

# 1. What proportion of climate scientists conclude that humans are the primary driver of today's climate warming?

**Our answers, in brief:**

**(Doug)** – Over 99% of climate scientists. The familiar figure is 97%, that was from earlier, and is now greater. The lessons are that 1) many people don't understand that it is this high, and 2) convincing people that there is an overwhelming consensus is an effective way to change people's minds about climate change ("studies show...")

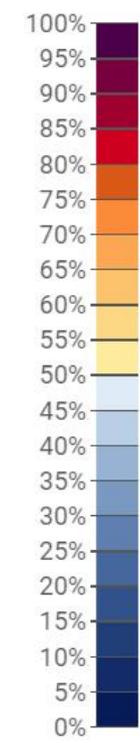
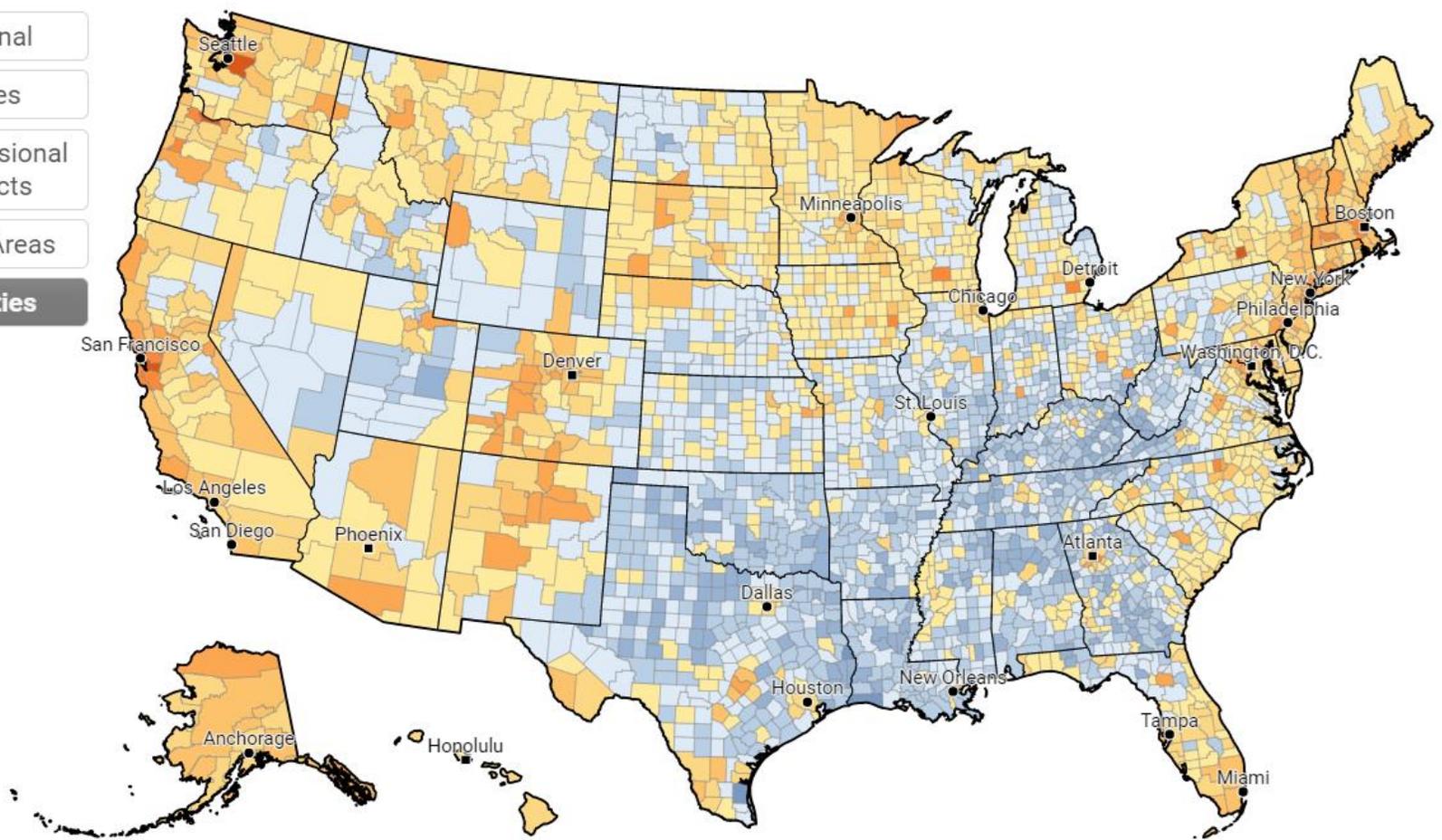
Select Question: Most scientists think global warming is happening

