

TC
CP | **Tompkins County**
Climate Protection Initiative

It's Happening Faster Than We Thought It Would



EMC Meeting
November 8, 2018

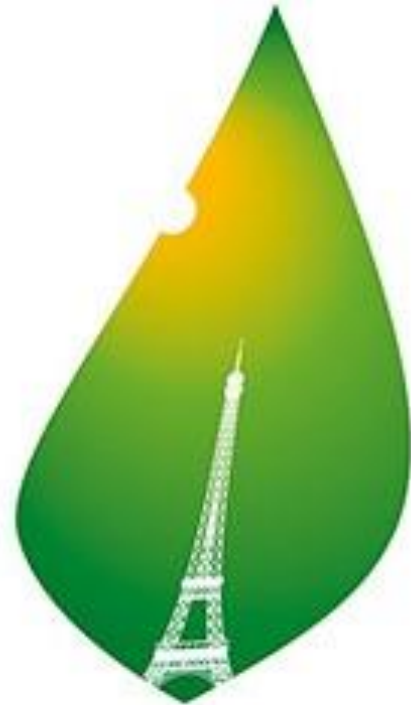
GHG Emissions Break Record



- In April, Mauna Loa Observatory in Hawaii recorded average concentration of atmospheric CO₂ above 410 parts per million (ppm)
- Highest monthly average in recorded history – in fact, according to ice core records, highest in at least 800,000 years
- Clearly headed for temperature increases of 4°C or more

Little Progress on Paris Agreement

- Few nations have plans aligned with Paris Agreement targets
- Rich countries that have generated most to GHG buildup aren't providing enough help for poorer ones
- 2018 BP Statistical Review of World Energy issued in June
- Biggest increases in 2017 CO₂ emissions occurred in emerging nations – 4.4% jump in India and 1.6% gain in China – rise of 1.5% in EU
- CO₂ emissions fell for third straight year in U.S. but estimated 30% increase in methane emissions since 2002 probably offsets these reductions



COP21 • CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE



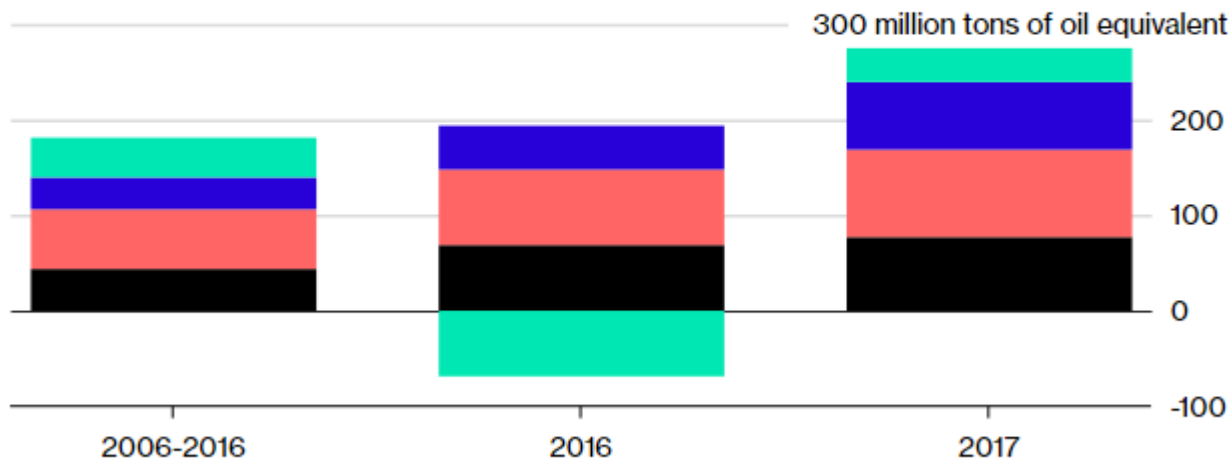
- IPCC issued report in October that sounded alarm bell on the lack of progress
- Only 12 years remain before world spews so much carbon into atmosphere it will be impossible to keep global warming to maximum of 1.5 degrees C
- After that all bets are off and human civilization will be courting catastrophe
- Loss of world's coral reefs, displacement of millions of people by sea-level rise, and dramatic decline in global crop yields

Coal Use Continues

Coal Comeback

After consumption of the fuel fell in 2016, it returned to growth last year

■ Oil ■ Gas ■ Renewables ■ Coal



Source: BP Statistical Review

- Use of renewables has surged but still not displacing coal
- According to BP data, coal's share of power generation globally has changed little over past three decades

Most sobering climate change news of year so far?



