

Climate change in Ohio: What should you do?

Robyn S. Wilson, Professor of Risk Analysis and Decision Science

Association of Ohio Health Commissioners, Dublin, OH ~ Sept 14, 2023



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES





Wildfire in California 2018 - Photo: Josh Edelson/AFP/Getty Images



Flooding, Arkansas 2019 - Photo: Drone Base via AP



Drought, Lake Tahoe 2015 - Photo: Kathryn Reed



Heat wave, Washington, DC 2018 - Photo: Alex Wong, Getty Images

Source: The Toledo Blade, Andy Morrison, Toledo, OH



Source: AP Madalyn Ruggiero, Findlay, OH



TICKS

Blacklegged Tick
(deer tick)

(can spread Lyme disease)

American dog tick
(wood tick)

(does not spread Lyme disease)

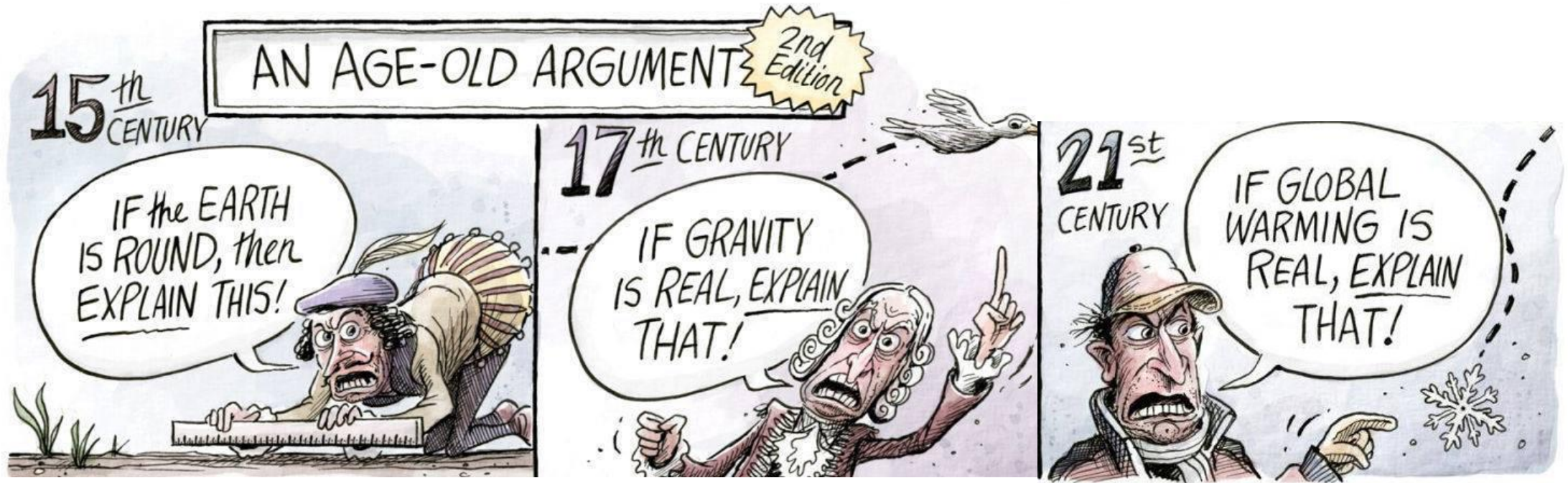


Source: AEP Ohio Twitter, central Ohio

Outline for today

- Is climate change real?
- Is it caused by people?
- Is it bad for people? For Ohio?
- Can we do anything about it?