Absolute Value

Click on map to select geography, or: Select a State

Select a County

- National
- States
- Congressional Districts
- Metro Areas
- Counties**

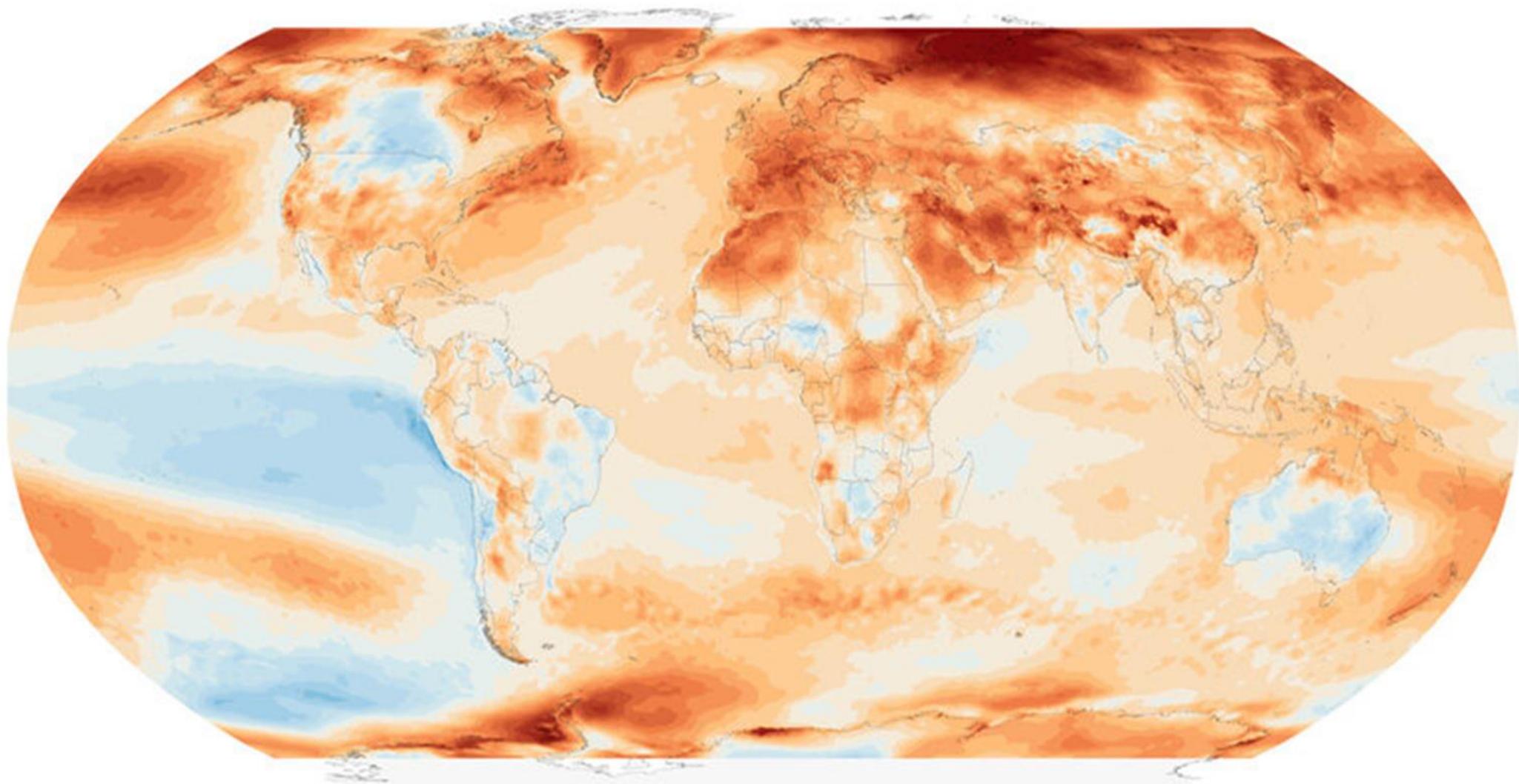


## 2. How much has the earth warmed since pre-industrial times?

**Our answers, in brief:**

**(Doug)** – Around 1.1°C (around 2°F). Compare that to the Paris Accord goal of limiting warming to 1.5°C, we're not far from that.

## 2022 Average Temperature Anomaly Compared With 1981–2010 Average



### 3. What part or parts of the world are warming fastest? Why?

**Our answers, in brief:**

**(Doug)** – The Arctic is clearly warming faster than more areas. This is partly due to feedback loops, which are an important part of climate change. In this case, melting ice means that more heat is absorbed in the arctic (because darker water and land absorb heat better than the white ice, which reflects the light). More heat absorbed means more melting ice, which means more heat absorbed...and on and on.

## 4. How much has Harrisonburg warmed? How much is it projected to change in this area?

### Our answers, in brief:

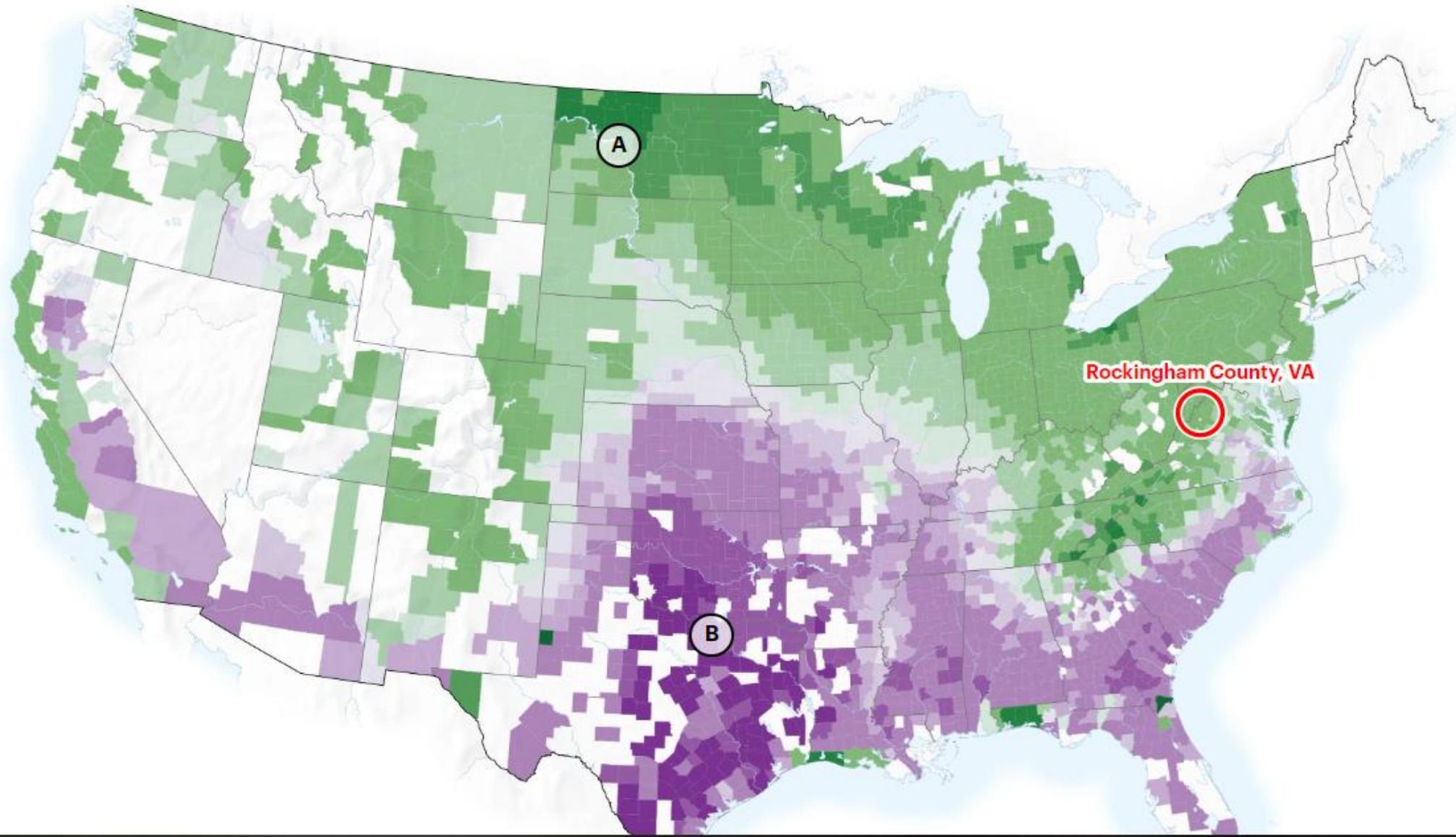
**(Doug)** – We are not the fastest warming area, data suggest we are warming at a moderate rate. A common observation about areas like ours that are buffered from the worst of these changes is that we may see "climate migrants" move into our area.

