Climate Change – A Hot Topic Session 5

Adaptation
Politics and Stake Holders

Blow Hot or Cold – but its happening.

Roy Campbell and Don Fournier

February 12, 2024

Overview Week 5

Adaptation

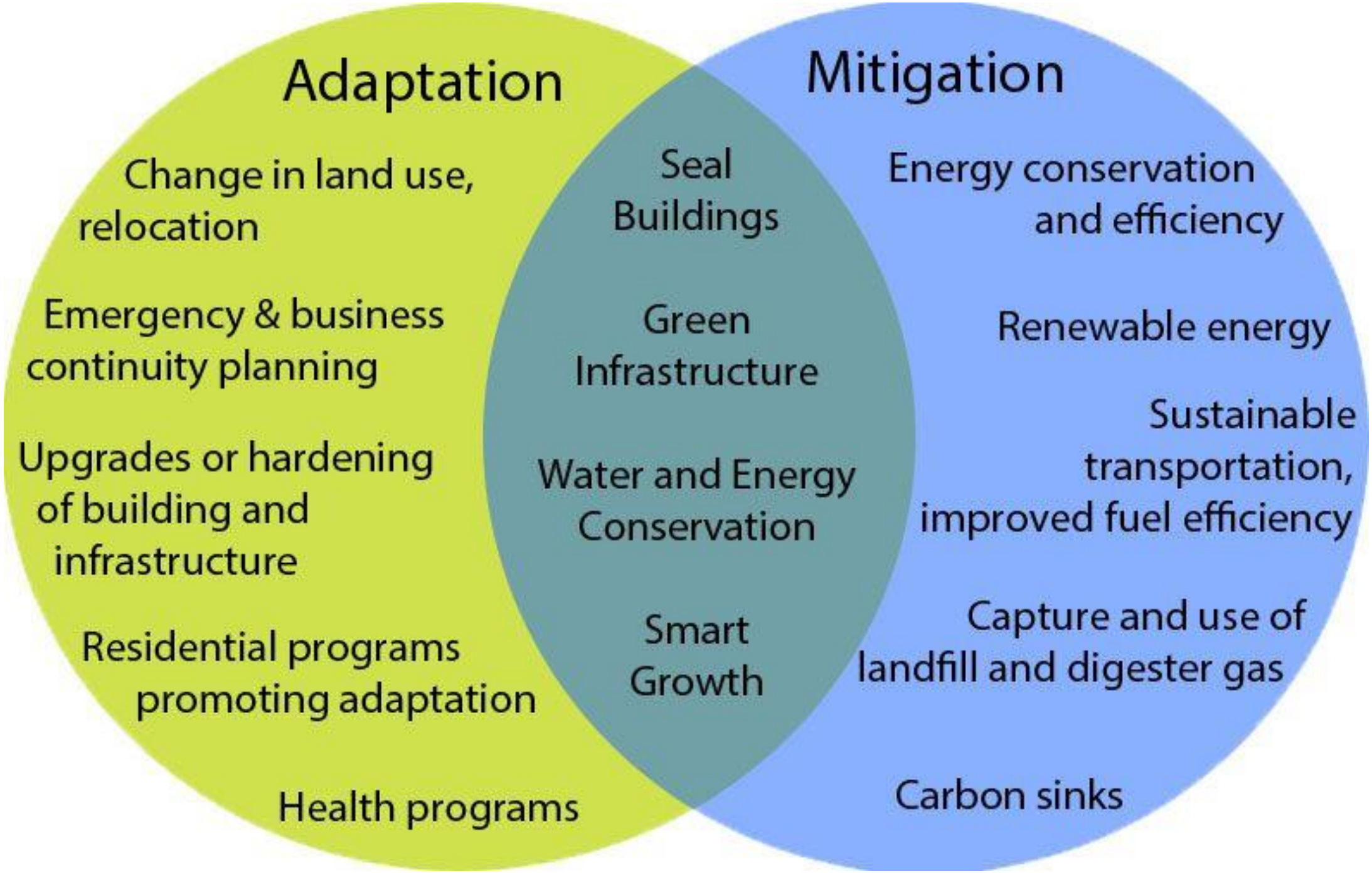
- Definition
- Disaster risks, response and preparedness
- Vulnerabilities, Exposure, Capacity
- Future Extremes

Politics and StakeHolders

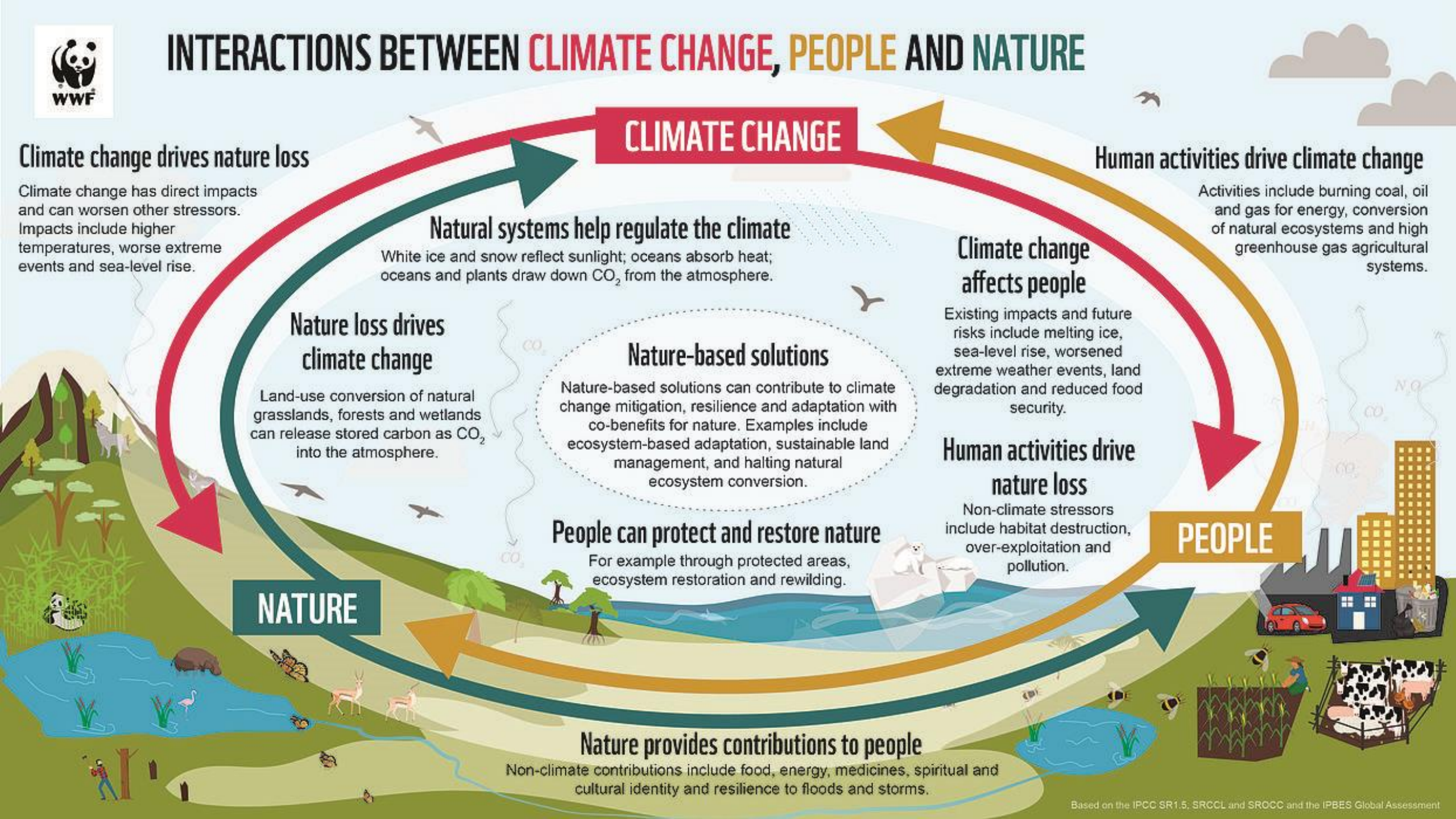
Compromised COP Process
Industries
Obstruction of the Energy Transition

Big Oil Disinformation Campaigns
Money vs Science

2


Adaptation
Change in land use, relocation
Emergency & business continuity planning
Upgrades or hardening of building and infrastructure
Residential programs promoting adaptation
Health programs
Seal Buildings
Green Infrastructure
Water and Energy Conservation
Smart Growth
Mitigation
Energy conservation and efficiency
Renewable energy
Sustainable transportation, improved fuel efficiency
Capture and use of landfill and digester gas
Carbon sinks

INTERACTIONS BETWEEN CLIMATE CHANGE, PEOPLE AND NATURE



Based on the IPCC SR1.5, SRCCL and SROCC and the IPBES Global Assessment

Adapting to Climate Change

Adaptation -- Strategies

- **Climate change adaptation** is the process of adjusting to the **effects** of climate change.
- These can be both current or expected impacts.[1]
- Adaptation aims to moderate or avoid harm for people.
- It also aims to exploit opportunities.
- Humans may also intervene to help adjustment for natural systems.

https://en.wikipedia.org/wiki/Climate_change_adaptation

Adapting to Climate Change

Adaptation -- Classification

Help manage impacts and risks to people and nature.

Adaptation actions can be classified in four ways:

1. Infrastructural and technological;
2. Institutional;
3. Behavioral and cultural; and
4. Nature-based options.

Adapting to Climate Change

Adaptation -- Definition

- "In human systems, as the process of adjustment to actual or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities."[7]
- "In natural systems, adaptation is the process of adjustment to actual climate and its effects; human intervention may facilitate this."[7]

- IPCC, 2022: Summary for Policymakers pp. 3–33,

Adapting to Climate Change

Adaptation -- Disaster Risks, Response, and Preparedness

- Climate change contributes to disaster risk. So experts sometimes see climate change adaptation as one of many processes within disaster risk reduction. In turn, disaster risk reduction is part of the broader consideration of sustainable development. Climate change adaptation and disaster risk reduction have similar goals (to reduce potential impacts of hazards and increase the resilience of people at risk). They use similar concepts and are informed by similar sources and studies.

Adapting to Climate Change

Adaptive Capacity

Adaptive capacity in the context of climate change covers human, natural, or managed systems. It looks at how they respond to both climate variability and extremes.

- Economic resources: Wealthier nations are better able to bear the costs of adaptation to climate change than poorer ones.
- Technology: Lack of technology can impede adaptation.
- Information and skills: Information and trained personnel are necessary to assess and implement successful adaptation options.
- Social infrastructure:
  - Institutions: Nations with well-developed social institutions are likely to have greater adaptive capacity than those with less effective institutions. These are typically developing nations and economies in transition.
  - Equity: Some believe that adaptive capacity is greater where there are government institutions and arrangements in place that allow equitable access to resources

Example North America Risks from Climate Change Requiring Adaptation (IPCC)

- Climate-sensitive mental health outcomes, human mortality and morbidity due to increasing average temperature, weather and climate extremes, and compound climate hazards
- Risk of degradation of marine, coastal and terrestrial ecosystems, including loss of biodiversity, function, and protective services
- Risk to freshwater resources with consequences for ecosystems, reduced surface water availability for irrigated agriculture, other human uses, and degraded water quality
- Risk to food and nutritional security through changes in agriculture, livestock, hunting, fisheries, and aquaculture productivity and access
- Risks to well-being, livelihoods and economic activities from cascading and compounding climate hazards, including risks to coastal cities, settlements and infrastructure from sea level rise

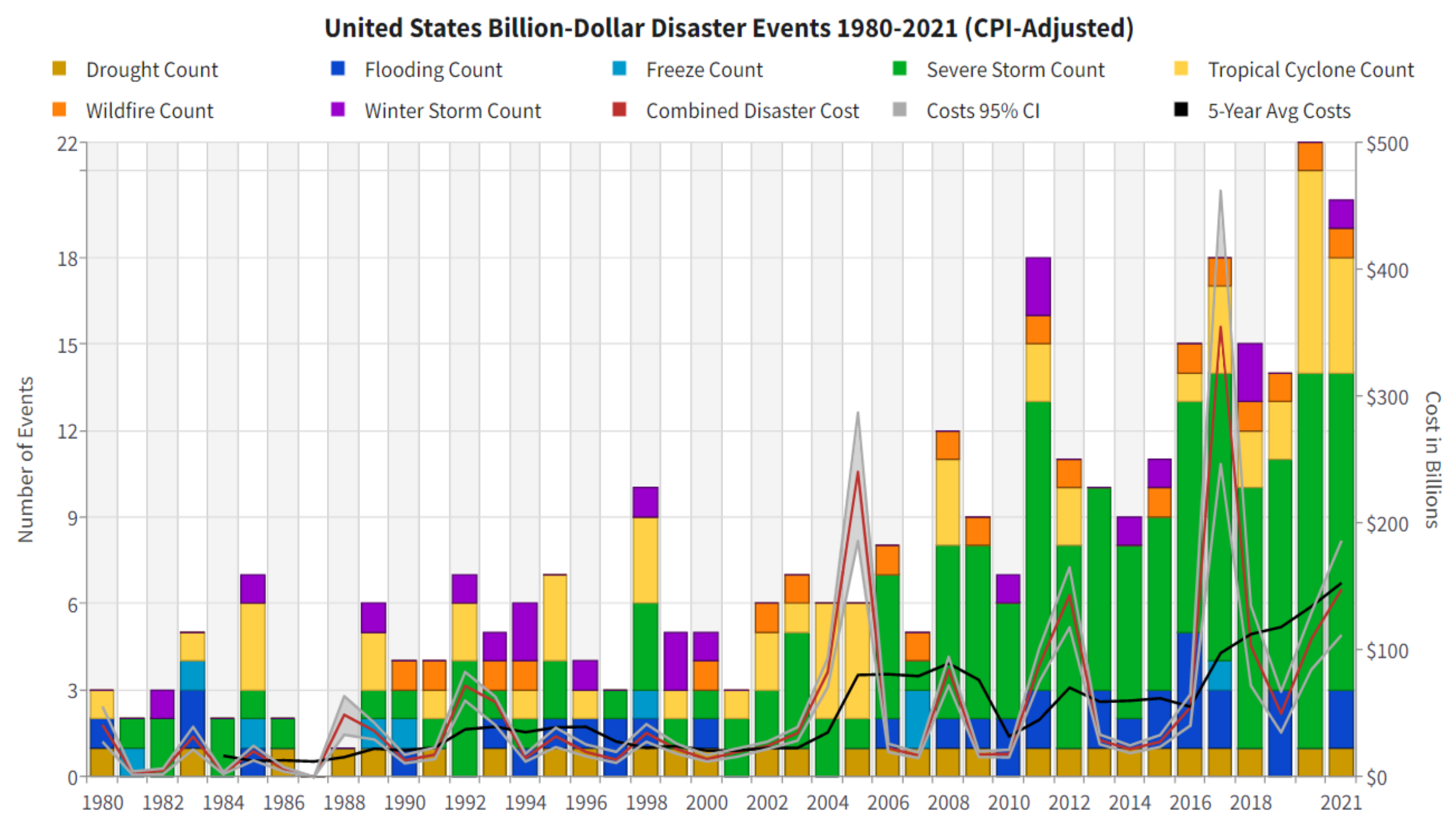
Adapting to Climate Change

Air
- Indoor Air Quality
- Outdoor Air Quality
- Temperature
- Precipitation
- Wind
- Wildfires

