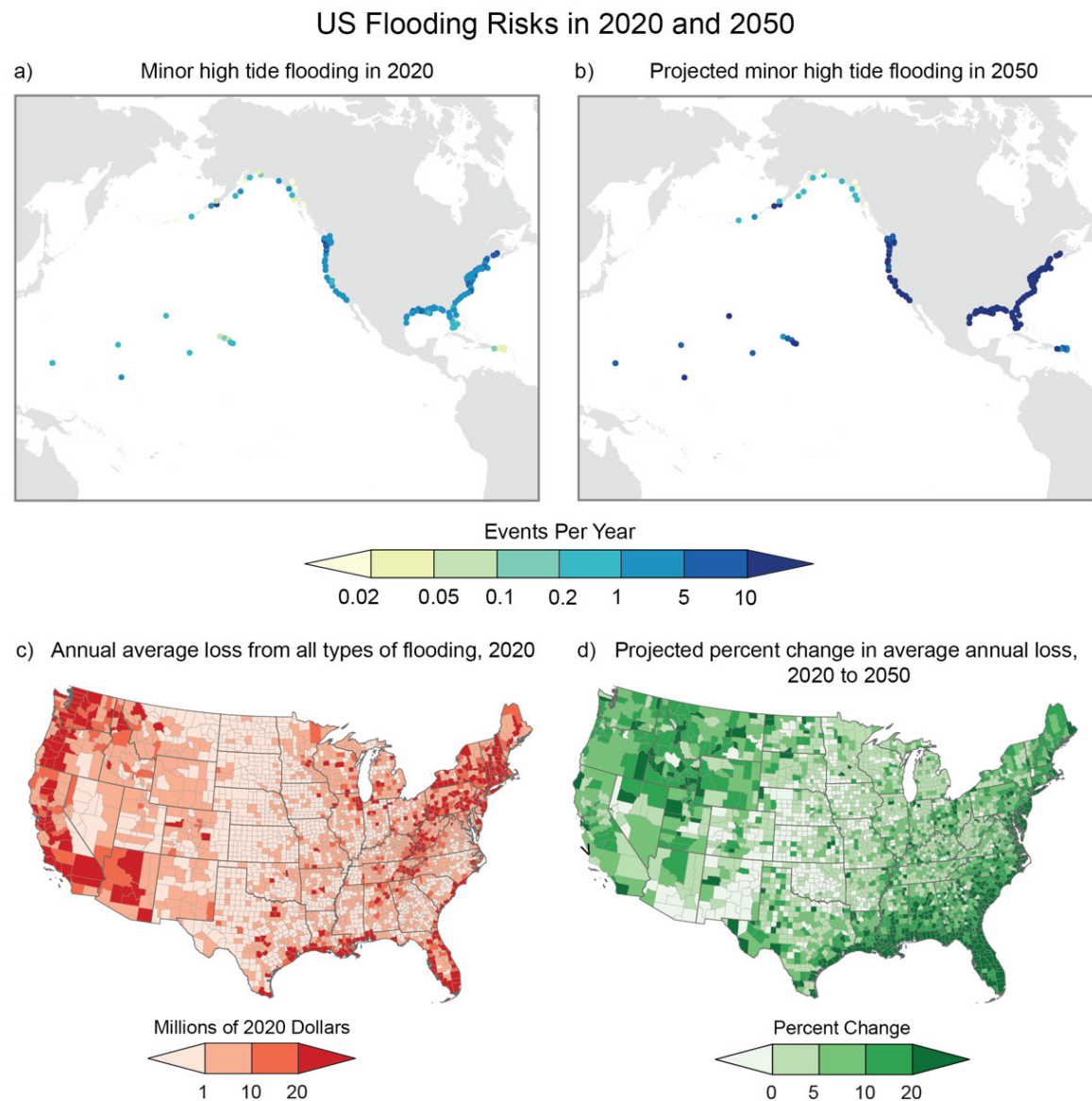
## Projected Increases in Average Annual Losses (AALs) from Floods by 2050



**Figure 1.9. Losses due to floods are projected to increase disproportionately in US Census tracts with higher percentages of Black residents.**