The lesson here is that not all areas are impacted equally, and it depends what impact you look at. The map on the next slide shows projected impacts on agriculture. In that estimation, our production would actually increase. Of course that doesn't mean we want climate change to happen (!), but it is important to recognize the local variability in effects.

Rockingham County, VA



Percent decline in yields



Rockingham County, VA

5. Besides, carbon dioxide, what other gases are responsible for climate warming?

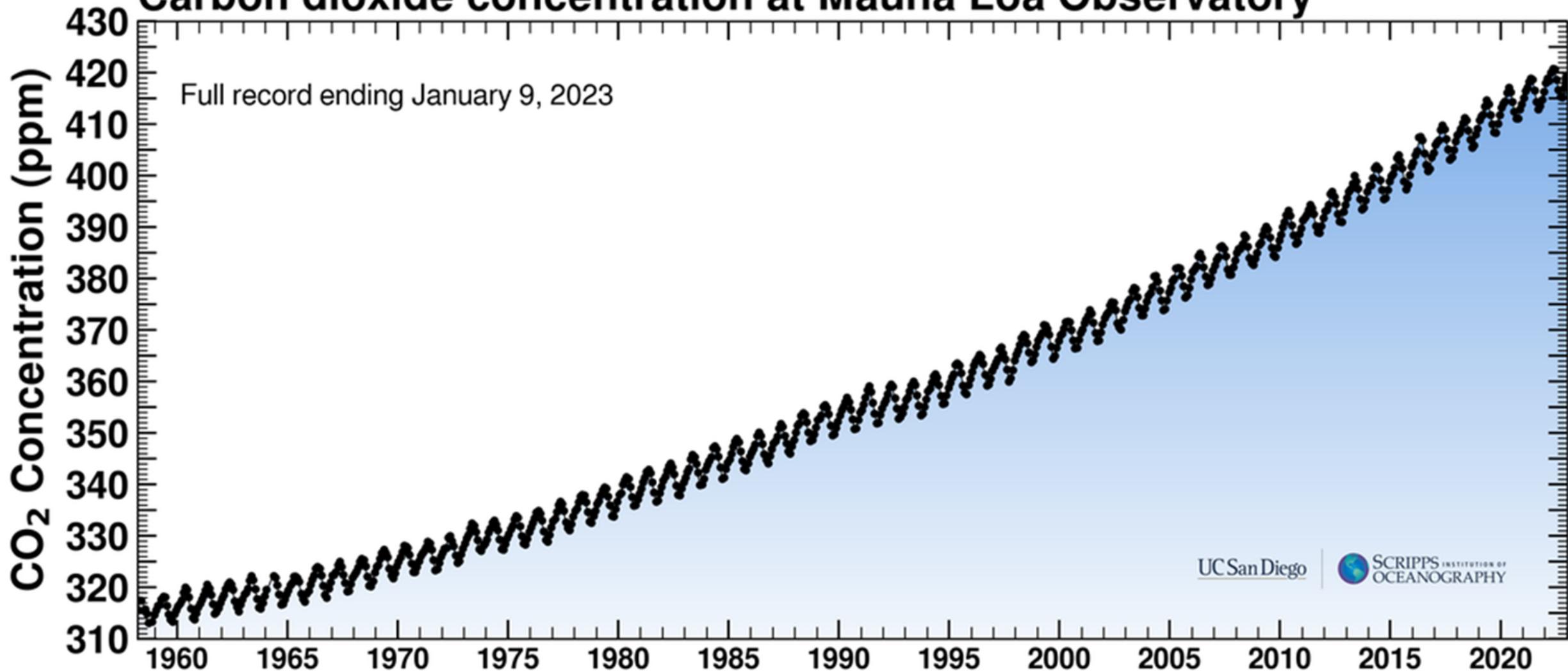
5. What are the main sources of methane?

What is nitrous oxide and where does it come from?

Why do Drawdown and other sources make a big deal about refrigerants?

6. How much has carbon dioxide increased in the atmosphere?

# Carbon dioxide concentration at Mauna Loa Observatory



7. How long does CO<sub>2</sub> remain in the atmosphere?

## 8. The planet's temperature has changed before, is there something different about the current changes?

### Our answers, in brief:

**(Doug)** – In general, this is a very fast change in temperature compared to past changes. There are times (like the Younger Dryas period, some 12,000 years ago, where it looks like there were some fast changes in temperature, at least in local areas. The lesson here is that those changes had dramatic effects on the earth's ecosystems, so we can likewise expect dramatic effects with the current change.

## 9. If we stopped burning fossil fuels today, what would happen to the climate?

### Our answers, in brief:

**(Doug)** – The most recent data suggests that we can stabilize temperatures relatively quickly. This is a newer finding; previous models which were less refined had suggested that there is a lot of warming "baked into the system", and that it would take a long time to slow the rate of warming.

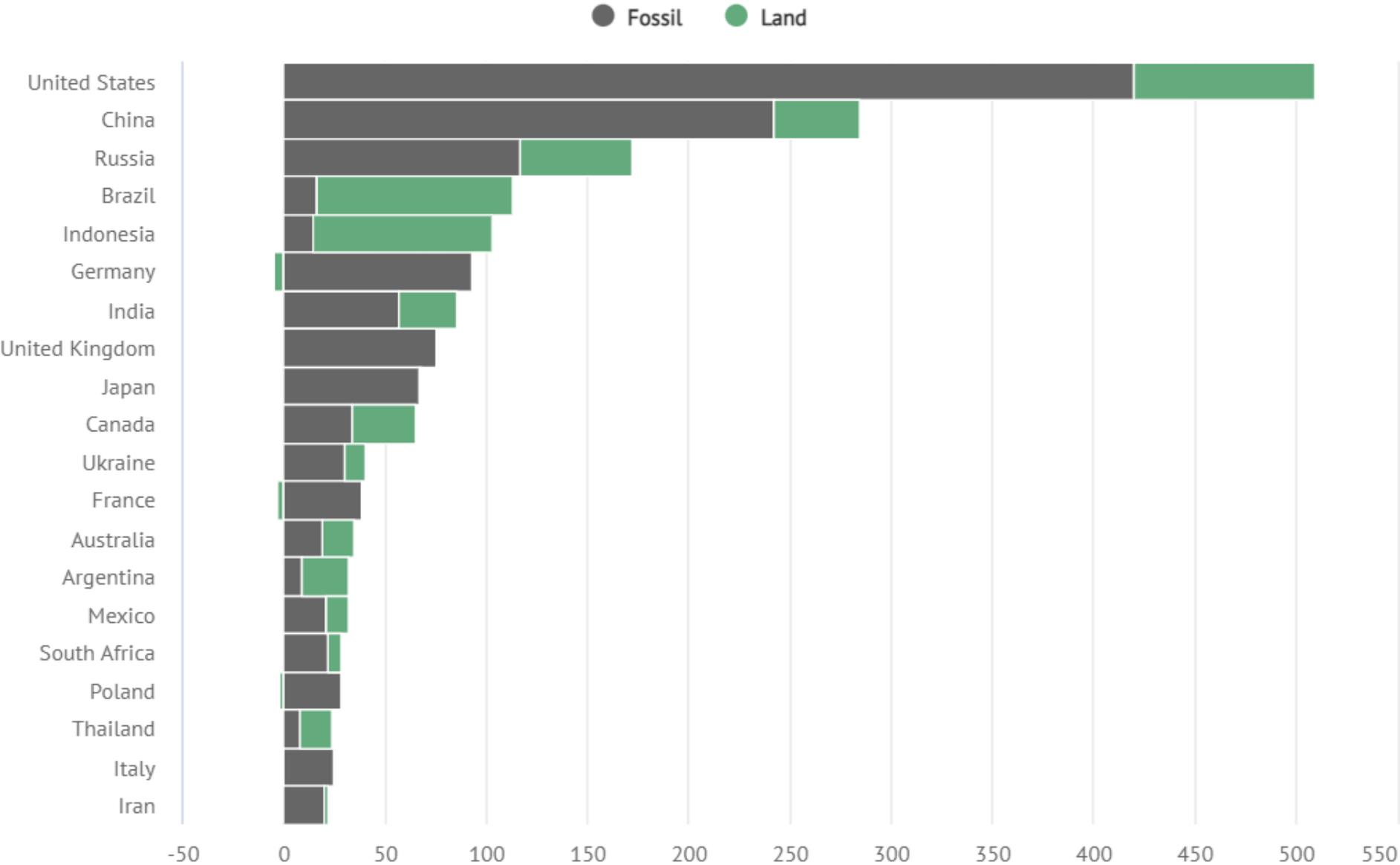
## 10. What country has the largest carbon footprint?