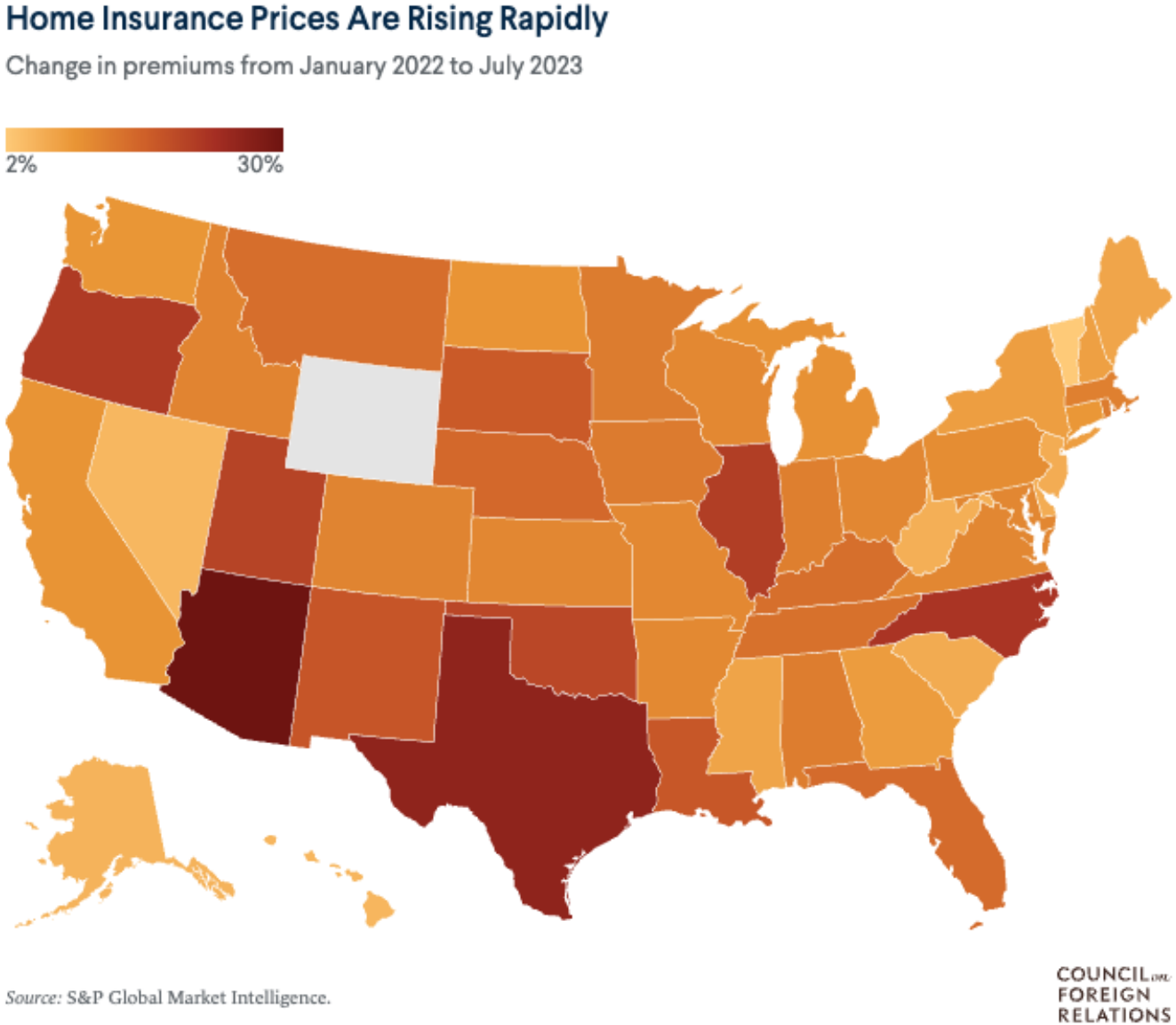
Water
- Drought
- Saltwater Intrusion
- Sea Level Rise
- Flooding
- General Utility Preparedness
- Stormwater Runoff
- Erosion and Sedimentation
- Algal Blooms

Waste
- Waste Facility Protection adaptation strategies
- Waste Management

Public Health
- Viruses
- Air, Water and Insect born diseases
- Heat stroke
- Dehydration
- Hypothermia


United States Billion-Dollar Disaster Events 1980-2021 (CPI-Adjusted)
Drought Count
Flooding Count
Freeze Count
Severe Storm Count
Tropical Cyclone Count
Wildfire Count
Winter Storm Count
Combined Disaster Cost
Costs 95% CI
5-Year Avg Costs
Number of Events
Cost in Billions
0
3
6
9
12
15
18
22
$0
$100
$200
$300
$400
$500
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2021

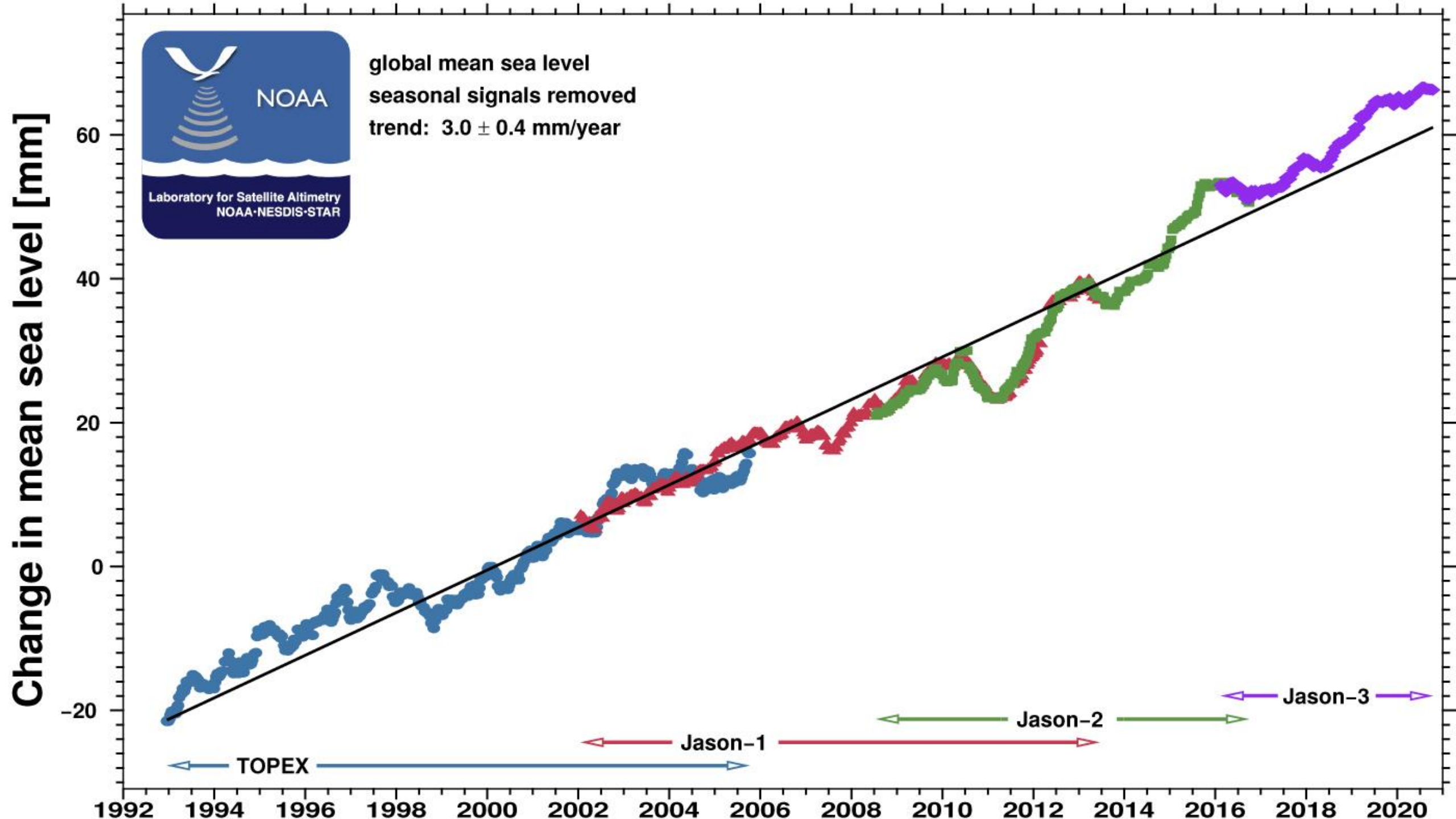
Home Insurance



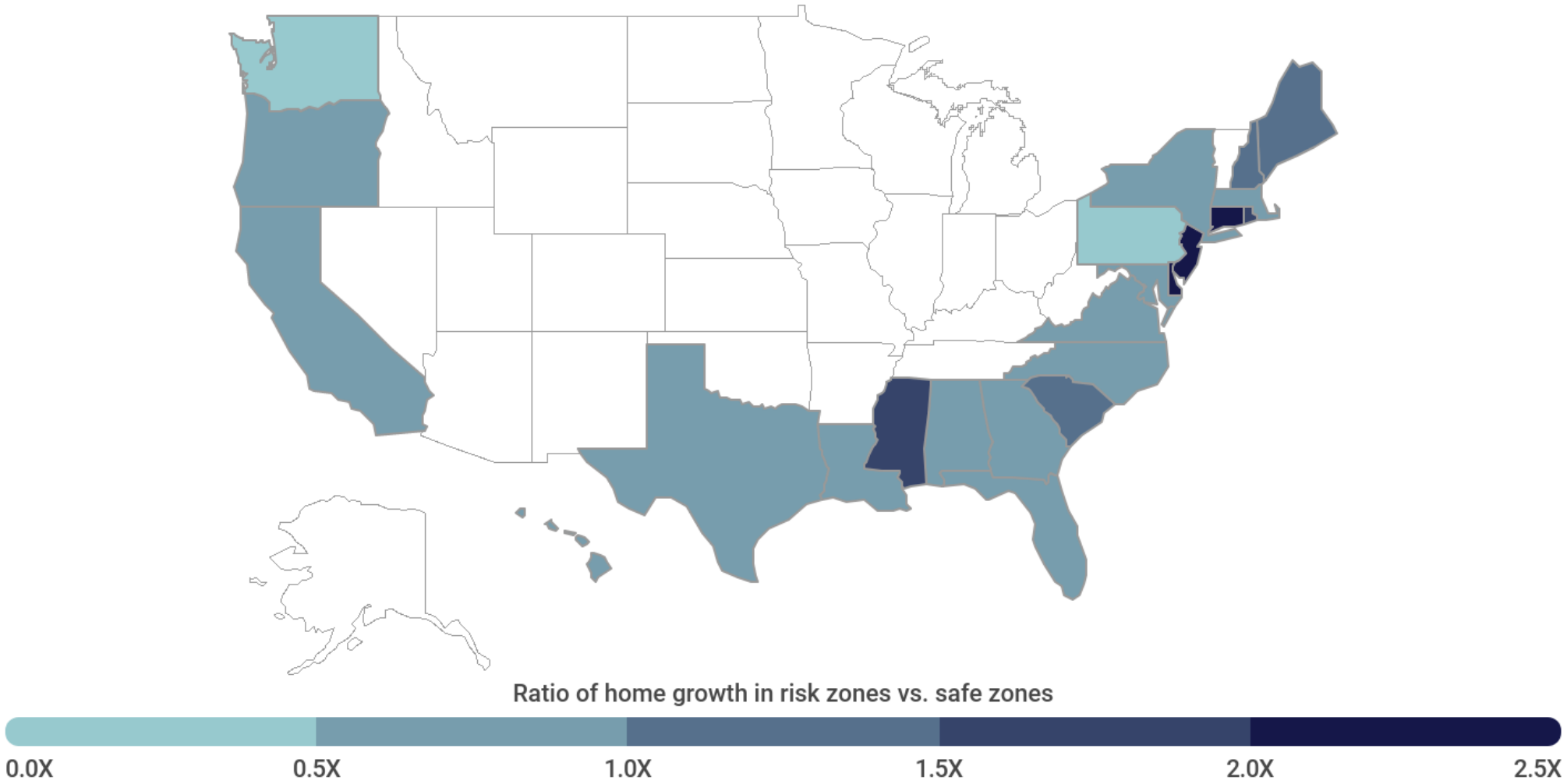
Introduction: https://en.wikipedia.org/wiki/List_of_climate_change_controversies

Healthcare Costs from Climate Change and Fossil Fuels (NRDC Study 2021)