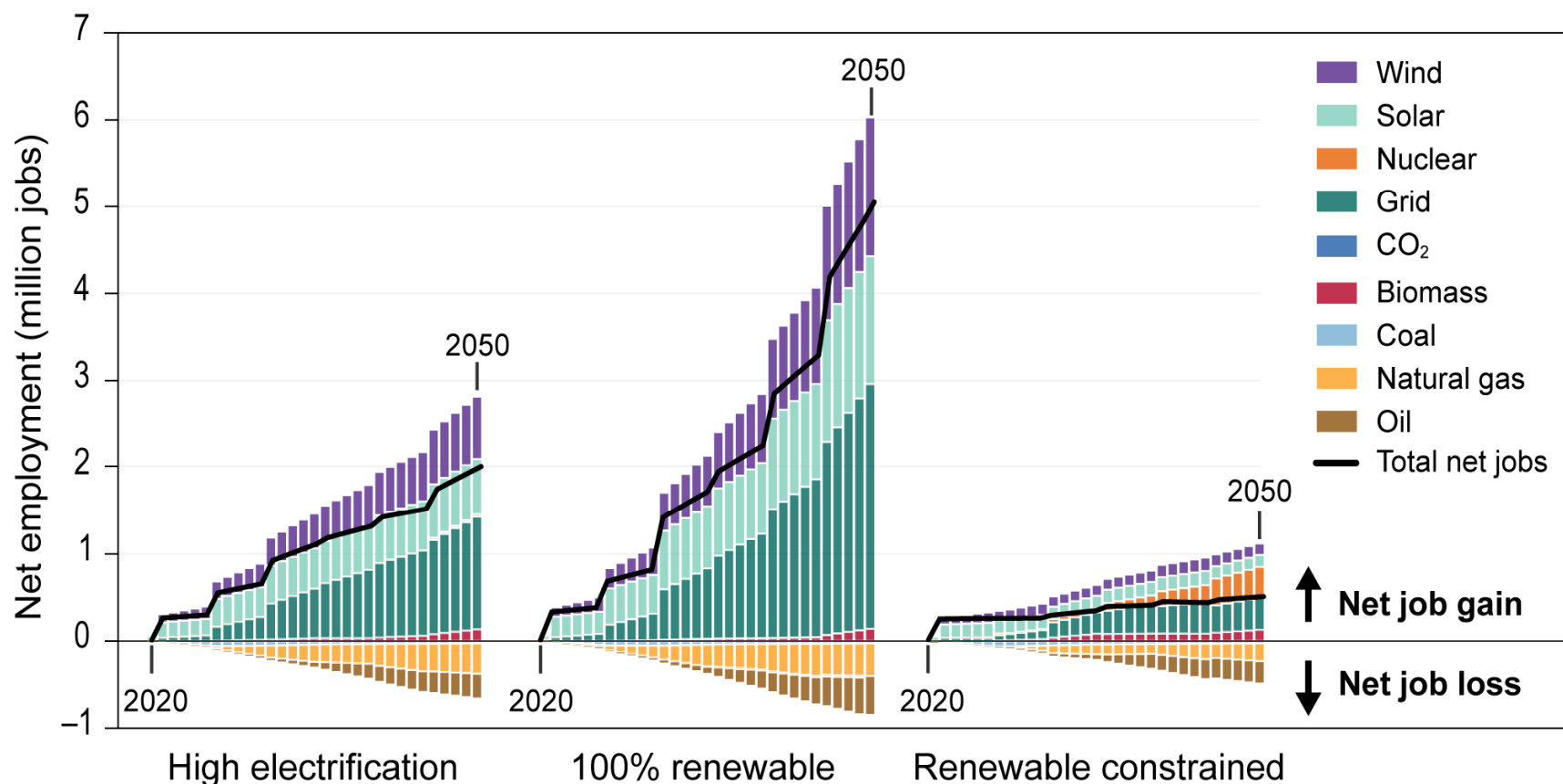
# Figure 1.10. Increasing flooding puts more people and assets at risk.