- “Trajectories of the Earth System in the Anthropocene” – study released in *Proceedings of the National Academy of Sciences* in early August
- Even with increase of 2°C series of feedback loops could occur, pushing climate into permanent hothouse state – 4 to 6°C higher
- “These tipping elements can potentially act like a row of dominoes. Once one is pushed over, it pushes Earth towards another. It may be very difficult or impossible to stop the row of dominoes from tumbling over.”

Most sobering climate change news of year so far?



- Tipping points could lead to higher global average temperature than in any interglacial period during past 1.2 million years
- Also: sea level rise up to 60 meters (almost 200 ft), swamping coastal populations and forcing communities inland
- Real threat of climate change not slow slide into warmer world but rather fast change into radically different climate

Close Runner Up: Atlantic Conveyor Belt

- April report: Gulf Stream system (AMOC) at its weakest in 1,600 years
- Declined 15-20% over past 150 years due to increased carbon emissions
- Rising sea levels on U.S. East Coast – disrupted weather patterns across North America, Europe, and north Africa
- Increase in frequency of extreme weather events, like flooding, drought, and winter storms.

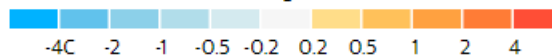


Close Runner Up: Arctic Sea Ice



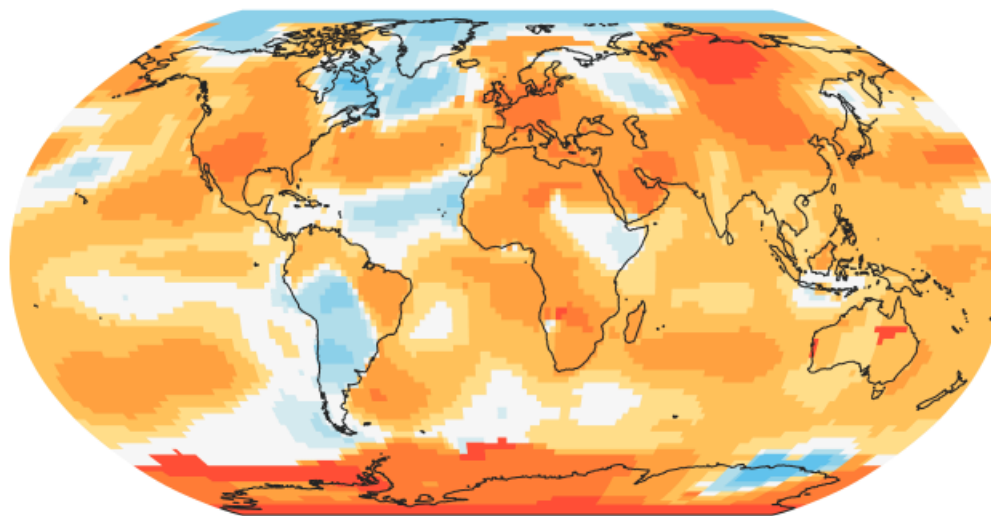
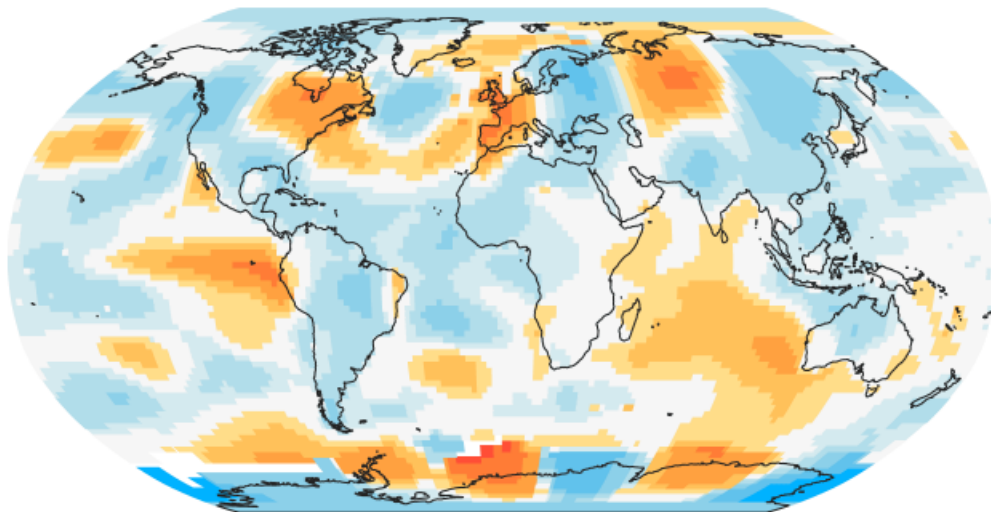
- August report: Arctic's oldest and thickest sea ice breaks up for first time on record
- Open waters north of Greenland normally frozen even in summer – previously seen as last ice area but no more
- Usually below zero but earlier this year 10 days above freezing – record high of 63°F in mid-August