Air pollution		
Soot air:	Burning fossil fuels releases microscopic soot particle pollution into the air. Breathing in that air pollution triggers cardiovascular disease and respiratory ailments and was estimated to cause about 107,000 premature deaths annually.	**$820 billion**
Ozone smog	Emissions from burning fossil fuels and higher temperatures fueled by climate change increase ozone pollution (smog). This worsens asthma and may worsen cardiovascular, metabolic, nervous system, and reproductive outcomes.	**$7.9 billion**
Allergenic pollens:	Rising temperatures and carbon dioxide concentrations increase the intensity and spread of pollen season. Allergenic oak pollen was estimated to cause 21,200 asthma visits in the Northeast, Southeast, and Midwest in 2010.	**$11.4 million**
Vector-borne infectious diseases		
	Climate-fueled warmer temperatures increase the range of ticks and mosquitos, which carry Lyme disease and West Nile Virus, leading to premature deaths, hundreds of thousands of new cases annually, and tens of thousands of visits to medical clinics and hospitals.	**$860 million -$2.7 billion.**
Extreme weather and climate events		
Heat:	Climate change drives higher temperatures and more intense heat waves, triggering heat stress, heat stroke and worsening a range of cardiovascular ailments, causing deaths and triggering more hospital and emergency room visits.	**$263 million**
Wildfire smoke:	Climate change drives higher temperatures and more intense heat waves, triggering heat stress, heat stroke and worsening a range of cardiovascular ailments, causing deaths and triggering more hospital and emergency room visits.	**$16 billion**
Hurricane Sandy:	The 2012 hurricane disaster caused 273 premature deaths, and more than 12,000 hospital admissions, emergency room visits and outpatient encounters	**$3.3 billion**

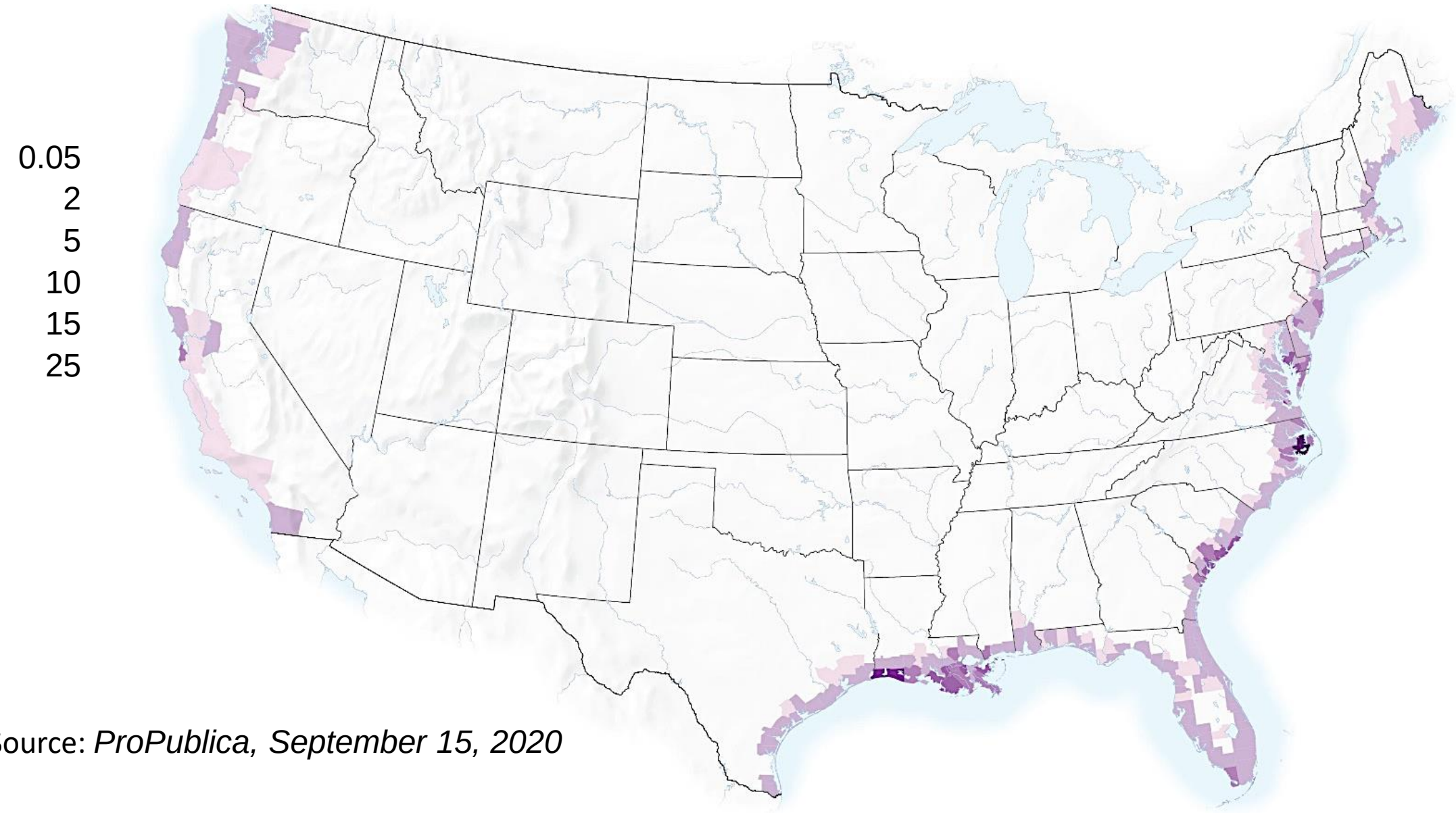

NOAA
Laboratory for Satellite Altimetry
NOAA·NESDIS·STAR
global mean sea level
seasonal signals removed
trend: 3.0 ± 0.4 mm/year
Change in mean sea level [mm]
60
40
20
0
−20
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
TOPEX
Jason−1
Jason−2
Jason−3

Certain Mid-Atlantic states are developing high-risk flood zones more than 2X faster than safer areas



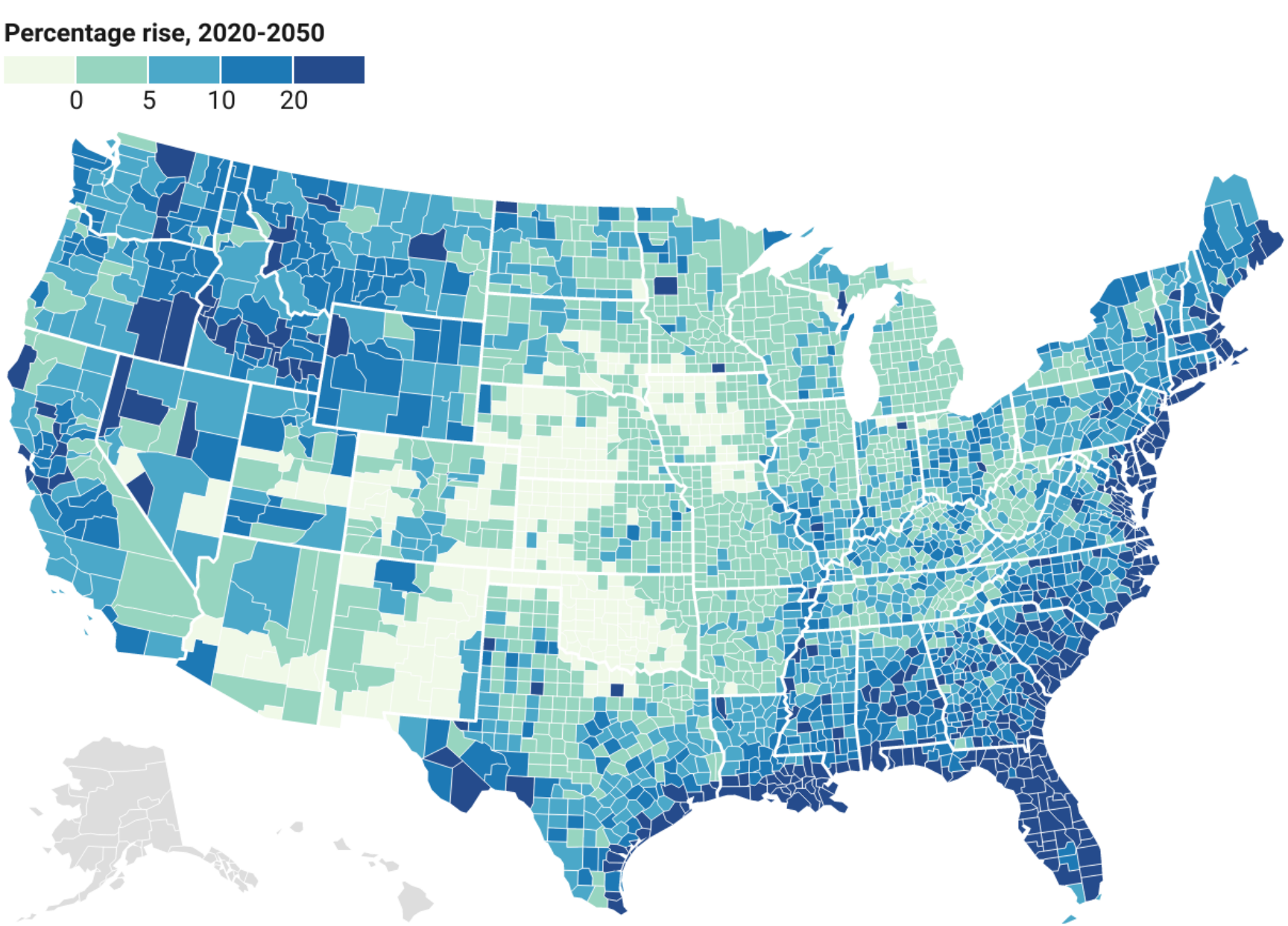
Source: Climate Central and Zillow

Sea Level Rise: 2040-2060 Percentage of property below high tide



Source: *ProPublica, September 15, 2020*

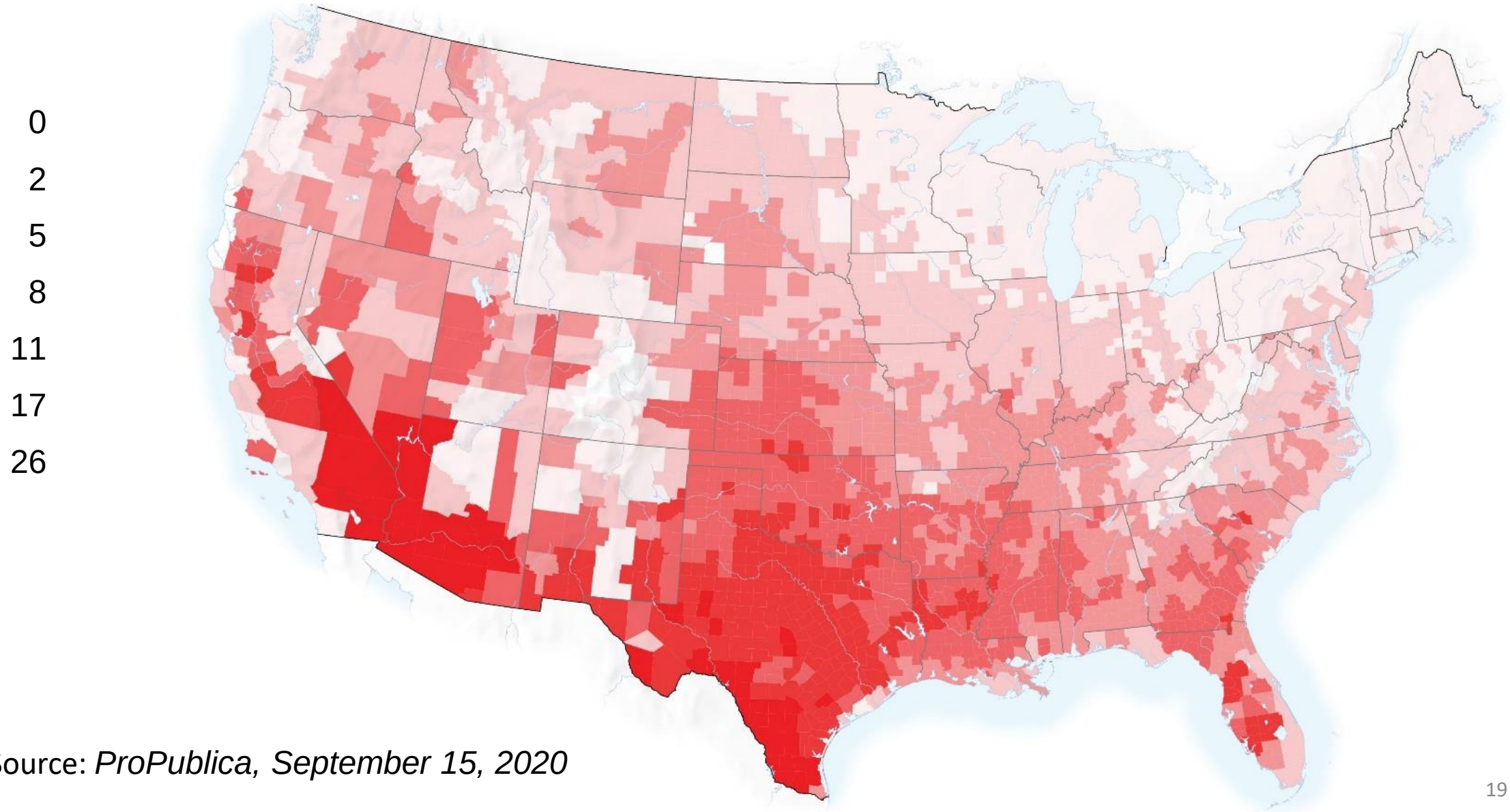
Where flood risk is projected to rise the fastest.



Flood damage measured in 2020 U.S. dollars.