# Exemplifying Indigenous Resilience



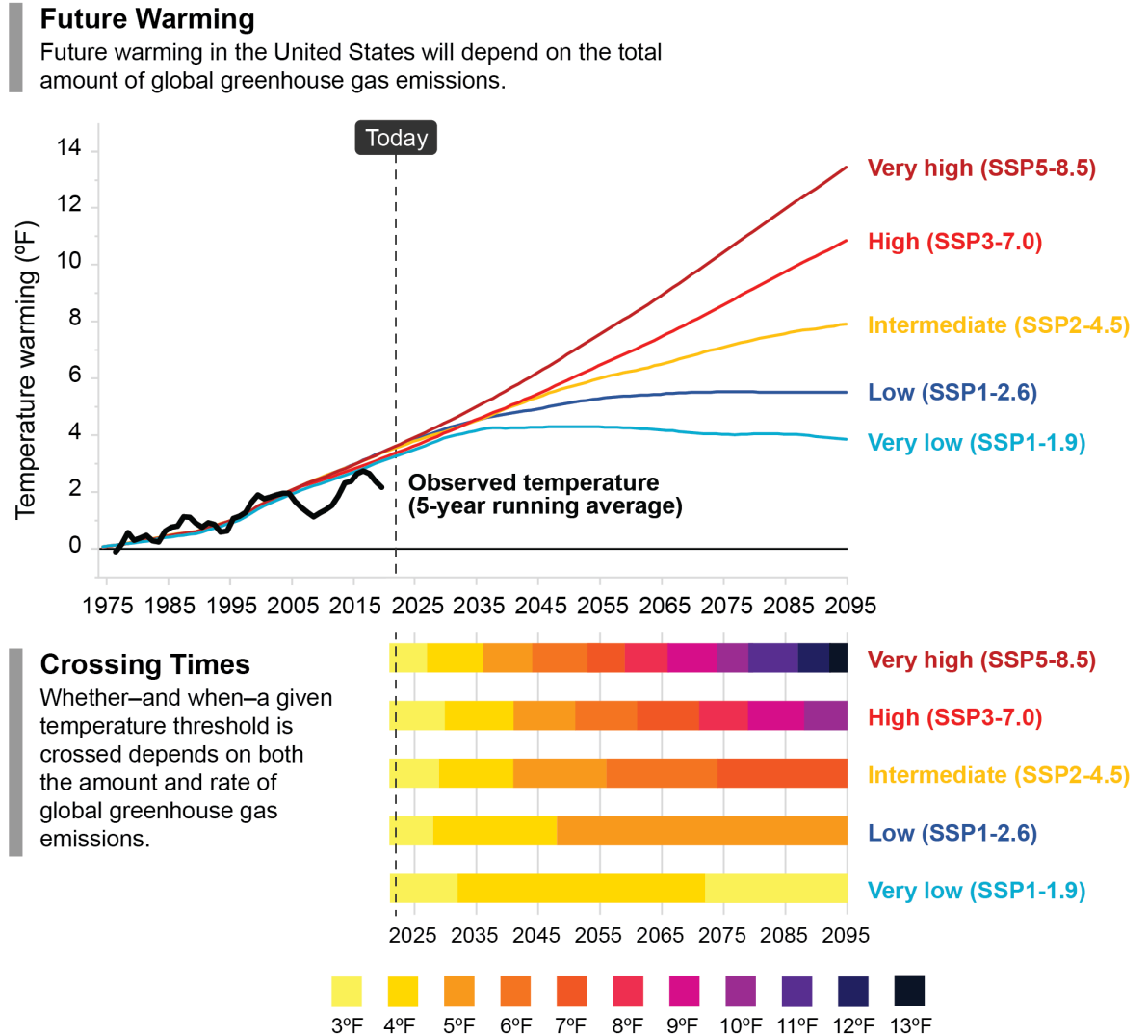
## Energy Employment (2020–2050) for Alternative Net-Zero Pathways