Variation from 1951 - 1980 average



Hot, Hot, Hot!

- 2018 shaping up to be fourth-hottest year on record
- Only years hotter were three previous ones
- 17 out of warmest years since modern record-keeping began have occurred since 2001
- In lower 48 U.S., May to July ranked as hottest ever
- Average temperature of 70.9°F: 3.4°F above average



Trouble in the Northern Hemisphere



- Extreme weather events have taken place throughout northern hemisphere this summer
- Heatwaves have shattered records and sparked wildfires of unprecedented size and intensity

Trouble in the Northern Hemisphere



- Heatwaves in northern hemisphere clearly linked to global warming
- Rising temperatures in Arctic and loss of sea ice slows flow of polar jet stream from west to east
- Jet stream driven by collisions between cold air descending southward from Arctic and warm air pushing northward from equator
- Temperature gap determining power of jet stream has narrowed because Arctic warming twice as fast as rest of planet – high and low pressure fronts “getting stuck”

Sweden



- Hottest July and worst drought in Sweden since record-keeping began 260 years ago – rainfall only about 1/7 of normal amount
- More than 80 wildfires, with 11 north of Arctic Circle – also massive wildfires in Siberia

Canada



- More than 90 people died from extreme heat in Quebec during first week of July
- Most of deaths occurred in Montreal where temperature reached mid-90s – 20 degrees higher than normal

United States



- Thousands of people forced from their homes this summer in U.S. West, especially in California and Colorado
- Unprecedented wildfires sparked by extreme heat and drought – reached 120°F in Chino, CA on July 6

California

- So far in 2018 total of 5,319 fires in California have burned more than 1.2 million acres
- Largest fire in state's history burned more than 400,000 acres in Mendocino in July
- In less than two months this summer state spent \$405 million on fighting fires – only \$443 million set aside for entire year
- New state report projects number of acres burned in wildfires in average year will increase 77% by end of century
- Adds up to half-million more acres of wildfires in average year