Definitions



Source: Adam Zyglis, 2014

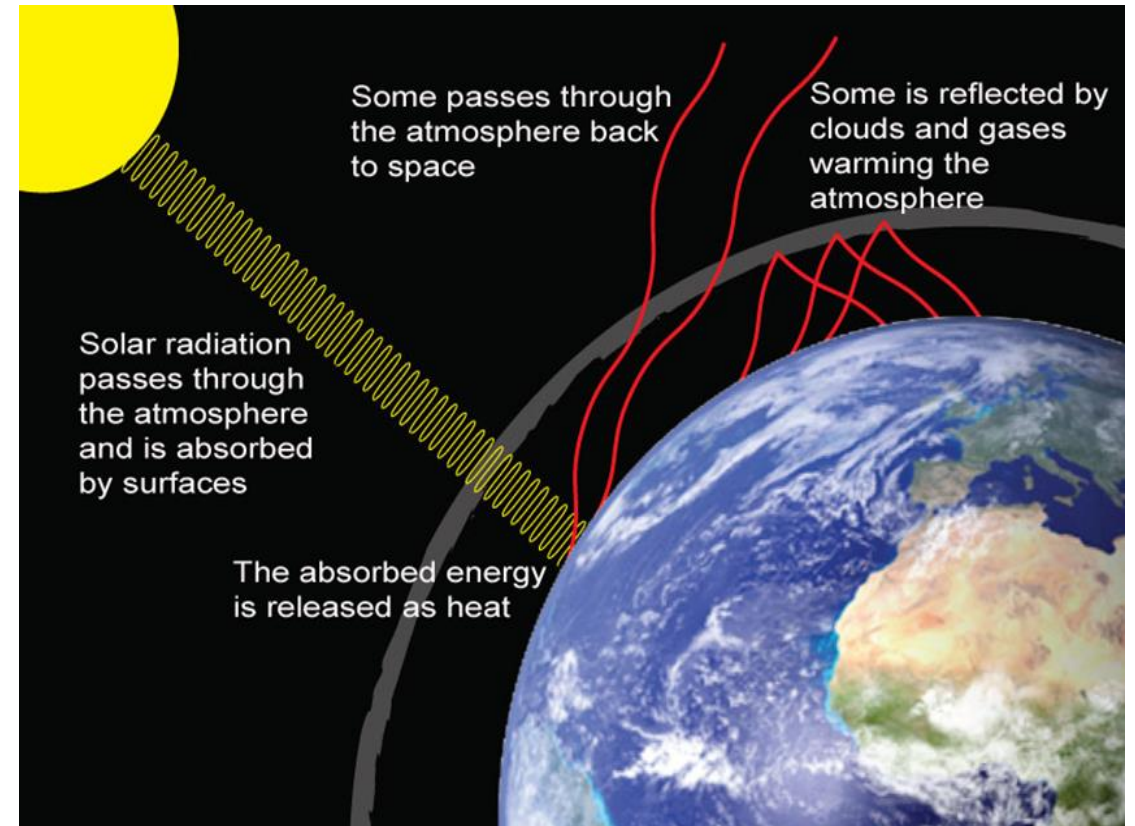
Definitions

- Weather - what's happening right now
 - It is warm today in Columbus!
- Climate - general weather characteristics of a region
 - Ohio is typically cold in the winter!
- Climate change - trends in the weather observed in a region over a long period
 - Ohio winters are getting warmer! This doesn't mean they will never be extremely cold again.



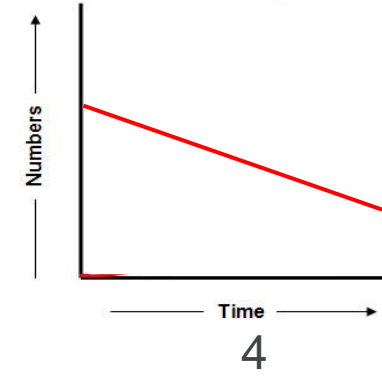
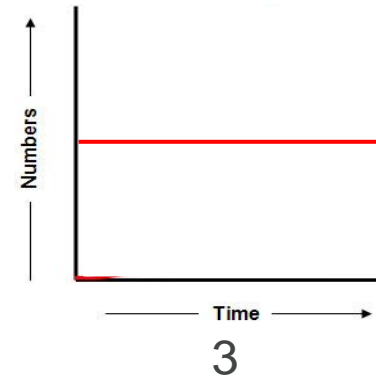
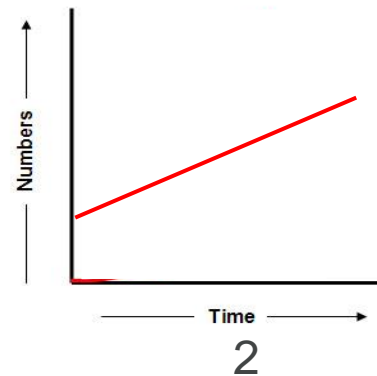
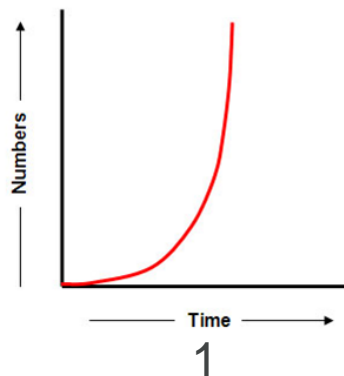
Is climate change real?