**Our answers, in brief:**

**(Doug)** – Remember there is a difference between total historical emissions and current annual emissions. The US is "the winner" on historical emissions. China is rapidly catching up, though, and they are "the winner" on current annual emissions.

# The countries with the largest cumulative emissions 1850-2021

Billions of tonnes of CO2 from fossil fuels, cement, land use and forestry



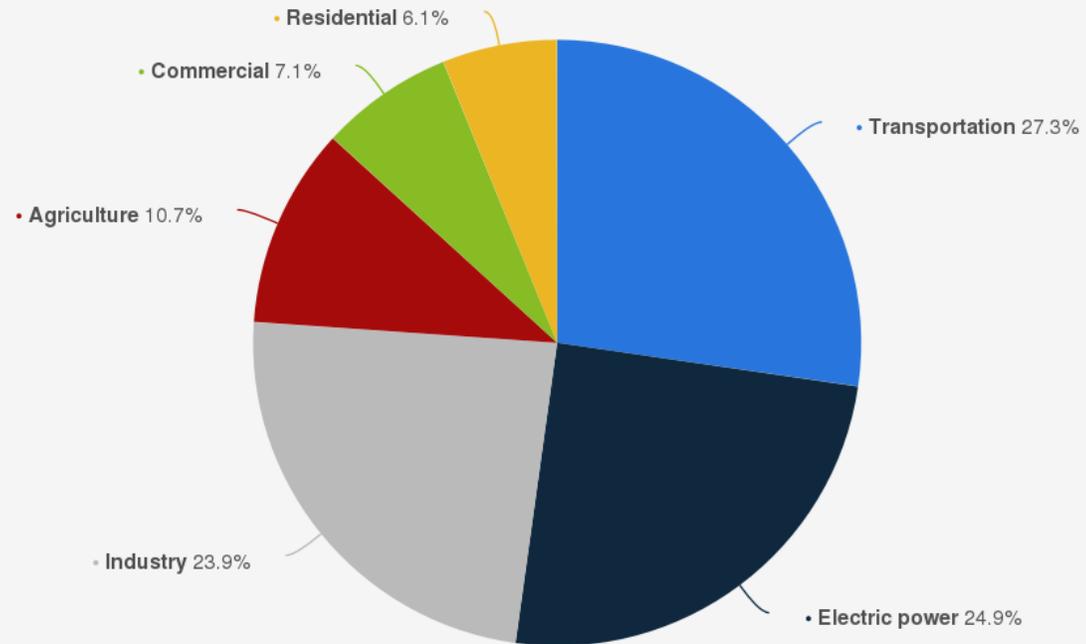
# 11. What general area of activity is the greatest source of greenhouse gases?

## **Our answers, in brief:**

**(Doug)** – Charts on the next page compare global and US emissions by sector, you can see there are some similarities and some differences. One lesson here is that there is no one single area that is the majority of emissions. We think of emissions as “wedges” - the total emissions is made up of many individual wedges, and we need to work on them all.

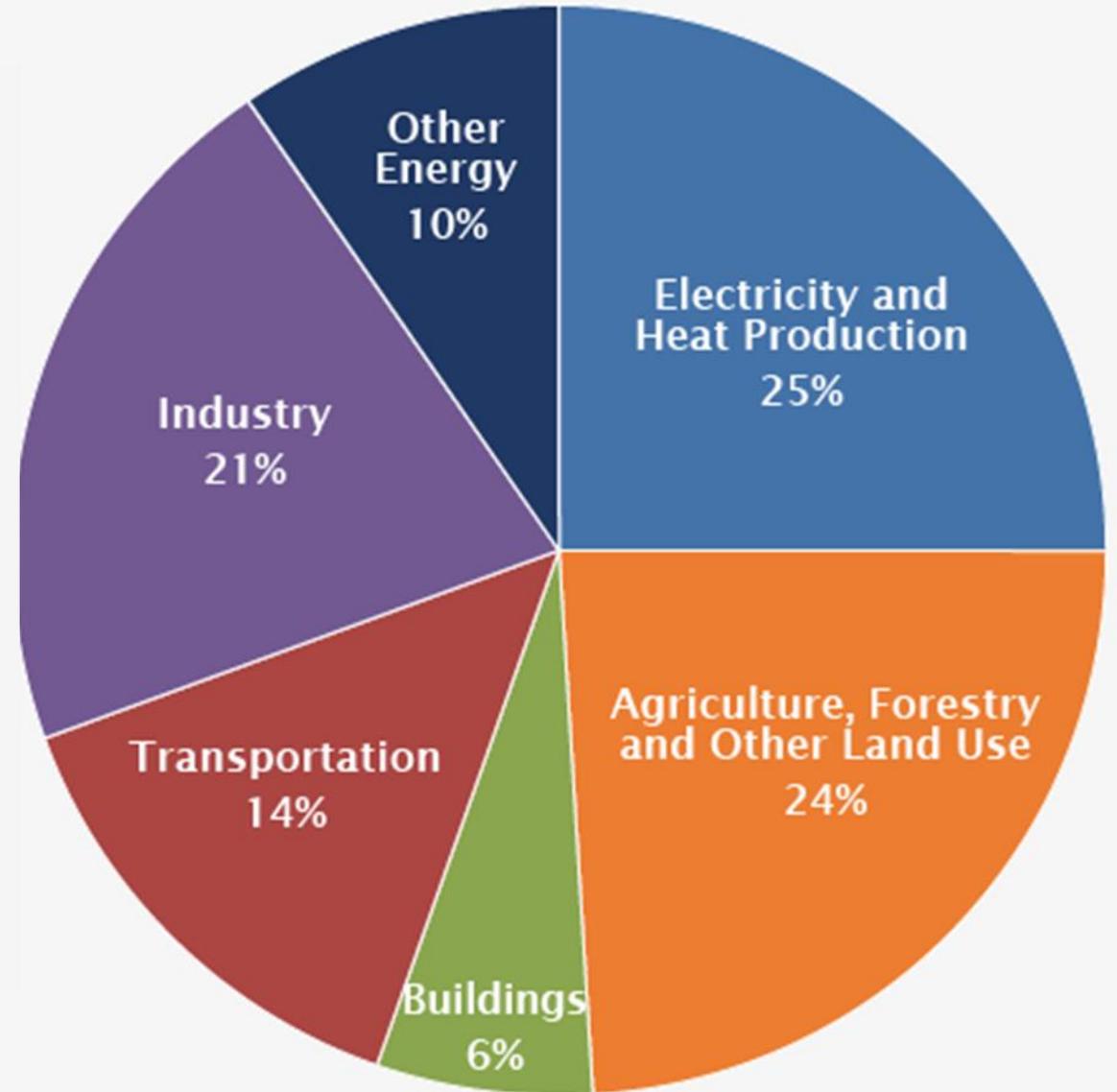
# Global Greenhouse Gas Emissions by Economic Sector