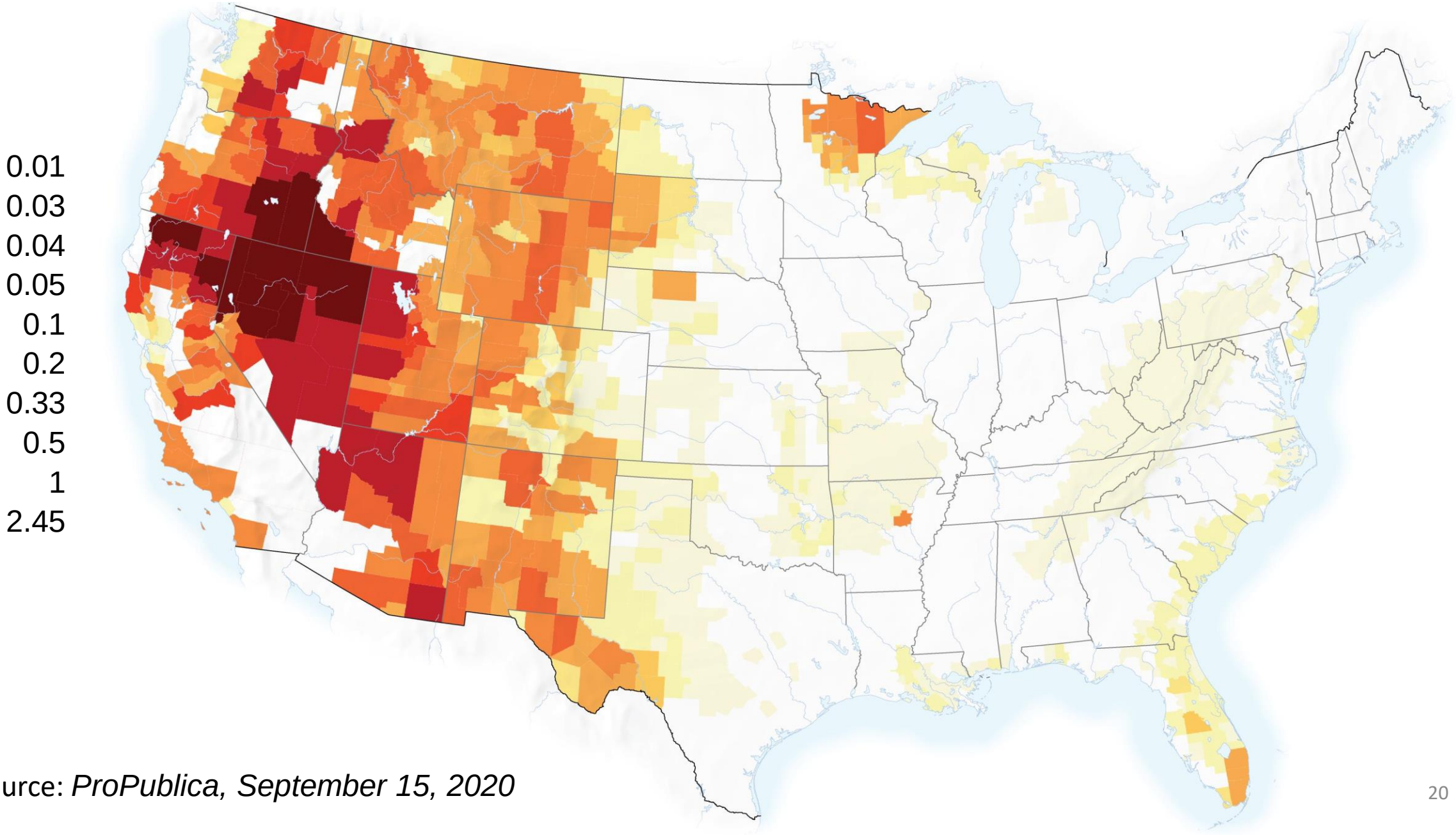
Map: The Conversation/CC-BY-ND • Source: Wing, et al. 2022

2040-2060 Weeks per year above 95 degrees F



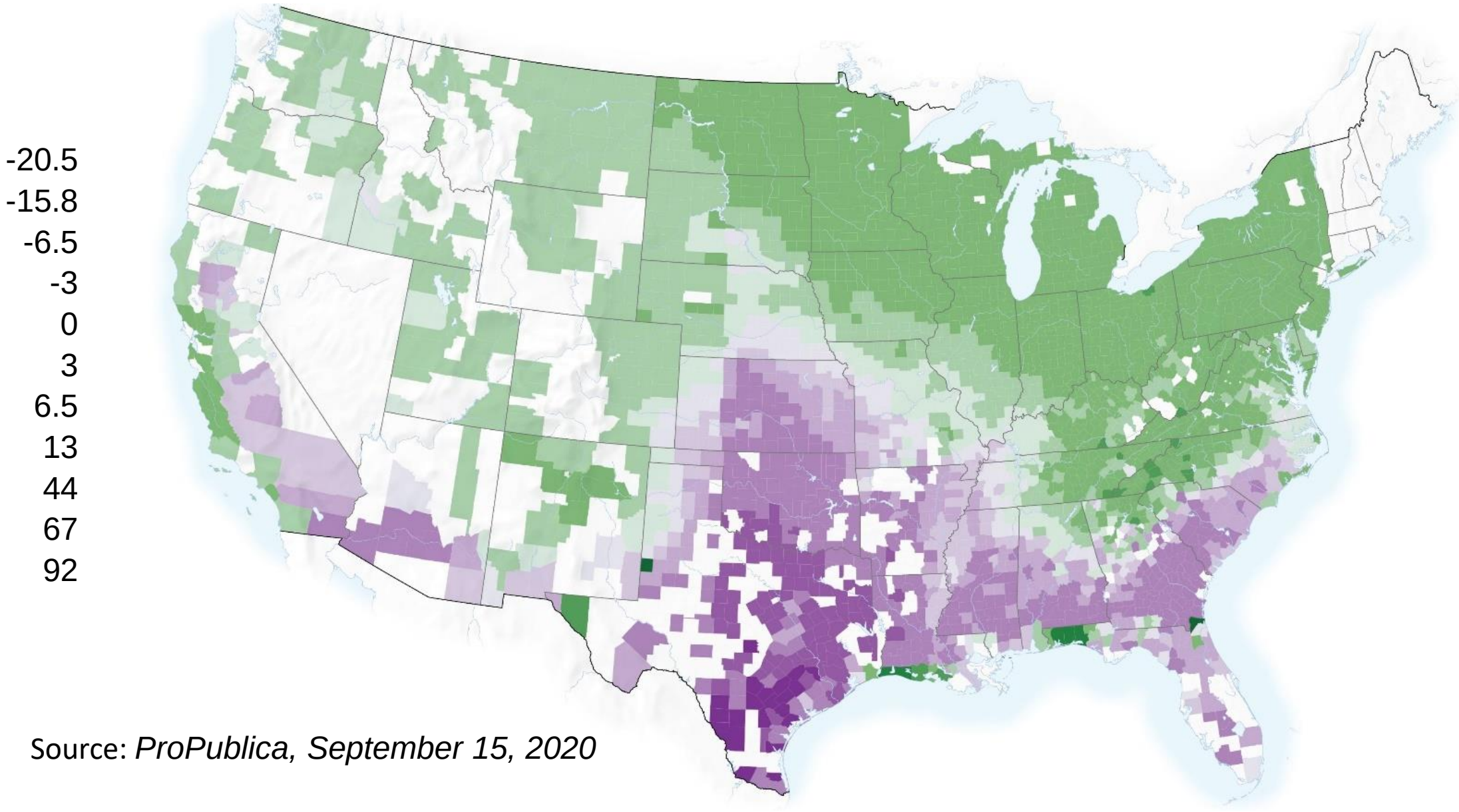
Source: *ProPublica, September 15, 2020*

Large Wildfires: 2040-2071 Average number of very large fires per year



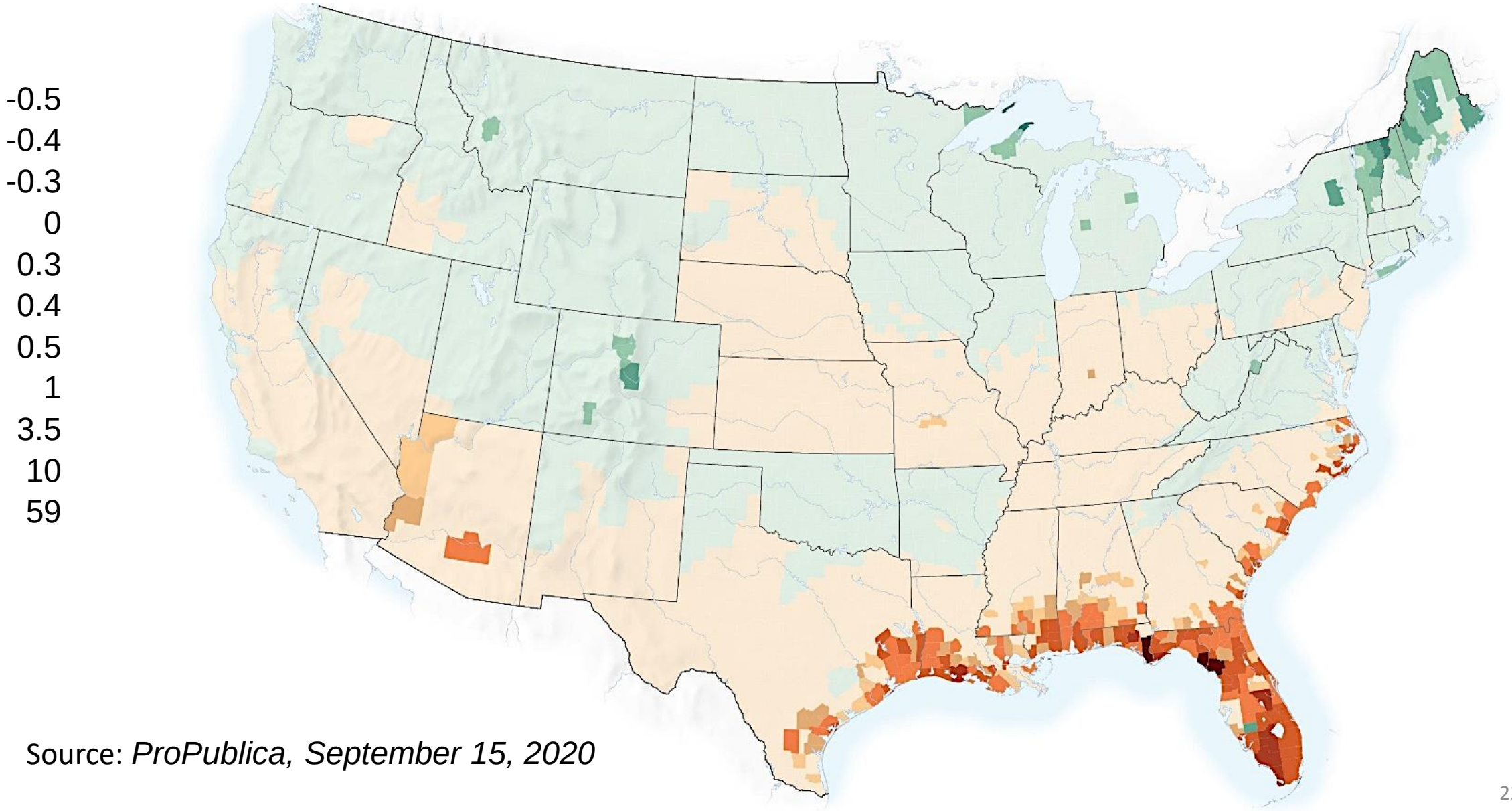
Source: *ProPublica, September 15, 2020*

Farm Crop Yields: 2040-2060 Percent decline in yields



Source: *ProPublica, September 15, 2020*

Economic Damages From Climate: 2040-2060 Climate damage as a percent of GDP



Source: *ProPublica, September 15, 2020*

Politics and Stake Holders

1. Whether it is occurring
2. How much has occurred in modern times
3. What has caused it
4. What its effects will be,
5. Whether action should be taken to curb it now or later

- Scientifically:

1. Very strong consensus that global surface temperatures have increased in recent decades
2. Trend is caused by human-induced emissions

Politically

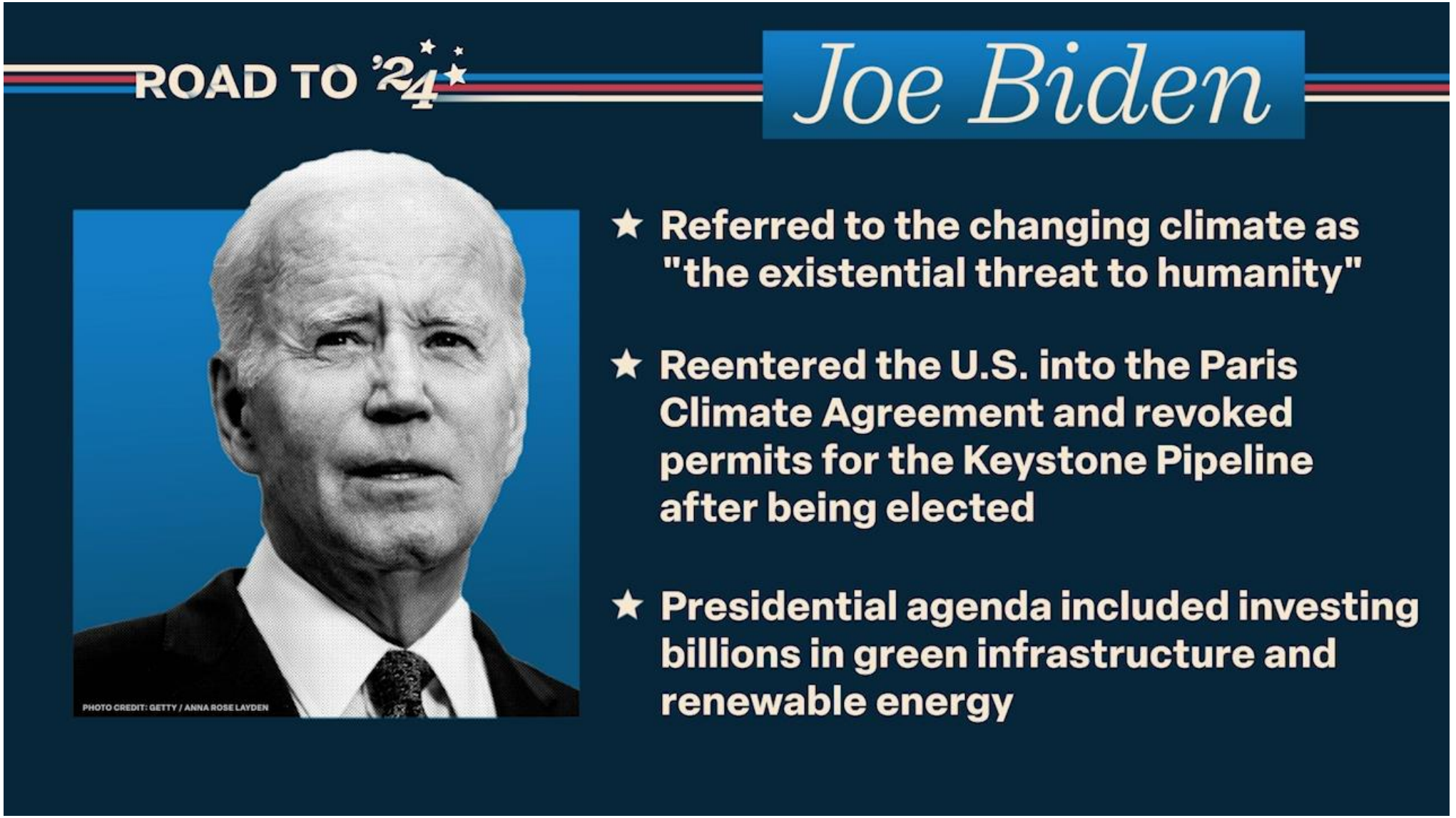
How much is global climate change going to cost you:

- taxes, missed earnings, increased insurance, increase health costs, lifespan, relocation expenses, travel expenses, energy expenses, reduction of life savings?