- The Greenhouse Effect
 - The sun generates light and heat
 - Gases in the atmosphere (like carbon dioxide) trap heat
 - This effect allows Earth to support life
- Isn't this good?
 - Too many gases = too much heat



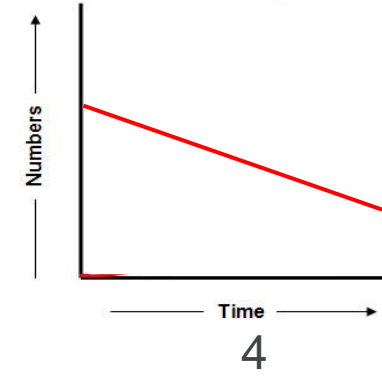
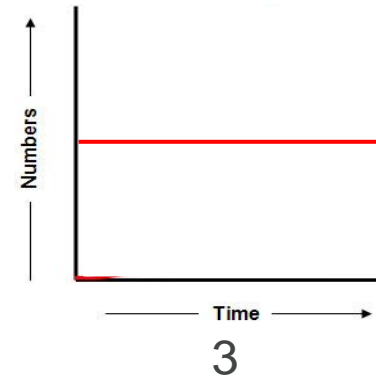
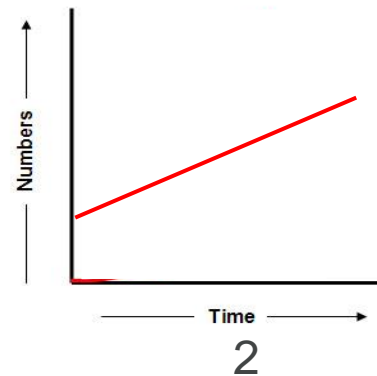
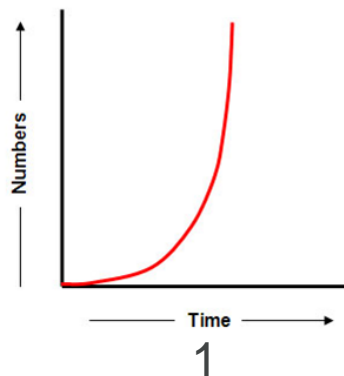
Since 1850, the amount of greenhouse gases (such as carbon dioxide) in the atmosphere have been...