Distribution of greenhouse gas emissions in the United States in 2020, by economic sector\*



Source  
Environmental Protection Agency  
© Statista 2023

Additional Information:  
2020; Based on total gross emissions of 5,958.4 MtCO<sub>2</sub>e

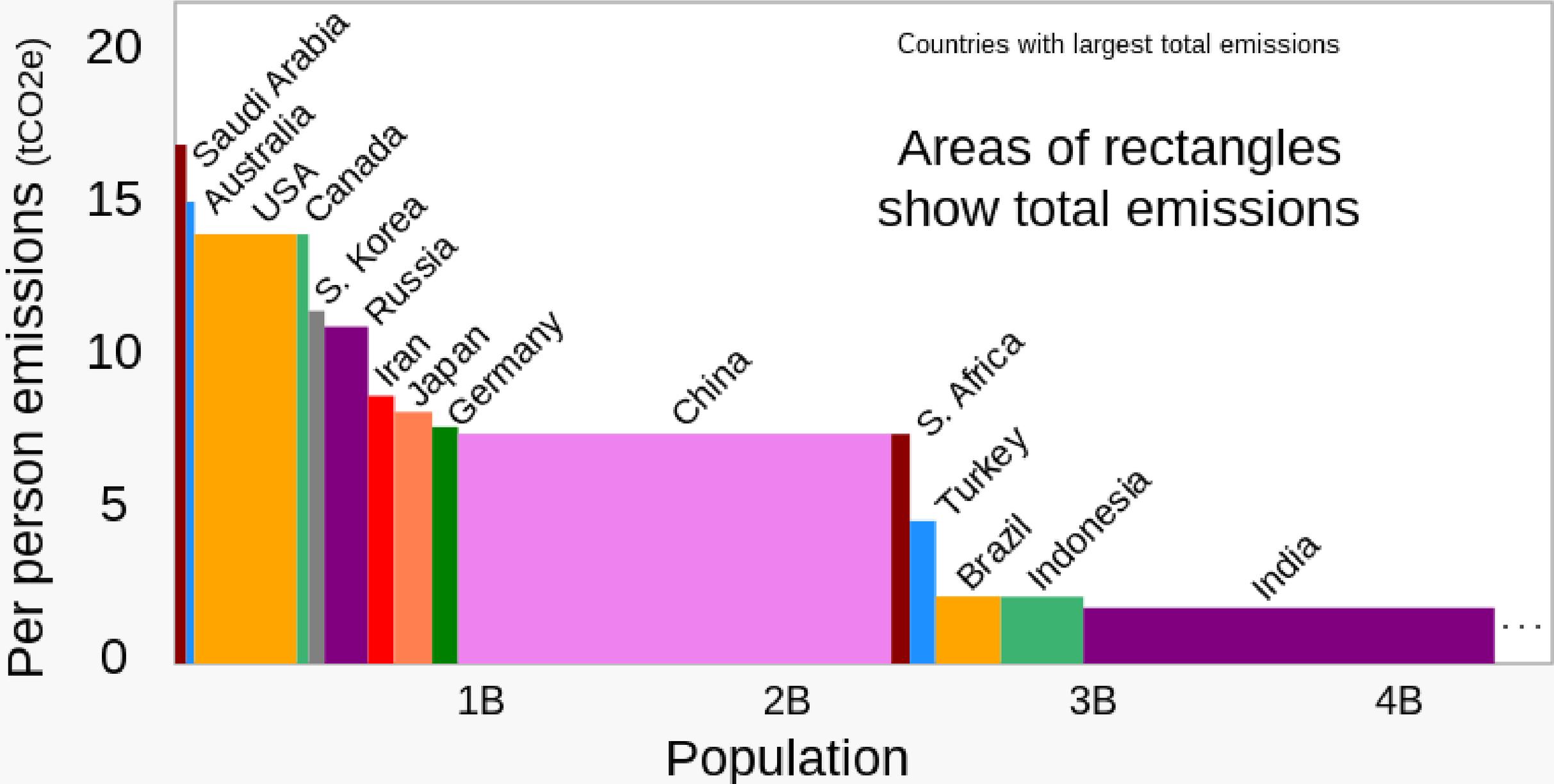


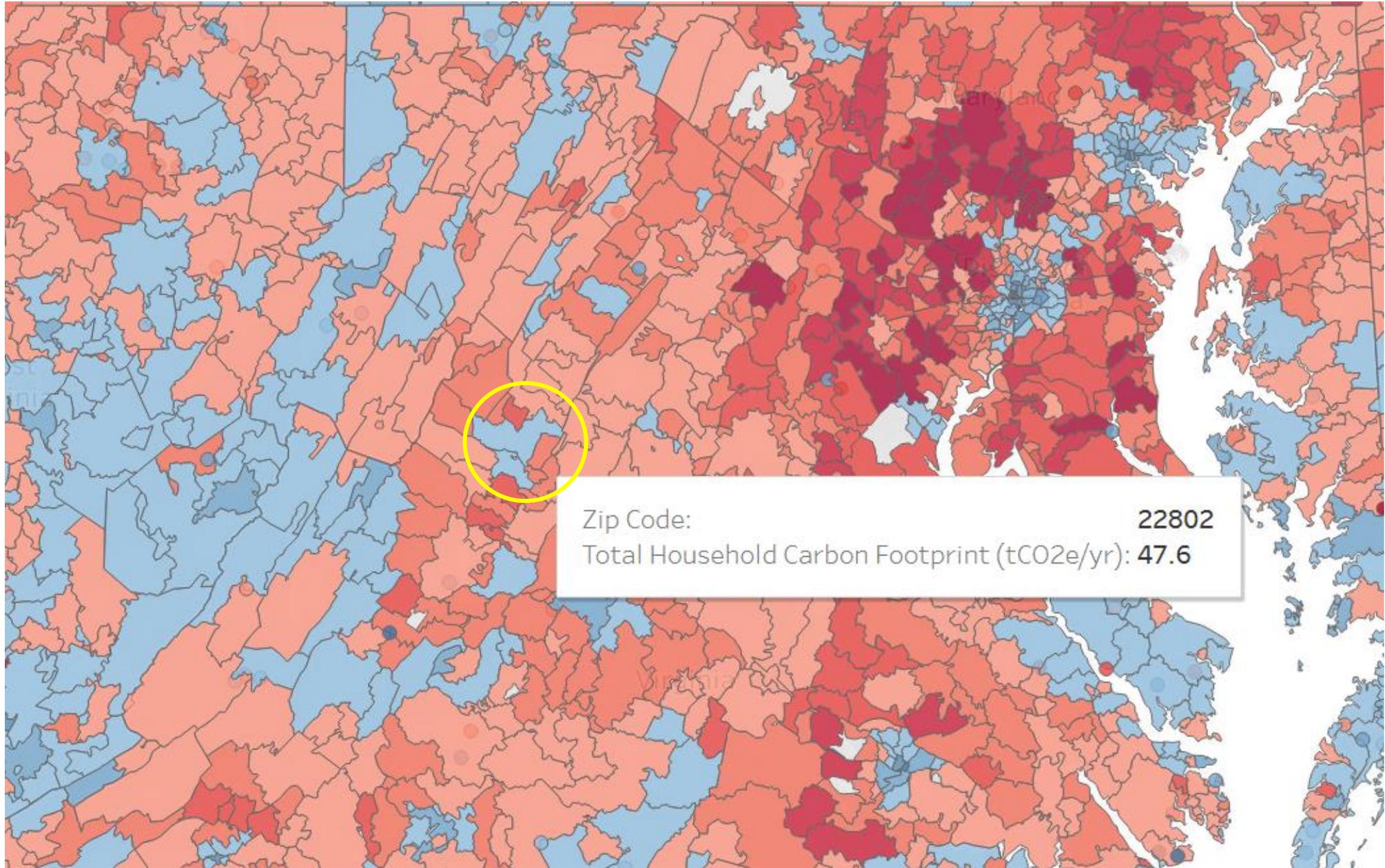
## 12. How large is the carbon footprint of the average American?

### Our answers, in brief:

**(Doug)** – Per capita emissions are nearing 15 tons/year in the US. The global average is around 7 tons/year, and some would argue we need to be around 2 tons/year to be reasonably sustainable. The graph on the next page illustrates how total emissions by a country are a combination of per capita emissions, and the total population. One lesson here is that there are large disparities in how much individuals are emitting. In fact, even within countries, there is a strong correlation of emissions with wealth. A small number of the wealthiest individuals tend to contribute a disproportionately large fraction of the total emissions.

# Carbon dioxide emissions per person





### Gasoline

20