How much are you willing to help people who are more impacted than you? How much do you expect help?

- Nations submerged, flooded cities, relocation of cities, sea walls, spoiled crops, changing crops, disaster zones, migrants, local and global disaster funds, cost of CO2 removal, health measures for extreme climates,

Politics at Home



Versus:-

ROAD TO '24

Donald Trump

- ★ Has dismissed climate change as a "hoax" or "nonexistent"
- ★ Withdrew from the Paris Climate Agreement
- ★ Labels himself an environmental champion, emphasizing the importance of clean water and clean air

10 New Insights in CLIMATE SCIENCE 2023/2024 https://zenodo.org/records/10251586

1. Overshooting 1.5°C is fast becoming inevitable. Minimizing the magnitude and duration of overshoot is essential.
2. A rapid and managed fossil fuel phase-out is required to stay within the Paris Agreement target range.
3. Robust policies are critical to attain the scale needed for effective carbon dioxide removal.
4. Over-reliance on natural carbon sinks is a risky strategy: their future contribution is uncertain.
5. Joint governance is necessary to address the interlinked climate and biodiversity emergencies.

10 New Insights in CLIMATE SCIENCE 2023/2024

6. Compound events amplify climate risks and increase their uncertainty.
7. Mountain glacier loss is accelerating.
8. Human immobility in areas exposed to climate risks is increasing.
9. New tools to operationalize justice enable more effective climate adaptation.
10. Reforming food systems contributes to just climate action.

Economic Impact of Climate Change on GDP

	Temperature rise scenario, by mid-century			
	Well-below 2°C increase	2.0°C increase	2.6°C increase	3.2°C increase
	Paris target	*The likely range of global temperature gains*		*Severe case*
Simulating for economic loss impacts from rising temperatures in % GDP, relative to a world without climate change (0°C)				
World	−4.2%	−11.0%	−13.9%	−18.1%
OECD	−3.1%	−7.6%	−8.1%	−10.6%
North America	−3.1%	−6.9%	−7.4%	−9.5%
South America	−4.1%	−10.8%	−13.0%	−17.0%
Europe	−2.8%	−7.7%	−8.0%	−10.5%
Middle East & Africa	−4.7%	−14.0%	−21.5%	−27.6%
Asia	−5.5%	−14.9%	−20.4%	−26.5%
Advanced Asia	−3.3%	−9.5%	−11.7%	−15.4%
ASEAN	−4.2%	−17.0%	−29.0%	−37.4%
Oceania	−4.3%	−11.2%	−12.3%	−16.3%

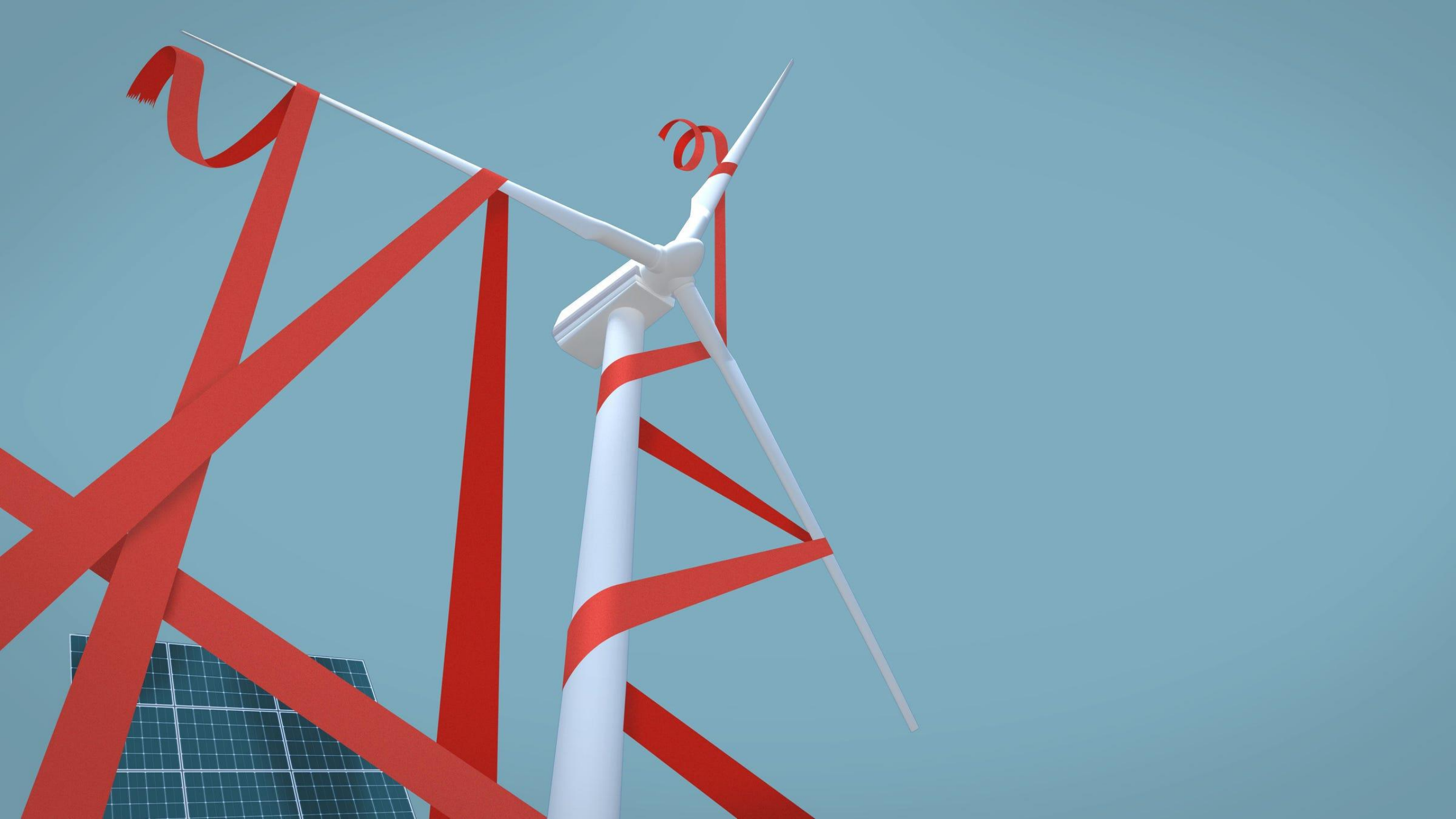
Note: Temperature increases are from pre-industrial times to mid-century, and relate to increasing emissions and/or increasing climate sensitivity (reaction of temperatures to emissions) from left to right.
Source: Swiss Re Institute

The UNFCCC Process has been corrupted

- There were more Fossil Fuel Lobbyists than ever at COP28.
- The COP28 attendees include government officials, climate scientists, climate activists, Indigenous peoples and, increasingly, fossil fuel lobbyists—*a lot* of fossil fuel lobbyists.
- In 2021, at the *COP26* gathering in Glasgow, Scotland, there were 503 fossil fuel lobbyists present. That increased to 636 at COP27 in Sharm el-Sheikh, Egypt, in 2022, before ballooning to a whopping 2,456 this year in Dubai.

UNFCCC Reform of COP Process Needed

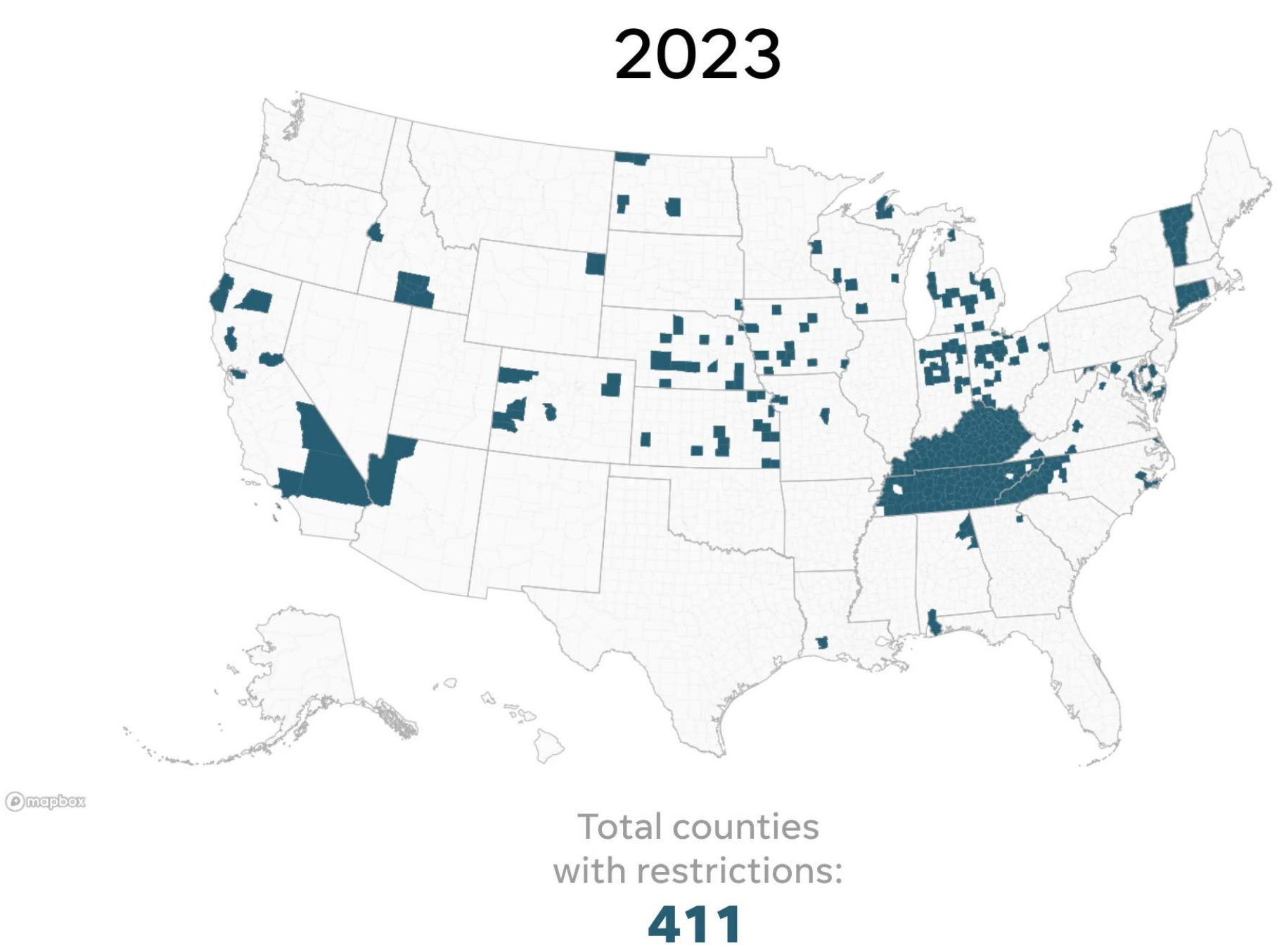
- Countries with economies heavily dependent on extracting and exporting fossil fuels shouldn't be allowed to host the talks, and that fossil fuel industry executives with an "enormous conflict of interest" should not be allowed to preside over the talks.
- COP rules should be changed to allow for a supermajority of, say, 75% of nations to approve a decision, rather than allowing one country to block progress.
- The "name and shame" mechanism envisioned by the UNFCCC has not worked. Punitive actions are needed against countries, like Saudi Arabia and Russia, who are clearly acting in bad faith.



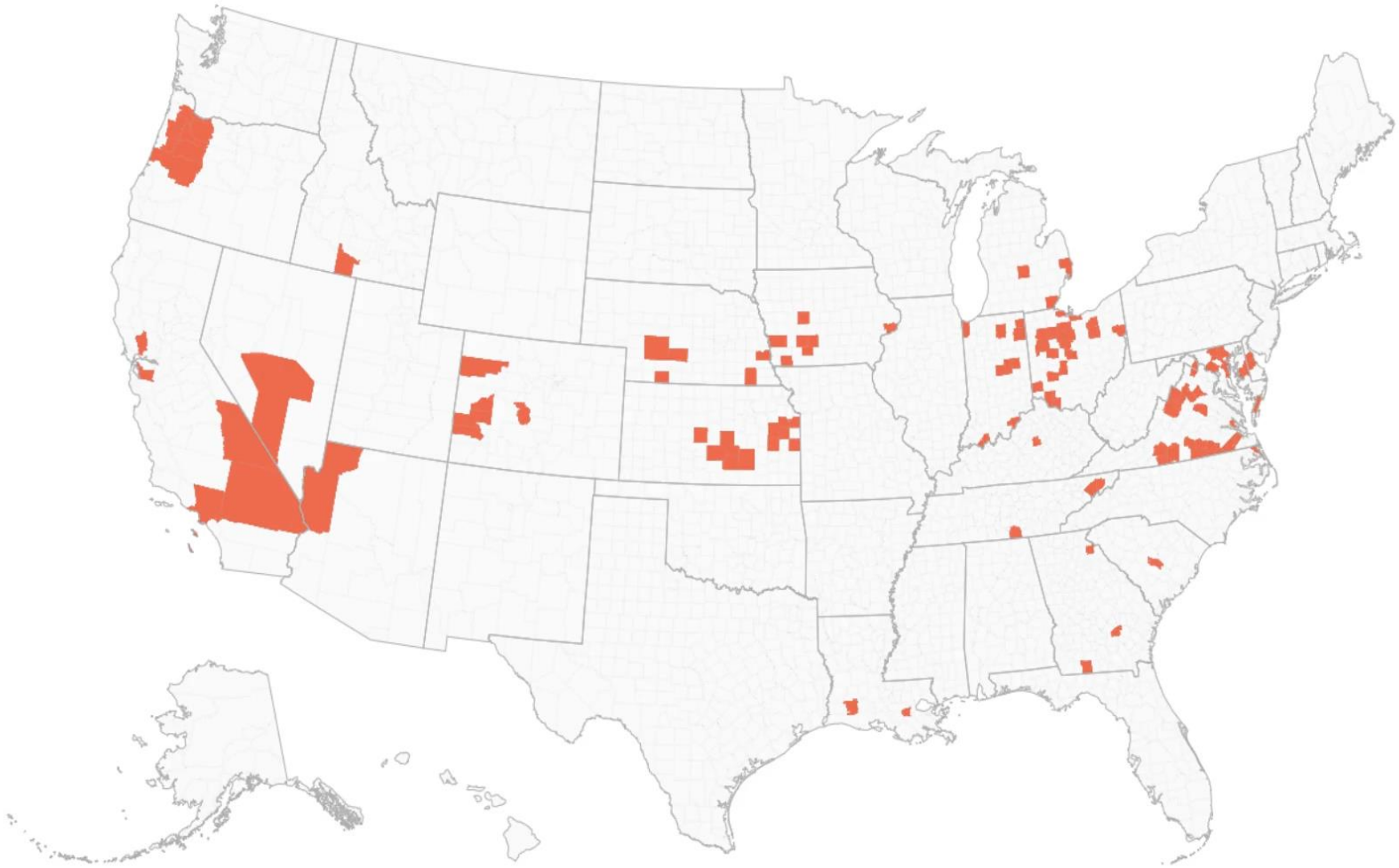
Clean energy plants are being banned faster than they're being built.