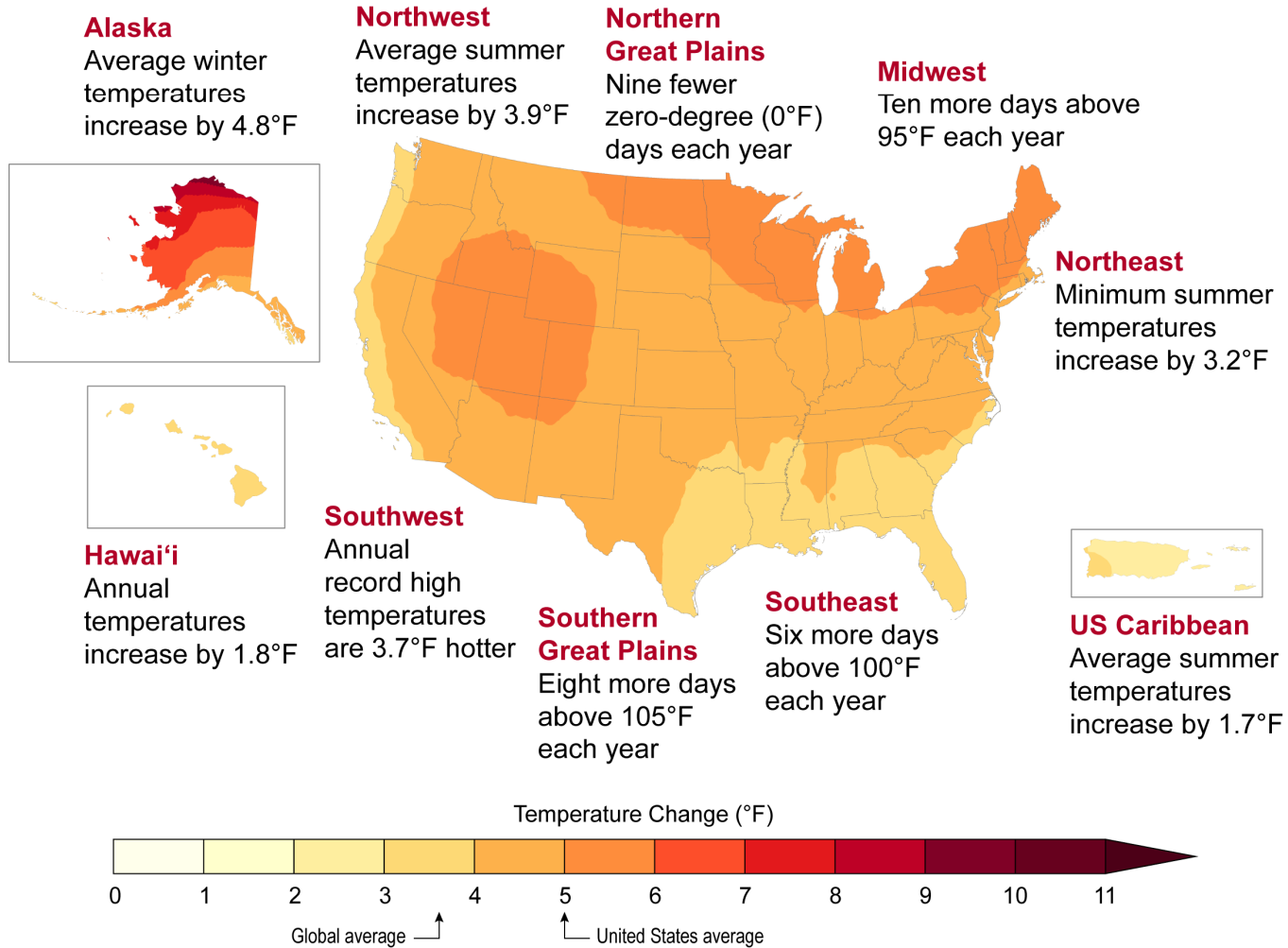
**Figure 1.12. Employment gains in electrification and renewable energy industries are projected to far outpace job losses in fossil fuel industries.**

**Figure 1.13. When or if the US reaches a particular level of warming depends on global greenhouse gas emissions from human activities.**