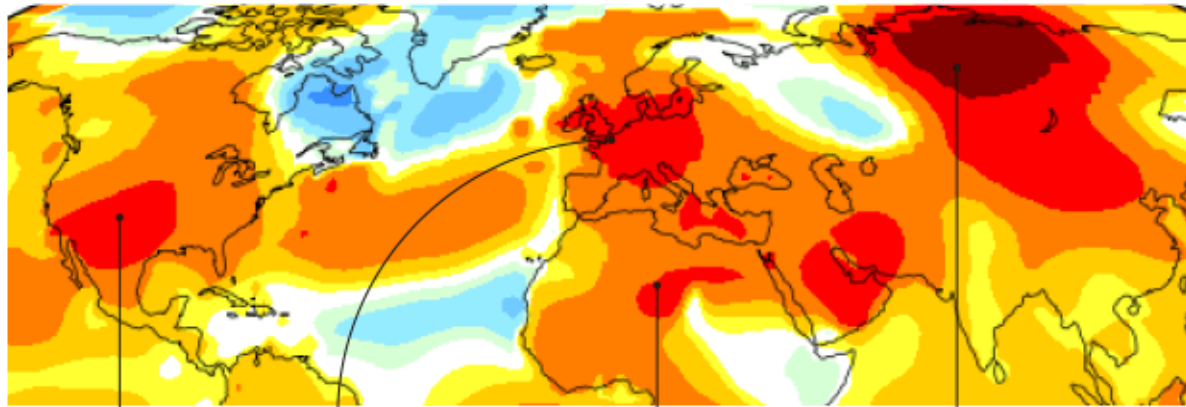
Japan



- Heatwave in late July sent 23,000 people to hospital & killed 65 – record of 106°F in city outside Tokyo – weather agency declared heatwave natural disaster
- Record rainfall in Japan in early July caused flooding and landslides leading to at least 179 deaths – highest death toll caused by rainfall in Japan since 1982
- 8.6 million people ordered to evacuate – 270,000 households had water supplies cut

Summer Heatwave & Climate Change

Variation from 1951 - 1980 average



North America

2018 ranked as the sixth warmest June since continental records began in 1910

Europe

Several countries had temperatures that ranked among the six warmest Junes on record

Africa

Fourth highest June temperatures since 1910

Asia

Seventh highest June temperature on record

Guardian graphic. Source: Nasa, NOAA

- Wide geographical spread of heatwave across four continents suggests global warming played key role
- “That pattern is something we wouldn’t be seeing without climate change,” says British climate scientist Peter Stott

How Do We Know?



- How do we know these are not isolated, unrelated events but rather part of a longer-term process that is nowhere near reaching its climax?
- Researchers, based on historical weather records and climate models, now able to draw links between extreme weather events and climate change, and even quantify them
- World Weather Attribution project – international coalition of scientists – issued study in July: Europe's record-breaking heatwave twice as likely to have occurred because of human-caused warming

2018: Climate Change Got Real



Kim Cobb, professor of earth and atmospheric science at Georgia Institute of Technology

“What we’re seeing today is making me, frankly, calibrate not only what my children will be living but what I will be living, what I am currently living. We haven’t caught up to it. I haven’t caught up to it, personally.”

Trump Administration Response



- In August, Trump administration scrapped Obama's Clean Power Plan, keystone of U.S. climate policy
- New plan allows states to set own rules for regulating power plants or request permission to opt out altogether
- EPA estimates Trump plan will lead to 1,400 additional premature deaths a year from increased coal-burning

Trump Administration Response

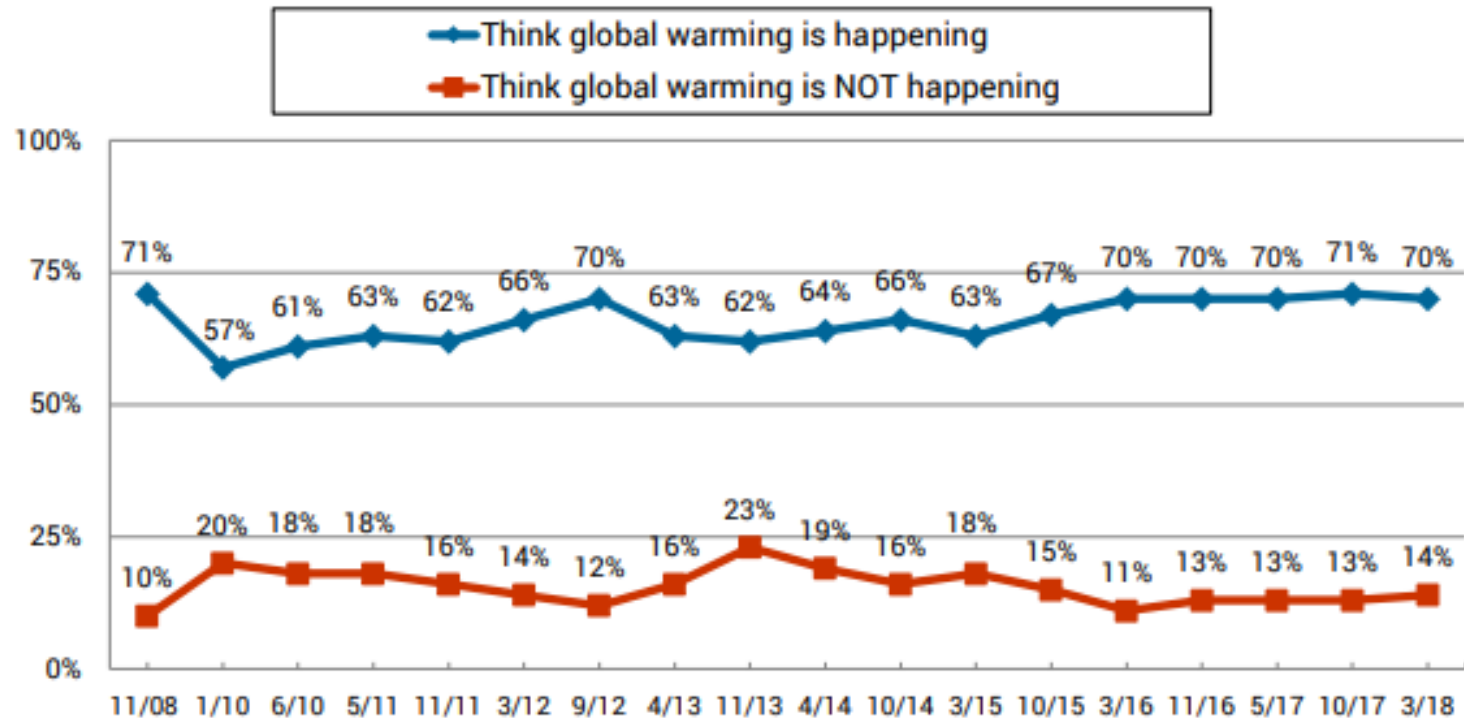
- New approach expected to reduce carbon dioxide emissions from power plants up to 1.5% by 2030 if all states implement effective plans
- Well below the 32% reduction target by 2030 from 2005 level set by Obama's Clean Power Plan
- Dramatic about-face on national climate action – Trump's second major move in less than a month: plan to freeze fuel-economy standards for cars and trucks