Enter amount of gasoline usage by gallons.

### Natural Gas

0

Enter amount of natural gas usage by therm.

### Liquid Propane

0

Enter amount of liquid propane used by gallons.

### Electricity

1400

Enter electricity usage by kwh.

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### Carbon Tax (in dollars)

\$40.8

<https://sustainableclimatesolutions.org/carbon-tax-calculator/>

# 13. What are the largest projected impacts?

### Our answers, in brief:

**(Doug)** – There are many impacts, so it's hard to say that there are a top 1 or 2 impacts. Judging the magnitude of an impact is also a subjective question - what do people experience as the biggest impacts?

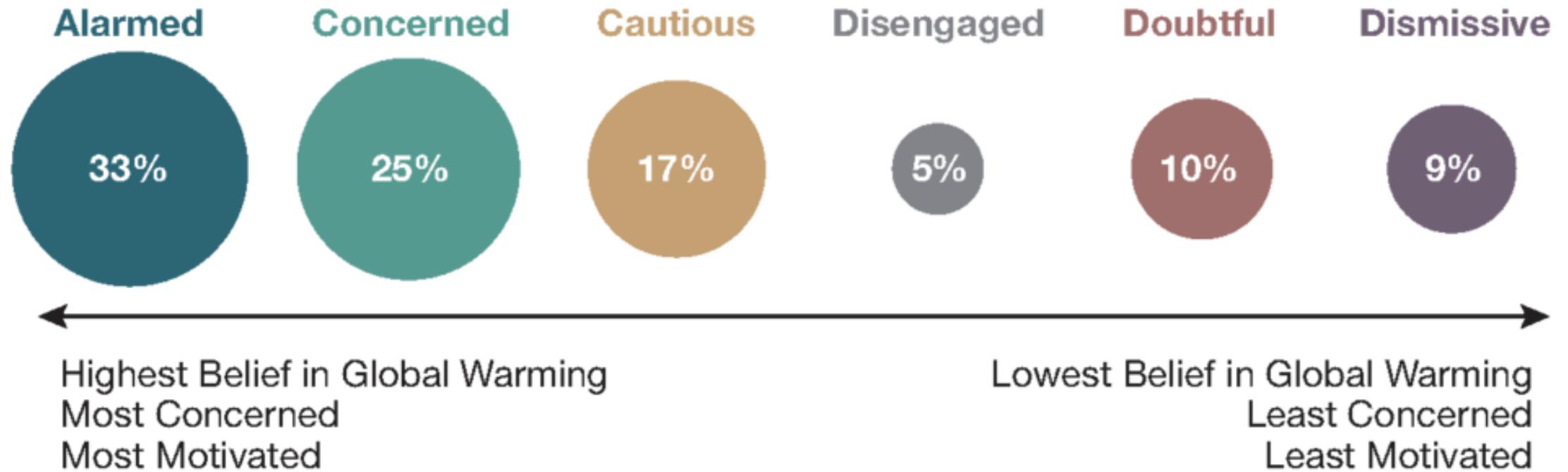
The table on the following slide identifies what Mennonites on different continents are experiencing as the biggest impact (from a Mennonite World Conference survey). The lesson here is that people's identify very differently with climate impacts in different places - Europe identified most with heat and drought events, while impacts on food and goods prices was higher in Africa, Asia and Latin America.