- At least 15% of counties in the U.S. have effectively halted new utility-scale wind, solar, or both.
- These limits come through outright bans, moratoriums, construction impediments and other conditions that make green energy difficult to build.
- In the past decade, about 180 counties got their first commercial wind-power projects. But in the same period, more than twice as many blocked wind development.
- Solar power has found more broad acceptance, 2023 was the first year to see almost as many individual counties block new solar projects as the ones adding their first projects.

Wind bans/block by county 2007-2023



Wind bans/blocks by county 2007-2023



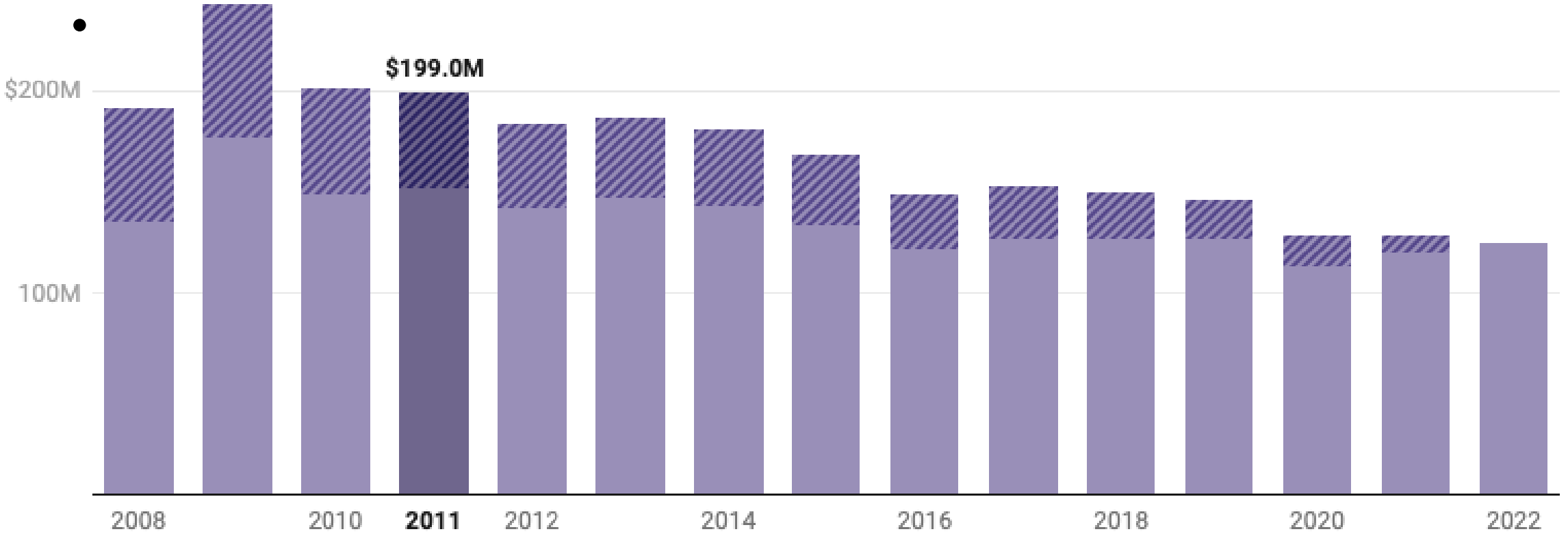
Who is Doing This?

- The opposition to renewable energy isn't as simple as left vs. right, and it isn't always a matter of big business vs. small activists. There’s no one group fighting renewables – there are many, with a range of objections.
- There are several national think tanks and groups, many that receive fossil fuel funding, that have been putting out arguments, often false, opposing wind and solar power for years.
- Much of the opposition comes from local activists without obvious ties to national groups.
- Attend a county zoning or commission meeting and there will most likely be conspiracy theories and wild accusations about the dangers of renewable energy and even questions about whether global warming truly exists – often the exact same arguments put forth by fossil fuel funded think tanks.

Who is Doing This?

- There are 32 organizations with links to fossil fuel interests that deny climate change is real and are against renewable energy deployment. Such as:
  - The Heartland Institute
  - The Heritage Foundation
  - The Cato Institute
  - American Enterprise Institute
- Major Funding Sources are:
  - Koch Brothers (Charles G. Koch Foundation)
  - ExxonMobil
  - Peabody Coal

Annual Lobbying By Oil and Gas Industry for Fossil Fuels



Annual spending is adjusted for inflation.

Chart: Jimmy Cloutier/OpenSecrets • Source: OpenSecrets analysis of 2022 federal lobbying disclosures. • Created with Datawrapper

Top 10 oil and gas industry clients of 2022

The ten industry clients that spent the most money on federal lobbying accounted for more than half the spending by oil and gas **companies** and **trade associations**.

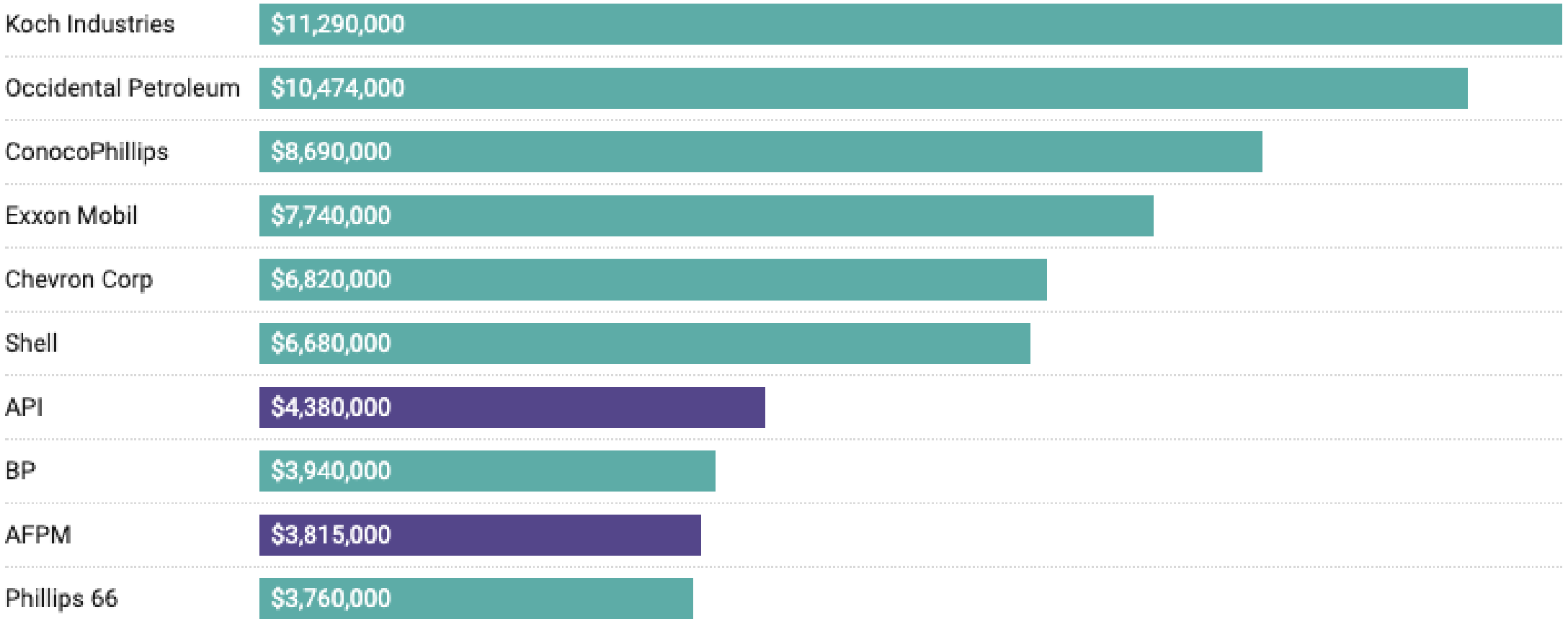
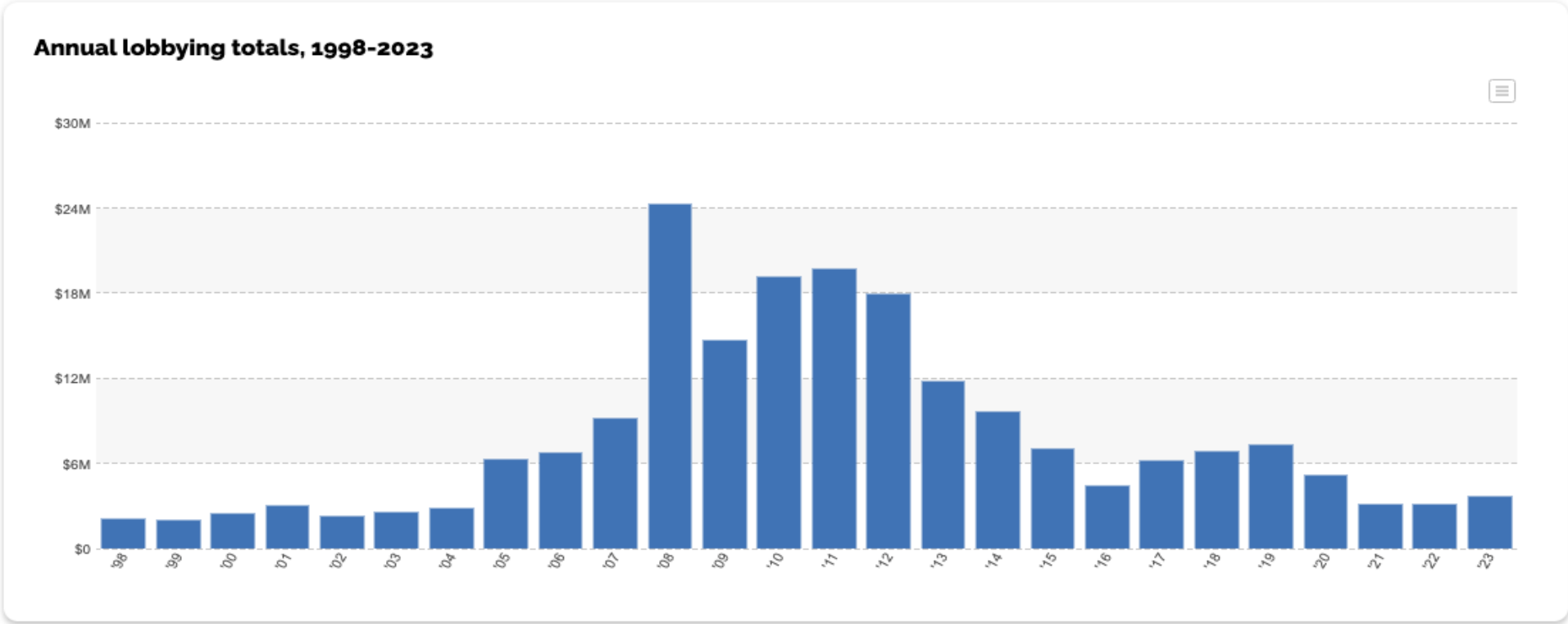


Chart: Jimmy/Cloutier • Source: OpenSecrets analysis of 2022 federal lobbying disclosures. • Created with Datawrapper