How Do Americans View Climate Change in 2018?



Seven in Ten Americans Think Global Warming Is Happening



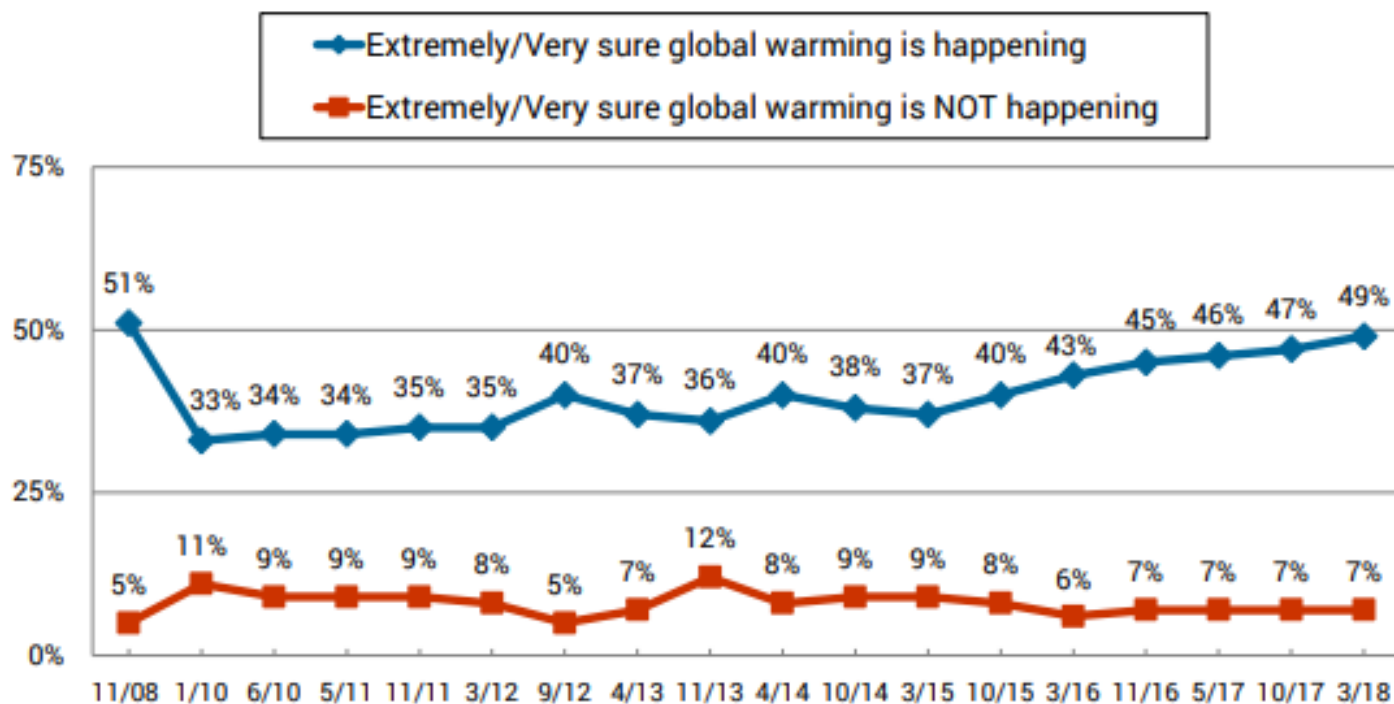
Do you think global warming is happening?