1. Rapidly increasing
2. Steadily increasing
3. Staying the same
4. Steadily decreasing



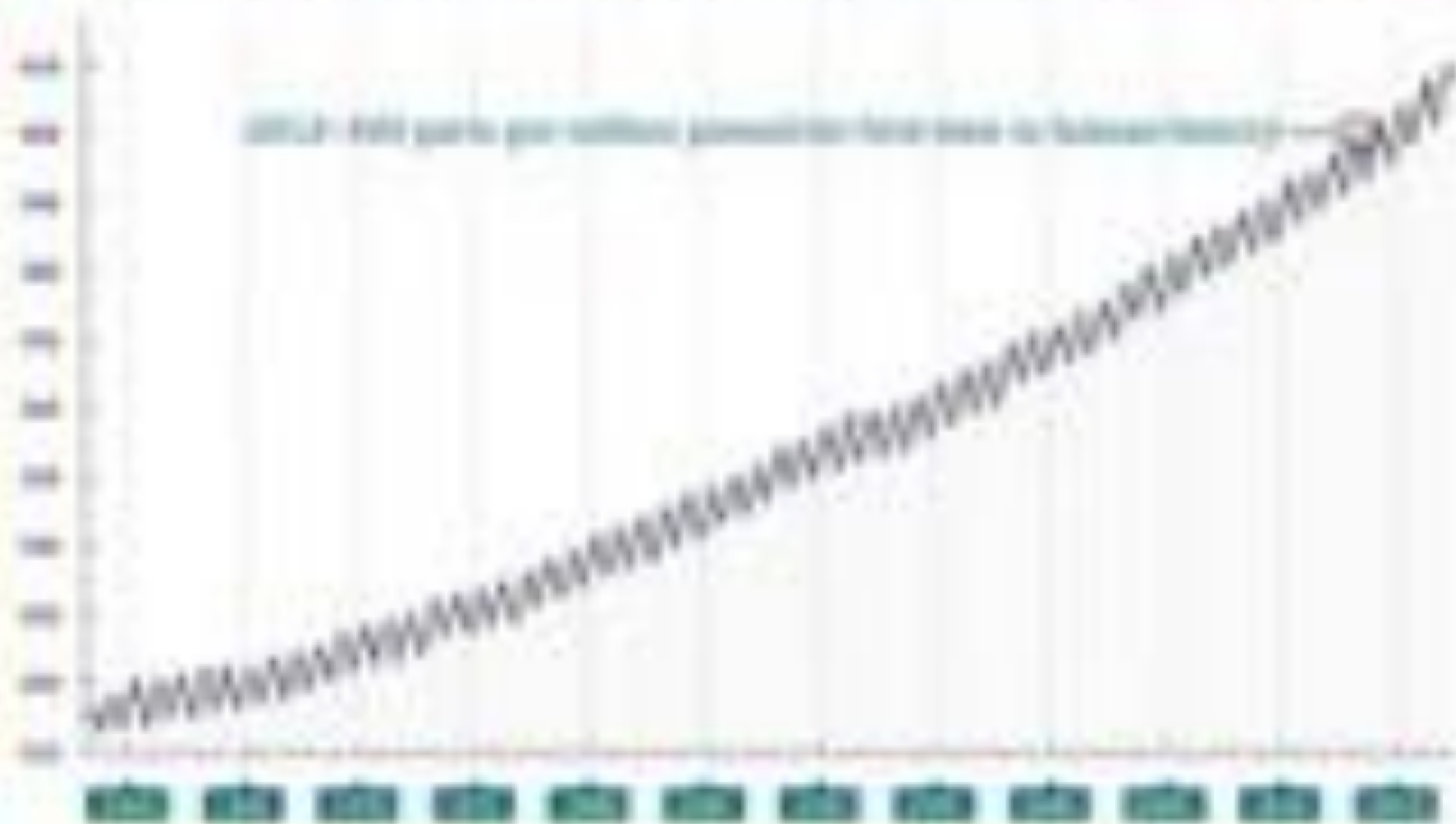
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CARBON DIOXIDE CONCENTRATION AT MAUNA LOA OBSERVATORY

CO₂ Concentration (ppm)