Potential Warming Pathways in the United States



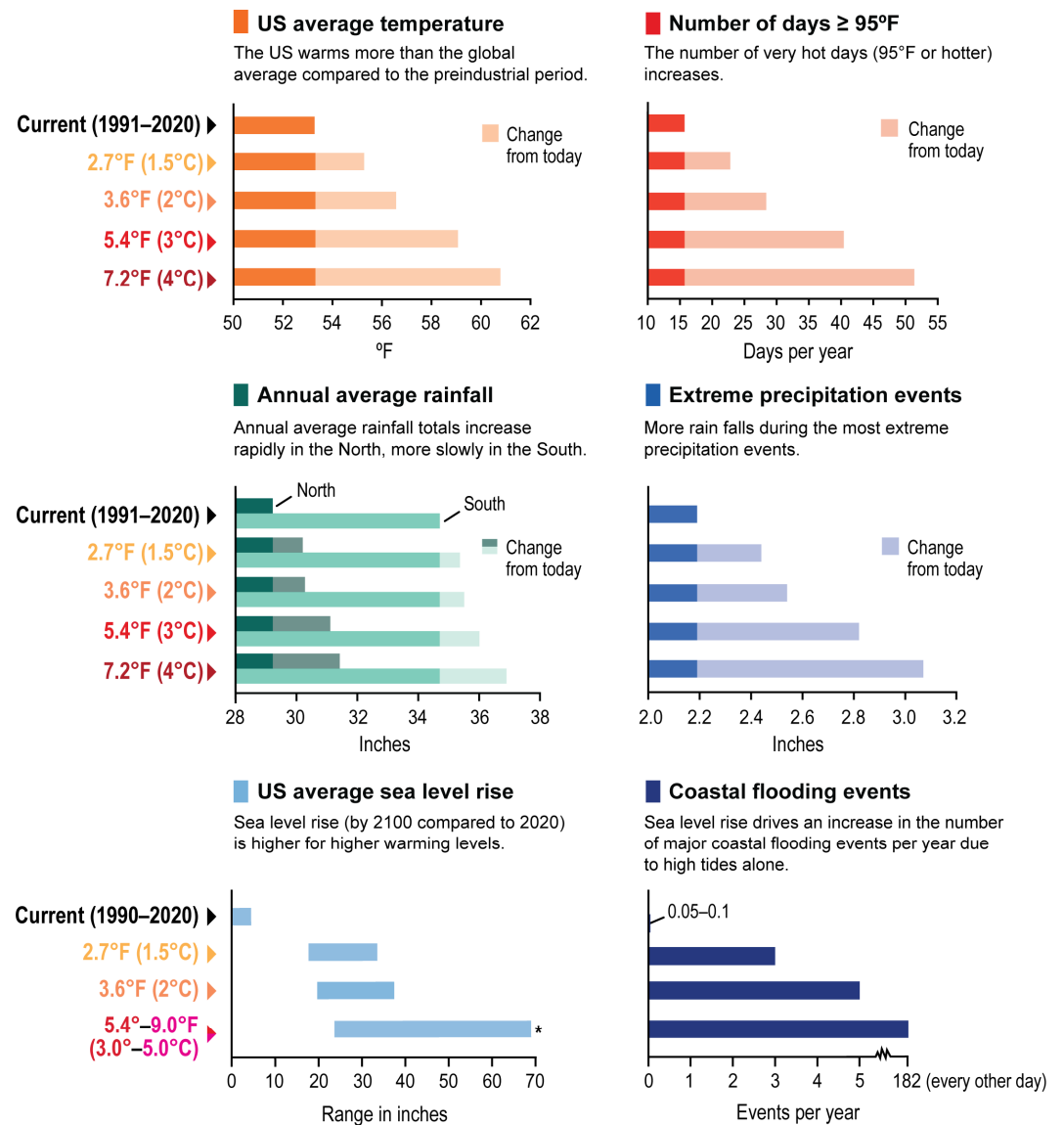
Projected Changes at 3.6°F (2.0°C) of Global Warming