March 2018. Base: Americans 18+.



Nearly Half of Americans Are Sure Global Warming Is Happening

- Certainty that global warming is happening at highest level since 2008 -

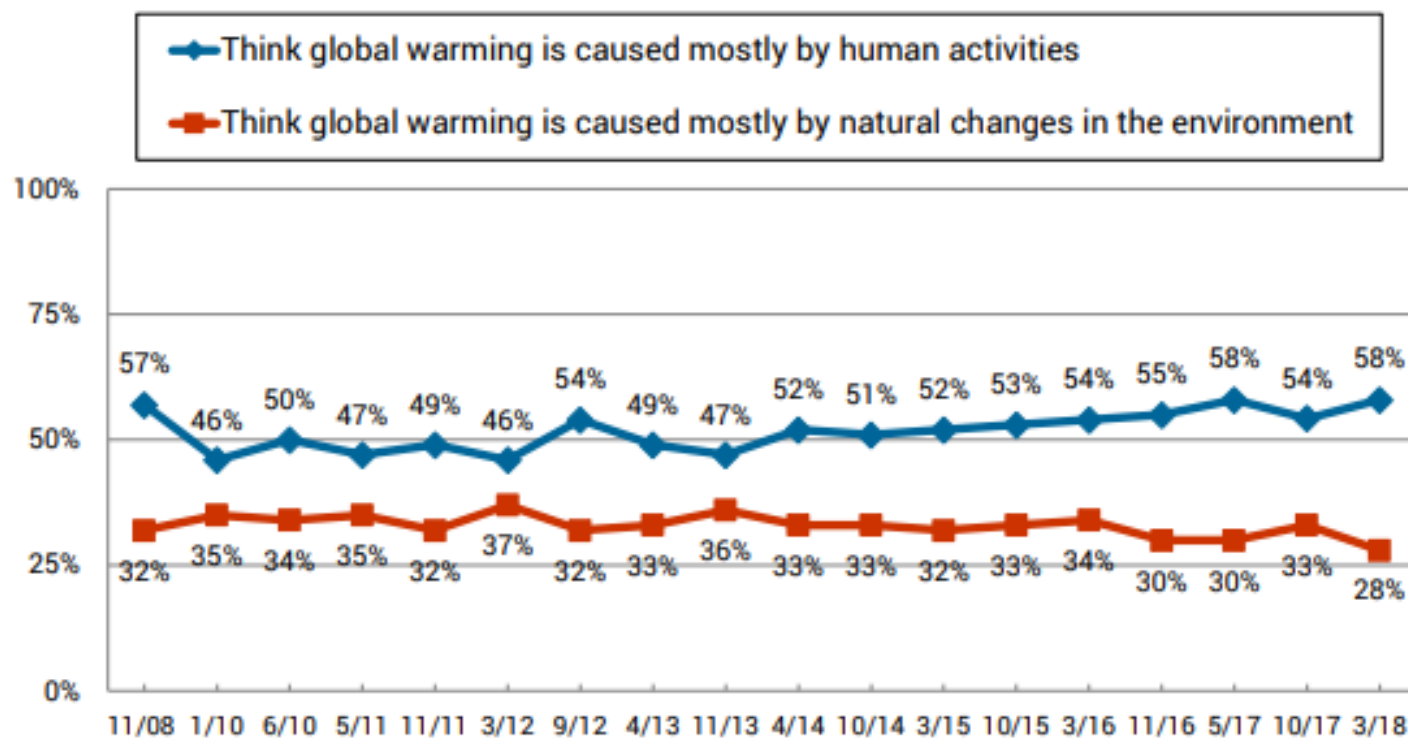


How sure are you that global warming is/is not happening?