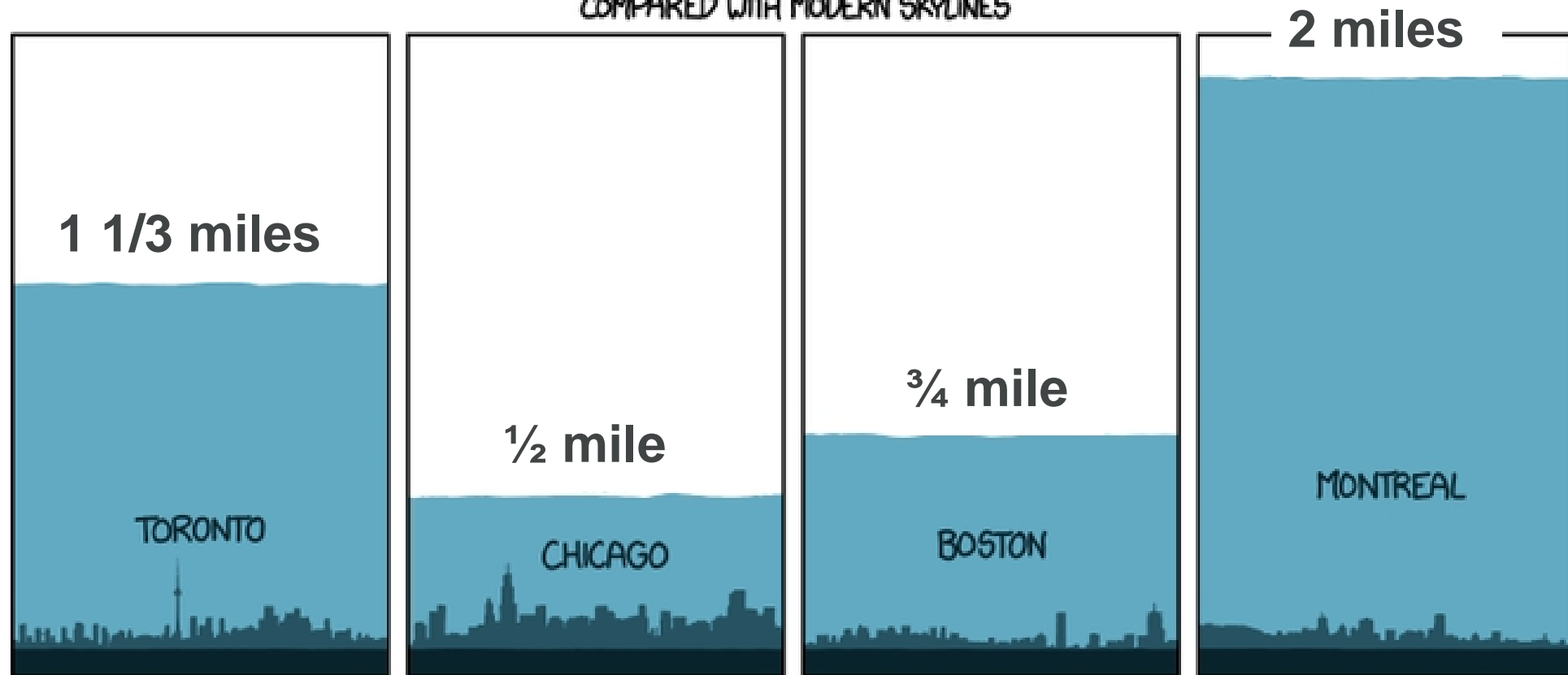


Climate change is real

- Global temperatures have been generally stable
 - In the last 10,000 years, global average temperatures ranged only 2°F warmer or 2° F cooler than today
- But small changes = BIG impacts
 - 20,000 years ago, global average temps were about 9° F cooler than today – and that caused the Ice Age!

THICKNESS OF THE ICE SHEETS

AT VARIOUS LOCATIONS
21,000 YEARS AGO
COMPARED WITH MODERN SKYLINE



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- But small changes = BIG impacts
 - 20,000 years ago, global average temps were about 9° F cooler than today – and that caused the Ice Age!
- Global temperatures today are less stable
 - In the last 100+ years, global average temps have already increased almost 2° F – that is fast warming!

Climate change is real

Rising Temperatures



2.3°F
1951-2012

Average Temperature

Average temperatures warmed by 2.3°F from 1951 through 2012, faster than the national and global rates. Models project this trend will continue, with temperatures rising approximately 3-5°F by mid-century.

Increasing Precipitation

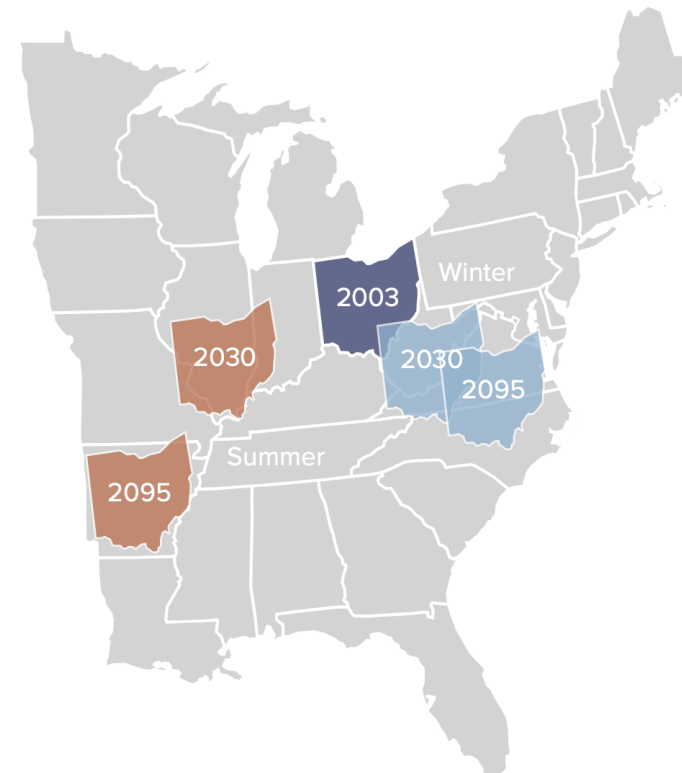


32%
1951-2012

Heavy Precipitation

Between 1951–1980 and 1981–2010, the number of very heavy precipitation events increased by 32%. The number of days per year that saw more than 1.25" of precipitation increased by 78% from 1951–2012.