	Africa	Asia	Europe	Latin Am	US/Canac
Higher prices for food and consumer goods	80%	39%	9%	63%	36%
Heat waves/increased urban heat	67%	30%	72%	56%	51%
Waste/plastic contamination/pollution	58%	45%	51%	59%	50%
Air pollution	64%	45%	34%	75%	38%
Floodings due to heavy rains	67%	55%	20%	25%	38%
Spreading of diseases or pests	80%	28%	22%	22%	30%
Loss of plants and animals, birds and insects	53%	27%	52%	38%	53%
Water pollution	62%	27%	14%	47%	29%
Drought, reduced rainfall, less water availability	49%	28%	62%	44%	37%
Malnutrition/Food insecurity	80%	15%	0%	38%	13%
Loss of arable land	47%	15%	25%	31%	19%
More violence around limited resources	62%	13%	0%	31%	3%
Migration	40%	18%	28%	53%	9%
Wildfires	16%	4%	8%	25%	18%
Increase in hurricanes/typhoons	16%	17%	8%	9%	2%
Sea level rise	2%	18%	8%	6%	2%
Glacier melting resulting in flooding and/or loss o	0%	0%	0%	0%	0%

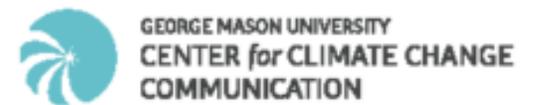
# 14. What percent of Americans deny climate change?

### Our answers, in brief:

**(Doug)** – The latest data show around 10% are in the denial category. The next slide shows the latest percentages in 6 different categories - this is probably the best place to go for understanding the perspectives of Americans. The lesson here is that only a small fraction of people actually deny climate change (although they tend to be vocal; and the proportion of climate deniers in Congress is unfortunately much higher than in the general population). Also, the percent of people alarmed has been steadily climbing. So in general, the fight is no longer to convince people climate change is happening, that switch has largely happened. The fight is more to convince people we can do something.

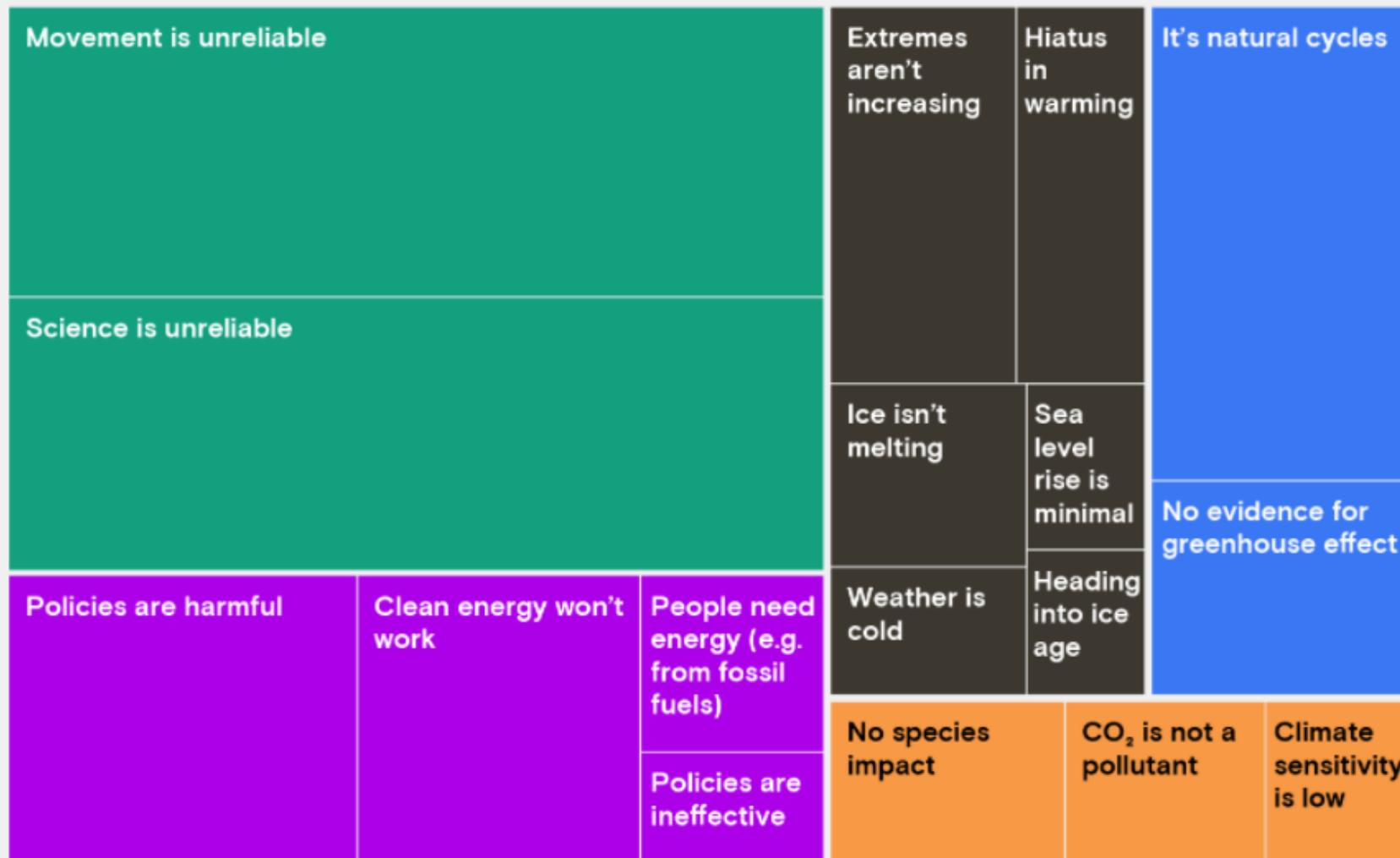


September 2021  
(n=1,006)



# Communication breakdown

Relative proportion of arguments against climate action made by conservative think tanks and blogs, 1998-2020



Data source: Coan et al. 2021

[https://grist.org/politics/study-charts-show-rising-attacks-on-clean-energy-and-climate-policy/?utm\\_medium=email&utm\\_source=newsletter&utm\\_campaign=weekly](https://grist.org/politics/study-charts-show-rising-attacks-on-clean-energy-and-climate-policy/?utm_medium=email&utm_source=newsletter&utm_campaign=weekly)



# 15. What countries have the highest climate concern? the lowest concern?

## Our answers, in brief:

**(Doug)** – Awareness tends to be higher in wealthier, western countries, although this can be misleading. Many in other countries know something is happening, they just don't name it as formally as we do in western countries. The table on the next slide shows the percent of Mennonites in different continents expressing emotion categories. The similarities are striking here - despite different conditions, people across the globe express fear of climate change.