March 2018. Base: Americans 18+.



More Than Half of Americans Think Global Warming Is Mostly Human-Caused



Assuming global warming is happening, do you think it is...

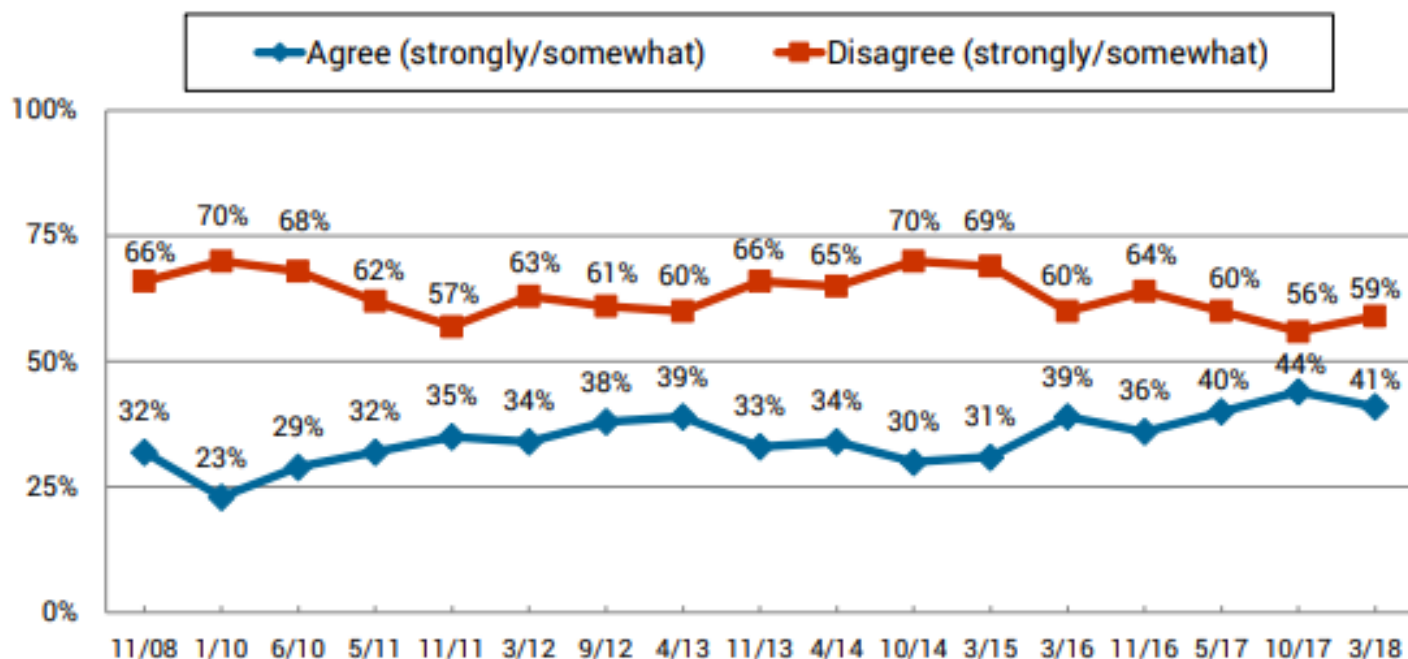
March 2018. Base: Americans 18+.