How the Future Climate of Ohio Compares to Current Climates Elsewhere



Observed historical changes and changes likely to occur

Data from GLISA 2016 Report “Climate Changes and Impacts in Columbus, OH”, Graphic from Columbus Climate Adaptation Plan

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Which comes closest to your own view? Among the world's scientists...

1. Most think climate change is caused by humans.
2. There is a lot of disagreement over whether or not climate change is caused by humans.
3. Most think climate change is not caused by humans.
4. I am not sure.

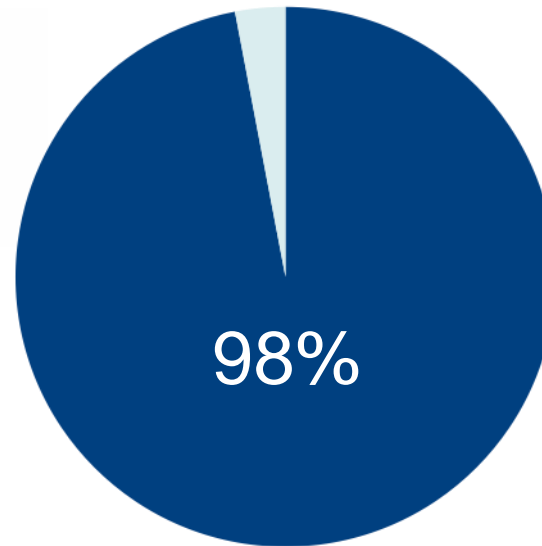
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Climate change is real and caused by people

Based on the evidence, 98% of climate scientists have concluded that human-caused climate change is happening.

American Association for the Advancement of Science



Climate change is real and caused by people

Climate Change & The Environment

As one of the largest electric utilities in the United States and a large consumer of fossil fuels, we know the impact our operations have on the environment. Climate change may be one of the most significant sustainability issues for AEP and one of our most challenging.

Our position on climate change remains unchanged: We believe it is a global issue that requires a global solution. Today there are no mandates to drive new investments in technologies that address carbon dioxide emissions. Consequently, we can only focus on what we can change and can afford.

Threat: Climate Change

The projections lead us to believe that severe weather events will increase in frequency and intensity.

**AMERICAN
ELECTRIC
POWERSM**

BOUNDLESS ENERGYSM
Care for Creation. Care for the Poor.

Which of the following, if any, contributes to climate change?

1. Aerosol spray cans
2. The hole in the ozone layer
3. Burning fossil fuels for heat and electricity
4. Powering cars and trucks
5. Cows and other livestock
6. Cutting down forests
7. Toxic wastes
8. Nuclear power plants