**Figure 1.14. What would 3.6°F (2°C) of global warming feel like in the United States?**

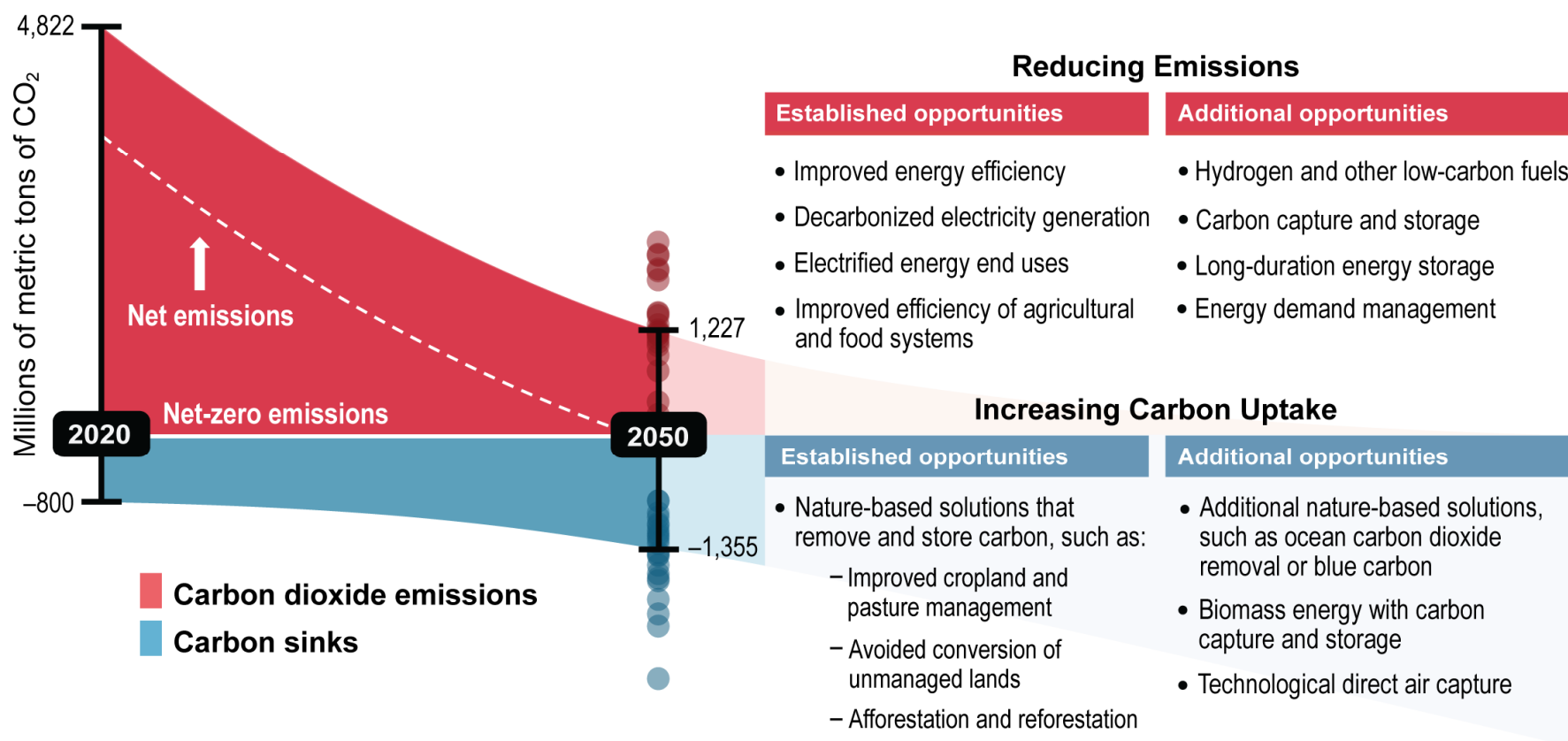
# Figure 1.15. At higher global warming levels, the US will experience more severe climate impacts.

## Consequences Are Greater at Higher Global Warming Levels



\*Rise at the upper end of this range cannot be ruled out due to the possibility of rapid ice sheet loss. The amount of warming required to trigger such loss is not currently known but is assessed to be above 3.6°F (2°C).

## Portfolio of Mitigation Options for Achieving Net Zero by 2050



**Figure 1.16. Reaching net zero by 2050 in the US will involve a mix of reductions in greenhouse gas emissions and increases in carbon dioxide removal.**

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