	Sadness	Fear	Lack of Control	Anger	Hope/Motivated	Guilt/Shame
Africa	29.5%	29.5%	11.4%	13.6%	15.9%	0.0%
Asia	47.6%	23.2%	11.0%	2.4%	7.3%	1.2%
Europe	12.3%	33.8%	3.1%	10.8%	4.6%	3.1%
Latin America	15.6%	25.0%	34.4%	15.6%	12.5%	3.1%
US/Canada	29.5%	34.1%	12.4%	16.3%	7.8%	7.0%

<https://mwc-cmm.org/stories/how-do-environmental-problems-make-people-feel>

# 16. What percent of Americans support research into renewable energy? What percent support regulating CO<sub>2</sub>?

## Our answers, in brief:

**(Doug)** – The map on the next slide shows that a majority of people support renewable energy across the entire country. This may surprise people, you may think that very conservative counties in the midwest (for instance) are not supportive of renewable energy, but that's not true. The lesson here is that people consistently underestimate how many people actually care about climate change, and are in favor of steps to address it.

Select Question:

Fund research into renewable energy sources

Absolute Value

Click on map to select geography, or:

Select a State

Select a County

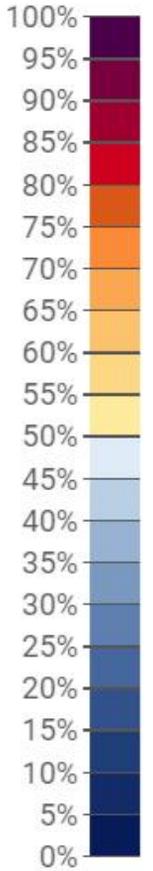
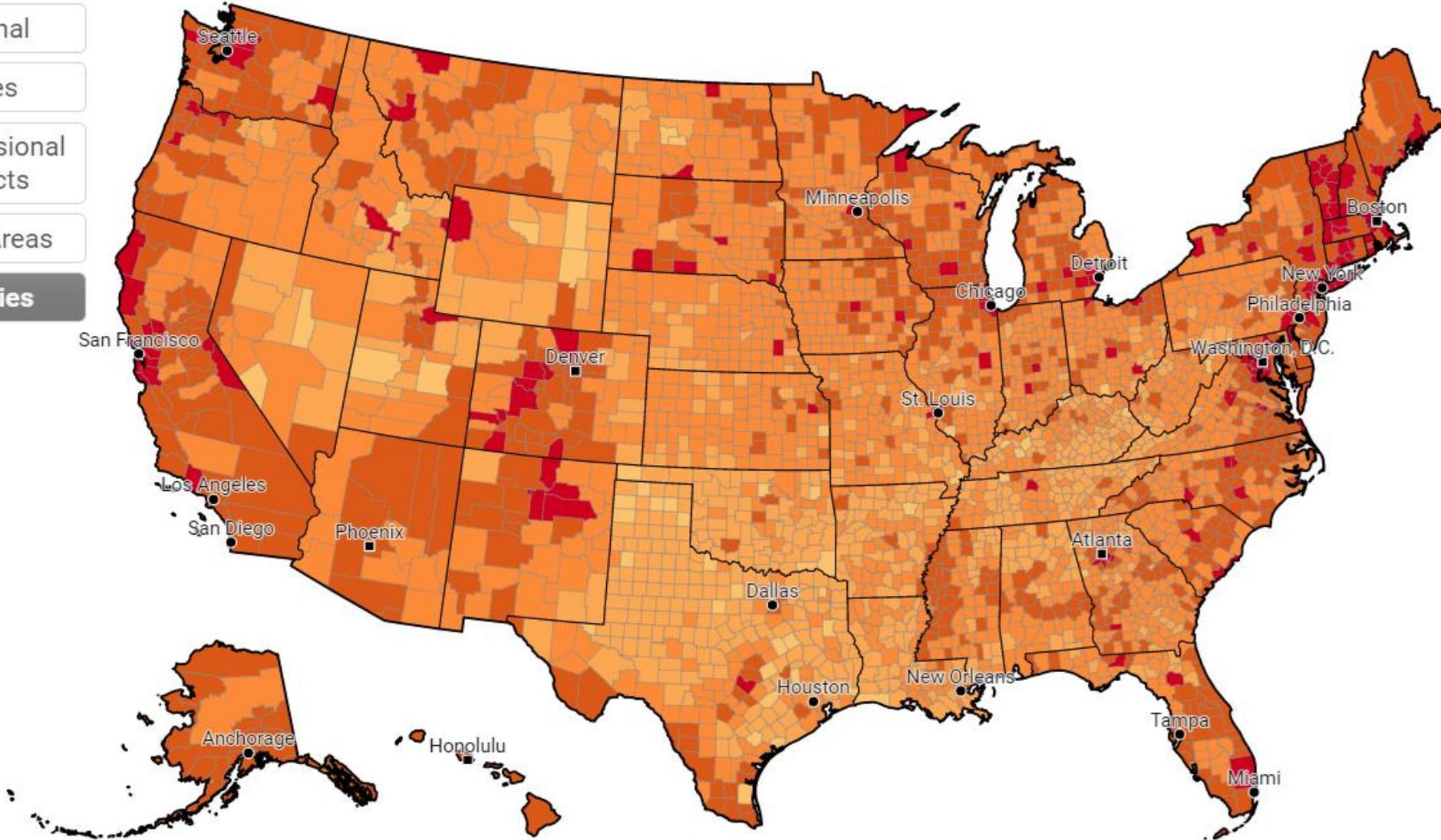
National

States

Congressional  
Districts

Metro Areas

**Counties**



# 17. What climate action has the highest bipartisan support?

**Our answers, in brief:**

**(Doug)** – Planting trees. A high percentage of Republicans and Democrats both support tree planting.

# 18. Was COP a success?

## **Our answers, in brief:**

**(Doug)** – This is hard to answer, and depends on your perspective. The COP process was never designed for quick dramatic changes. As a process of small changes, you might argue it made progress. For instance, there was a landmark agreement on “loss and damage” compensation for Global South countries. On the other hand, there was little actual progress on reducing fossil fuels. Fossil fuel companies and lobbyists are increasingly active at COP, and some feel the process is losing credibility.

# 19. What are the hopeful signs that some progress is being made?

## **Our answers, in brief:**

**(Doug)** – There are actually many hopeful signs, although we don't always focus on those! The switch to electric vehicles, despite its own issues, could be one. There are many successes on the local level that we don't here about, in fact local action in general has probably made more progress than national or international action. Watch for hopeful stories - they're out there!