Four in Ten Americans Say They Have Personally Experienced The Effects of Global Warming

- Up 10 percentage points since March 2015 -

"I have personally experienced the effects of global warming"

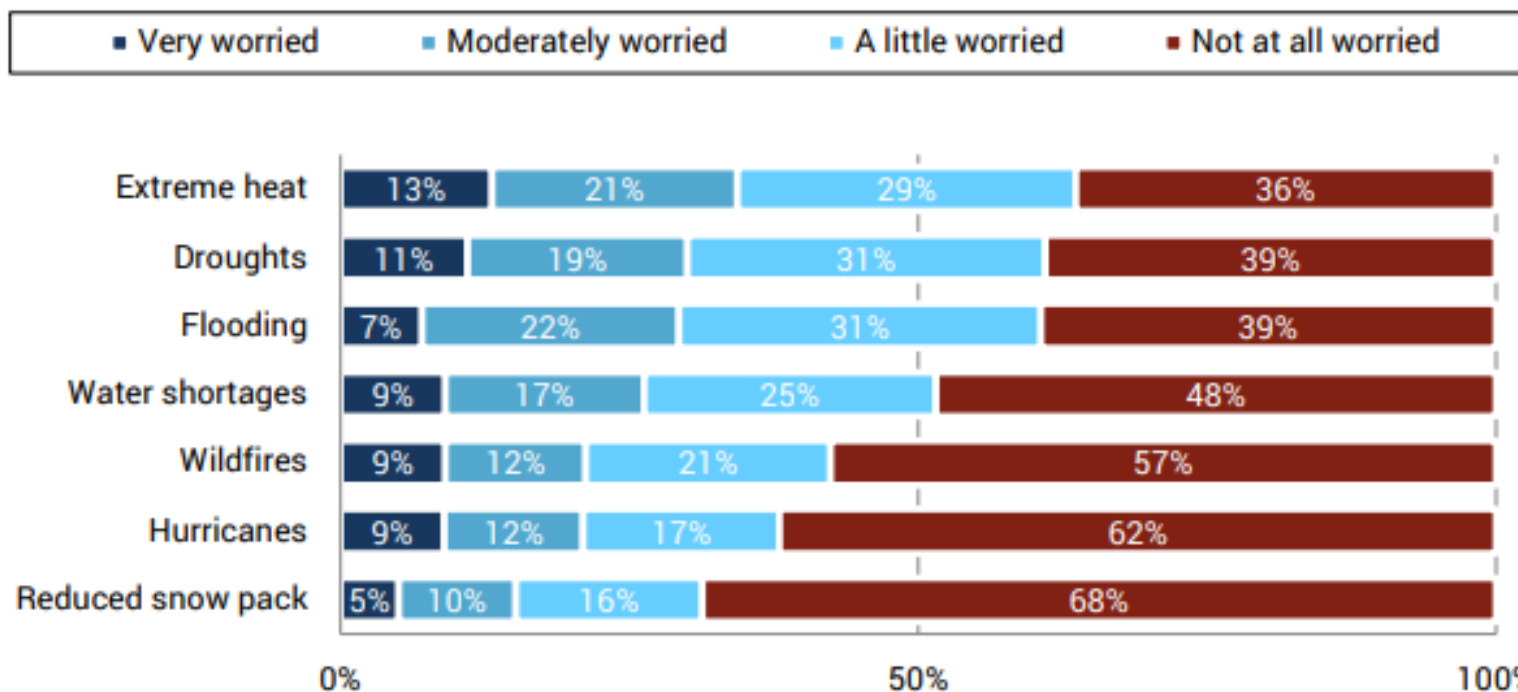


I have personally experienced the effects of global warming...

March 2018. Base: Americans 18+.



A Majority of Americans Are Worried About Harm From Extreme Events in Their Local Area



How worried are you that the following might harm your local area?

March 2018. Base: Americans 18+ (n=1,278).



What Do We Do?



- Three choices in response to climate change: mitigation, adaptation, or suffer consequences of what we fail to mitigate or adapt to
- Heading for some mitigation, very little adaptation, and lot of suffering
- But climate change a practical political problem – huge political changes have happened in past and continue to do so

Some Good News, Though



- In August California Assembly passed legislation to transition state's electricity grid to 100% renewable energy by 2045
- Goes to State Senate next and then to Gov. Jerry Brown for his signature
- California would become largest economy in world to commit to zero carbon electricity

Some Good News, Though



- Also US Supreme Court has just allowed young peoples' climate law suit to proceed in courts
- Suit, filed in 2015, argues that failure of government leaders to combat global warming violates constitutional right to clean environment



- To find out more about local climate action go to www.tccpi.org
- Follow climate news on Twitter: @rebootingfuture