Coal Mining: Annual Lobbying Totals 1998-2023



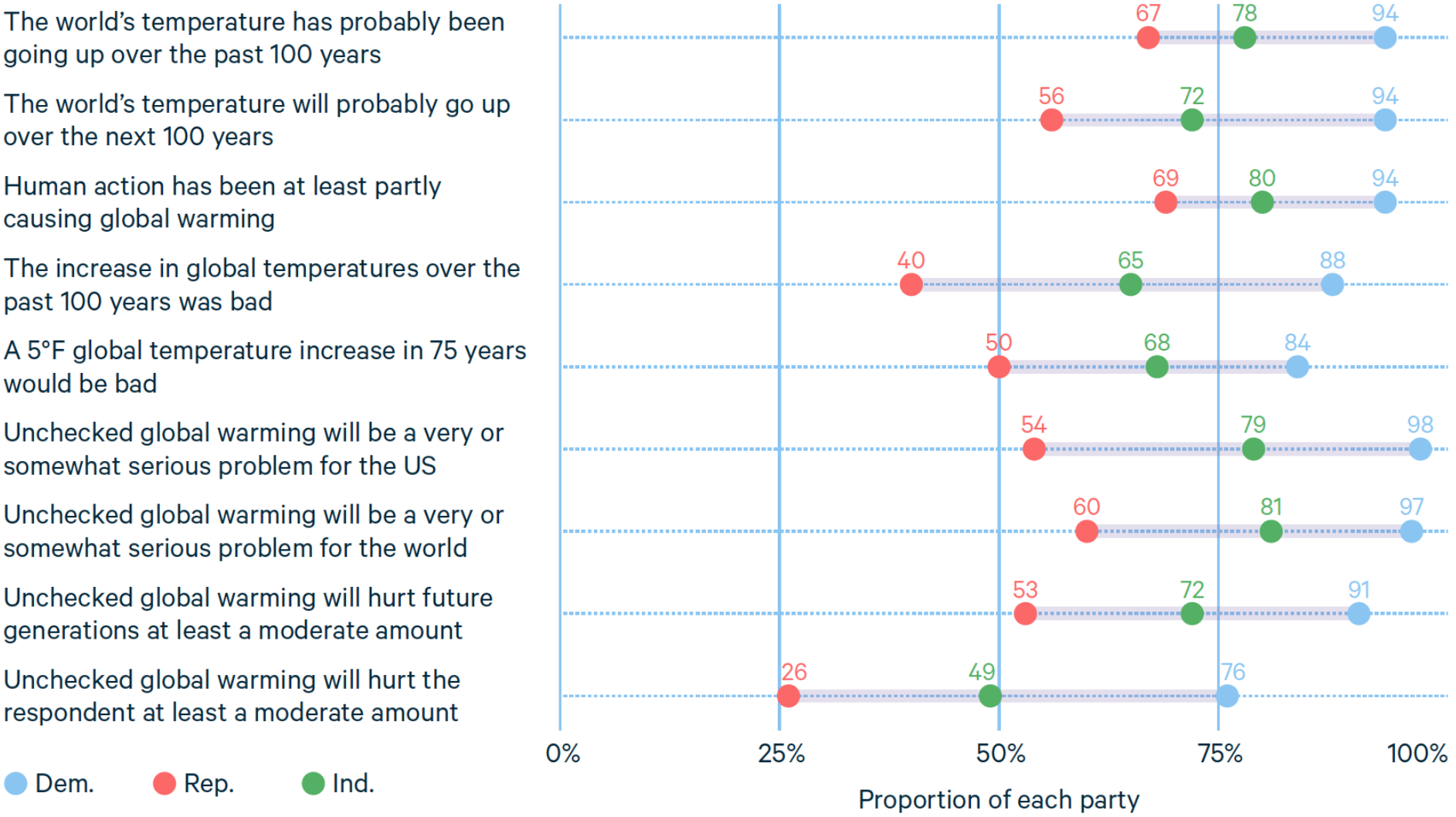
$3,667,500
2023 Total for Coal Mining

24
Number of Clients

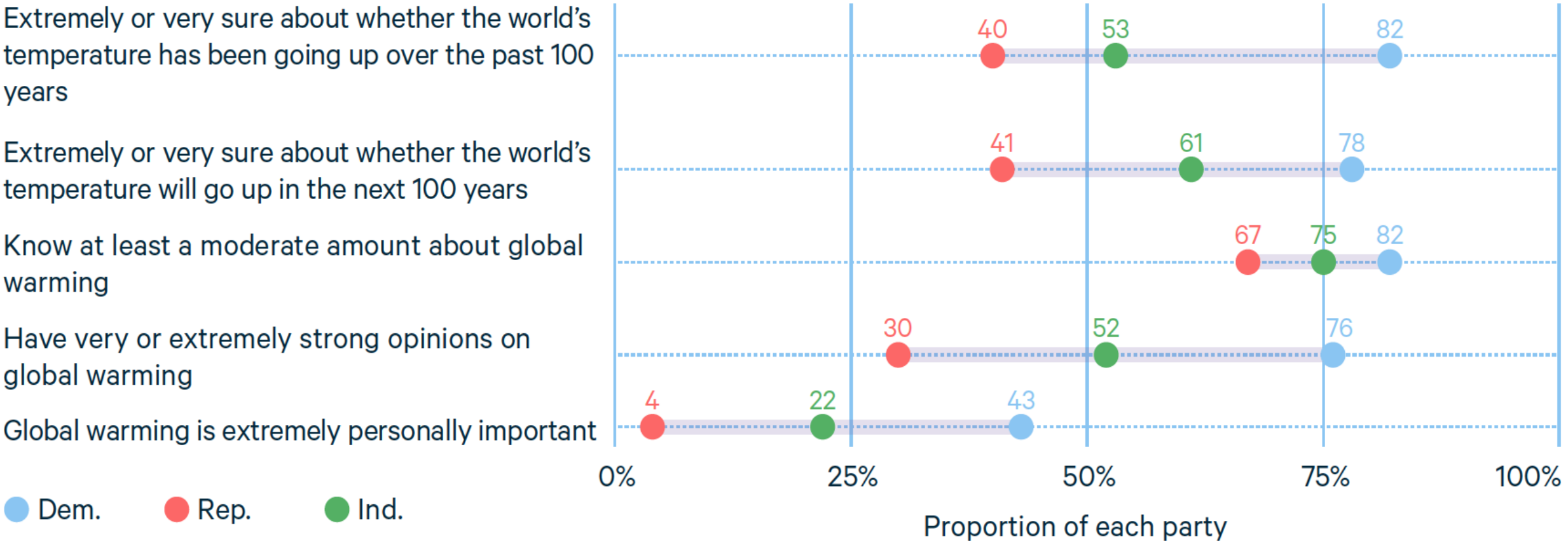
55
Number of Lobbyists

40
Number of Revolvers (72.73%)

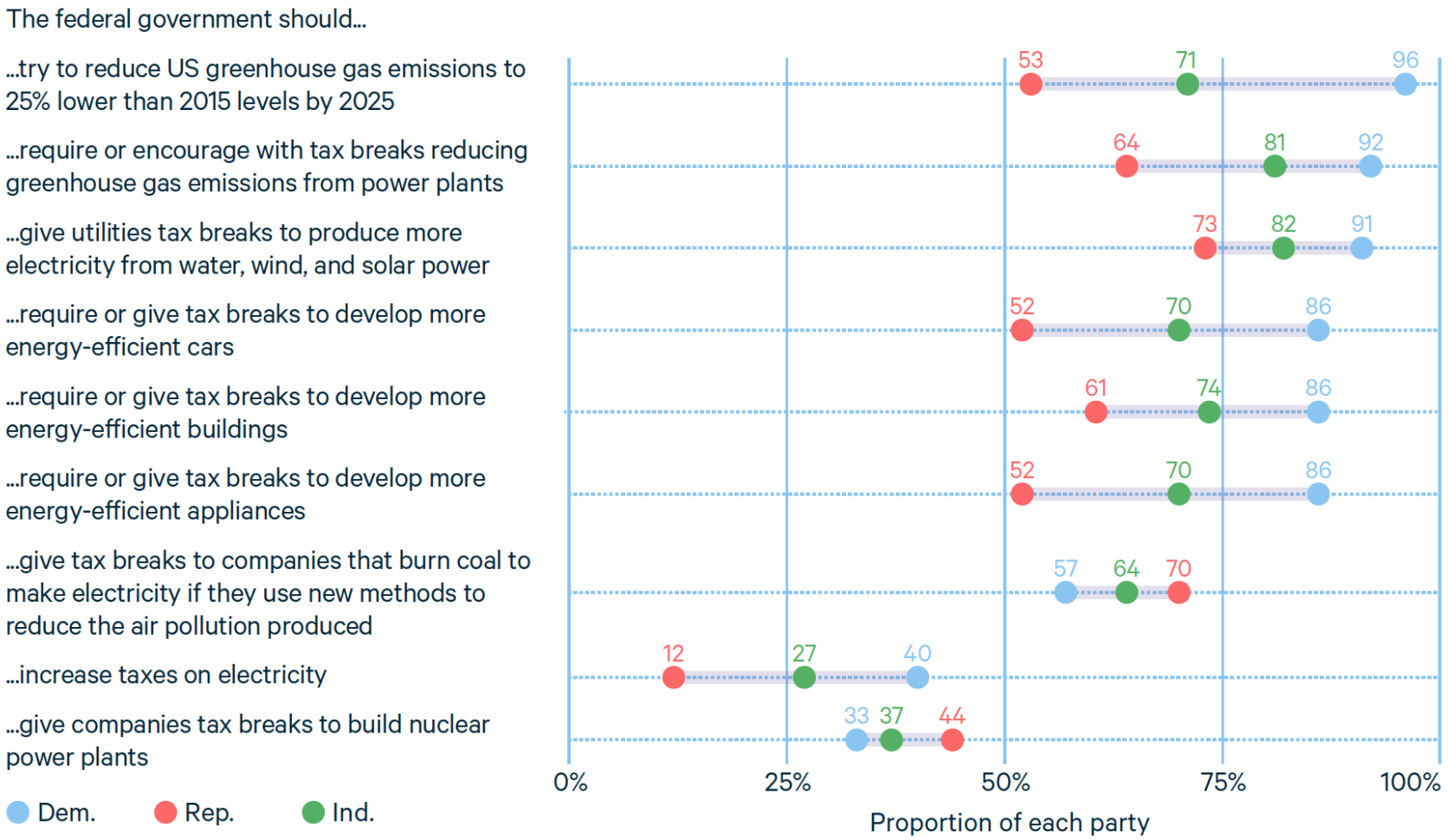
Party Breakdown of beliefs about global warming and its effects



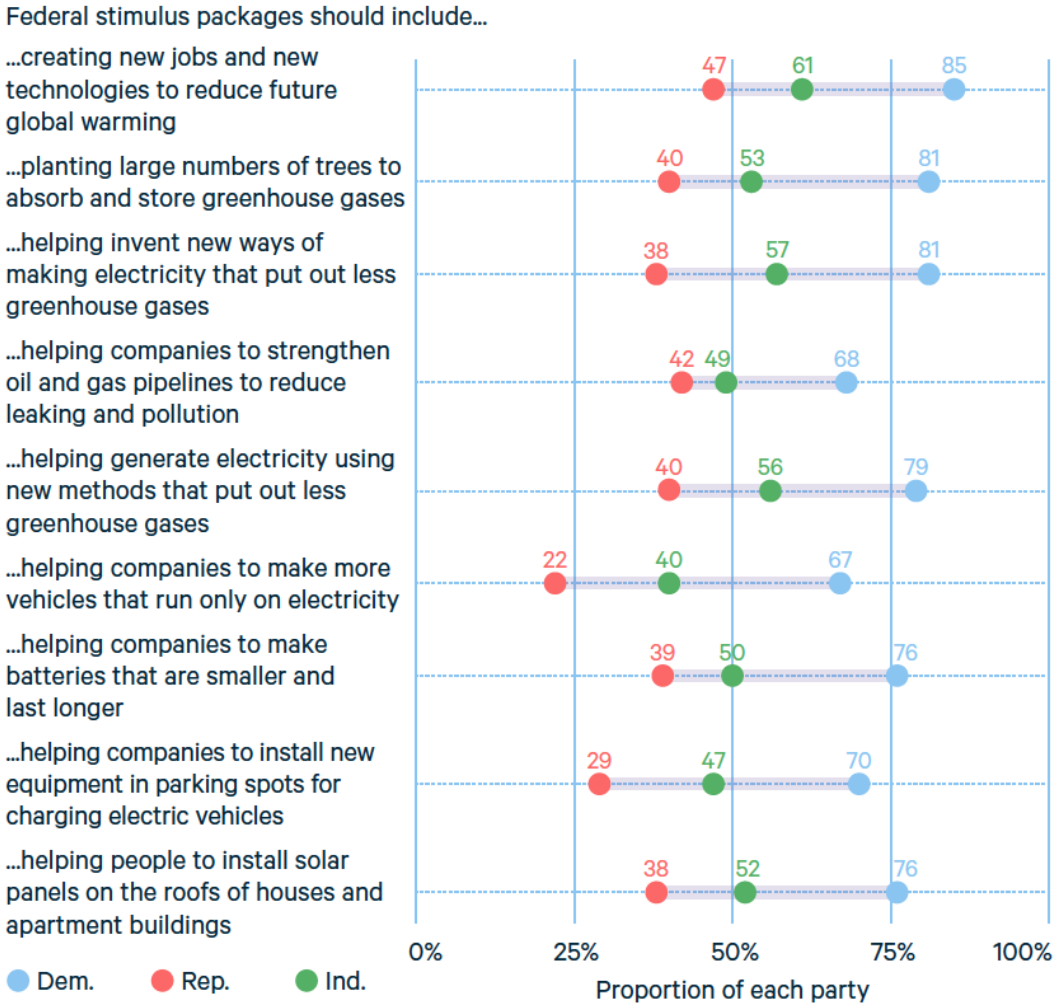
Party Breakdown on Opinion Strength



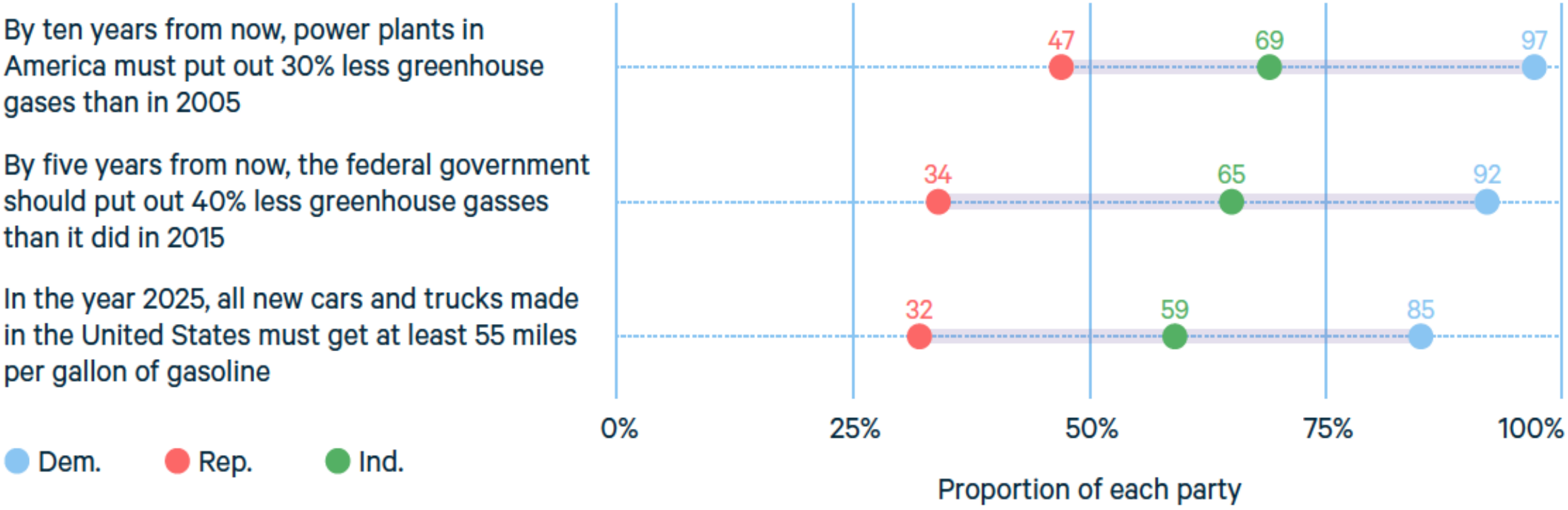
Party Breakdown of support for “common ground” policies on which the majorities of Democrats and of Republicans agree



Party Breakdown of opinions on federal stimulus policies on which the majorities of Democrats and of Republicans agree



Party Breakdown of opinions on Obama-era policies on which the majorities of Democrats and of Republicans disagree



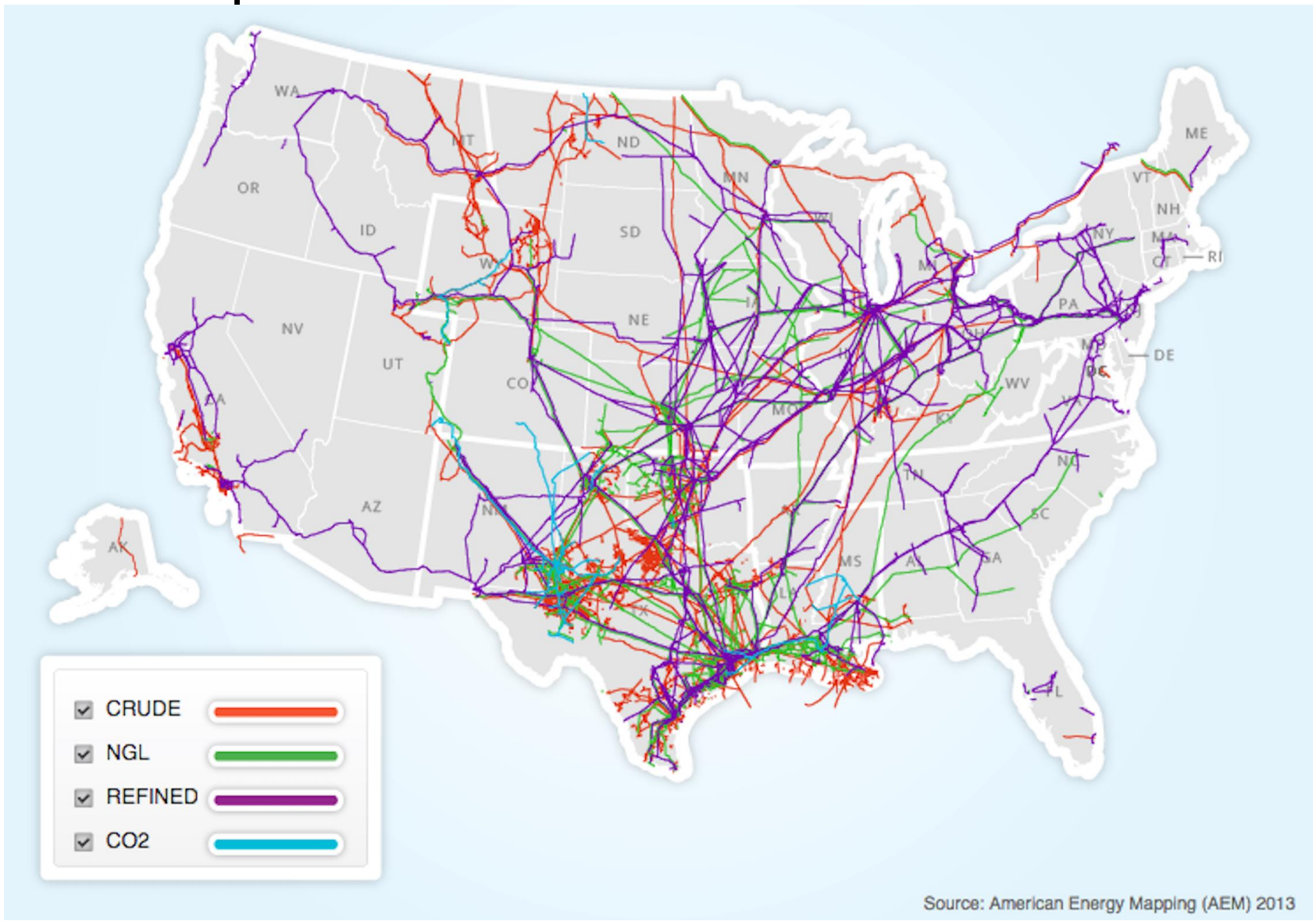
Look how much opinion has changed.

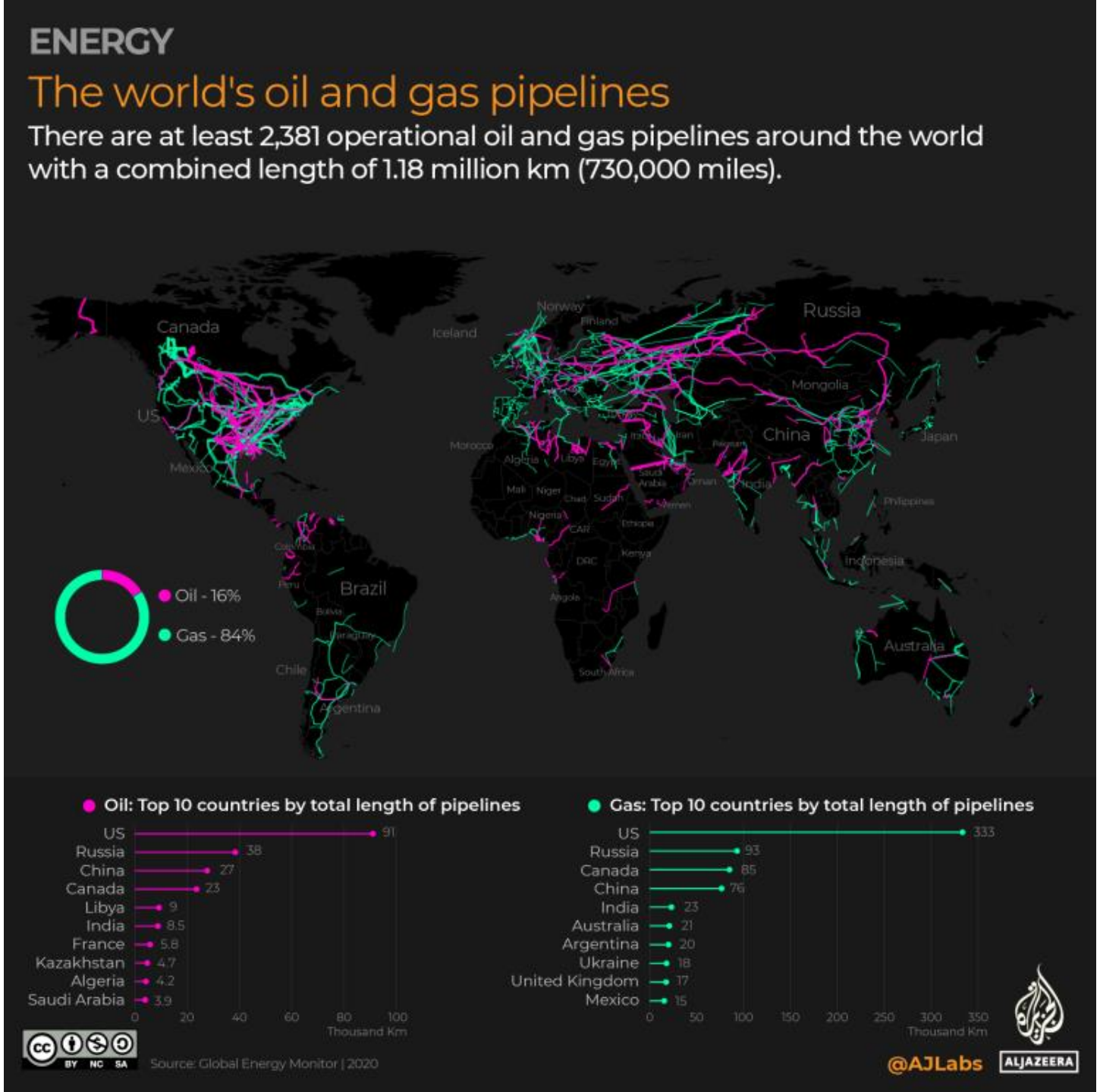
- https://www.pbs.org/wgbh/frontline/documentary/climate-of-doubt/ (first 7 mins)
-

Discussion

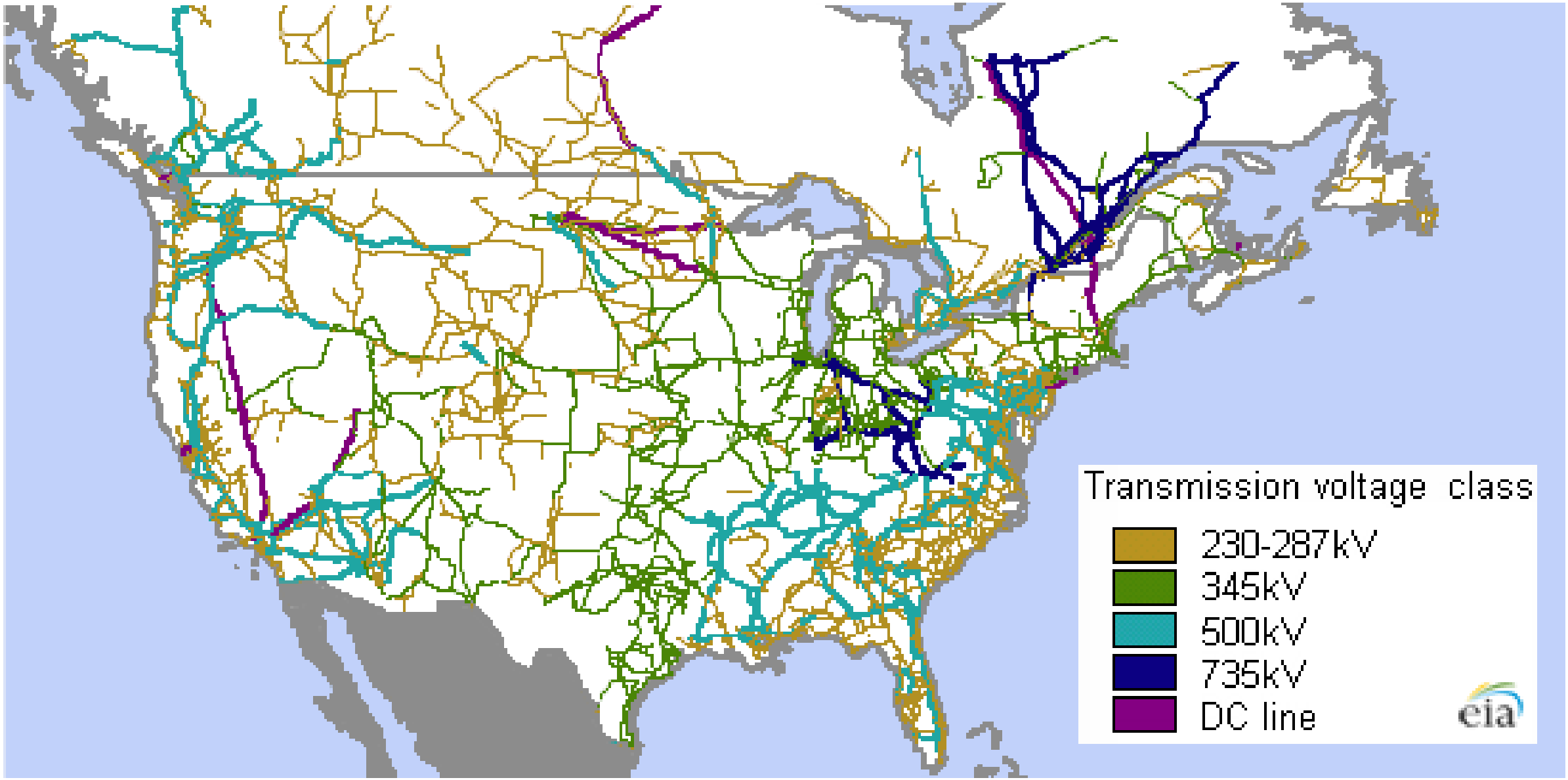
Extra Slides

Pipeline map USA




ENERGY
The world's oil and gas pipelines
There are at least 2,381 operational oil and gas pipelines around the world with a combined length of 1.18 million km (730,000 miles).
Canada
US
Mexico
Brazil
Chile
Argentina
Iceland
Norway
Finland
Russia
Mongolia
China
Japan
Morocco
Algeria
Libya
Egypt
Saudi Arabia
Oman
India
Mali
Niger
Chad
Sudan
Nigeria
CAR
Ethiopia
Kenya
DRC
Angola
South Africa
Philippines
Indonesia
Australia
Oil - 16%
Gas - 84%
Oil: Top 10 countries by total length of pipelines
US 91
Russia 38
China 27
Canada 23
Libya 9
India 8.5
France 5.8
Kazakhstan 4.7
Algeria 4.2
Saudi Arabia 3.9
0 20 40 60 80 100
Thousand Km
Gas: Top 10 countries by total length of pipelines
US 333
Russia 93
Canada 85
China 76
India 23
Australia 21
Argentina 20
Ukraine 18
United Kingdom 17
Mexico 15
0 50 100 150 200 250 300 350
Thousand Km
Source: Global Energy Monitor | 2020
@AJLabs
ALJAZEERA

Electric transmission crosses North American borders



CO2 Pipelines

- Keystone oil pipeline on their property. More than a decade since construction, their fields still aren't as productive after the damage.
- "The intent of pipelines is to deliver a product or commodity to a consumer at a cheaper rate of transportation in order to save them dollars,"
- Proponents of CO2 pipelines say they would extend the life of the ethanol industry, which in turn supports corn growers. But people counter that it won't directly benefit farmers who would have to give up their land.
- Get one time check and then it's done. How come we don't get paid as long as that pipeline is being used?"