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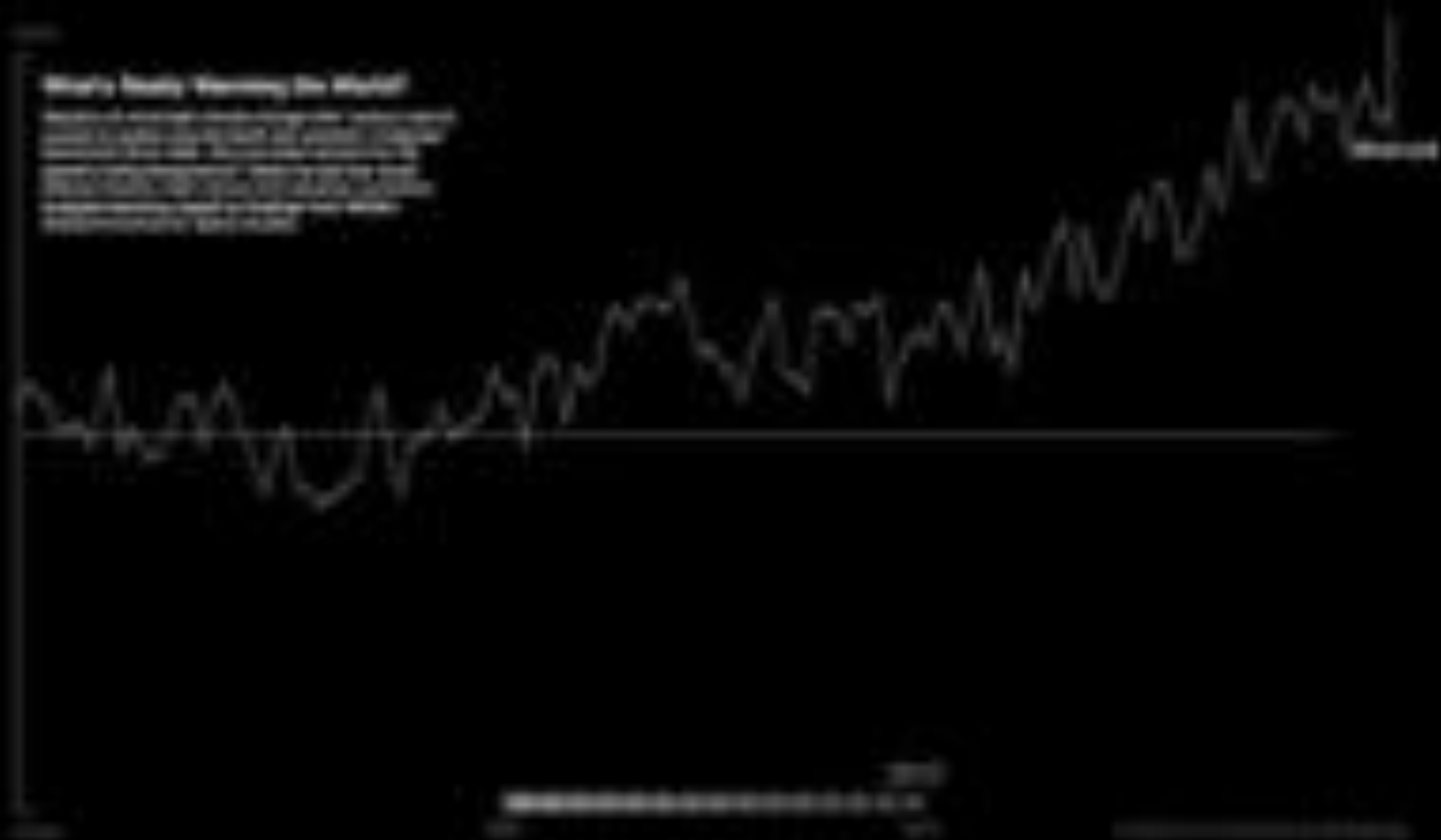
Climate change is real and caused by people

- The burning of fossil fuels (coal, oil) produces carbon dioxide:
 - Transportation (cars, buses, planes)
 - Energy production (electricity, heating/cooling)
- Industry (manufacturing/production) produces methane
- Cutting down forests reduces the carbon storage capacity of the Earth (as does turning up the soil)



Weekly Study: Warning the Market

Read the article, including the information about the impact of the market on the economy and the role of the Federal Reserve in the market. Then, answer the questions below.



Climate change will result in more of the following health problems...

1. Diabetes
2. Cancer
3. Asthma
4. Tuberculosis
5. Insect-borne disease (e.g., West Nile Virus)
6. Heat stroke
7. Storm-related injuries/deaths

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Climate change is bad for the Midwest



KEY MESSAGE 1

Agriculture

Ag productivity reduced to 1980 levels without technological advances



KEY MESSAGE 2

Forestry

Loss of important tree species and shifting forest types



KEY MESSAGE 3

Biodiversity & Ecosystems

Decreased provision of services such as water purification, flood control, crop pollination and recreational opportunities.

For information on climate impacts in Ohio, contact the State Climate Office at scoo@osu.edu or (614)292-7930.

Source: globalchange.gov/NCA4

Climate change is bad for the Midwest



KEY MESSAGE 4 Human Health

Health threats will lead to increased loss of life, worsened health conditions and economic impacts in the billions of dollars.



KEY MESSAGE 5 Transportation & Infrastructure

Annual cost of adapting urban storm water systems to more frequent and severe storms will exceed \$500 million by 2100.



KEY MESSAGE 6 Community Vulnerability & Adaptation

At-risk communities are becoming more vulnerable to climate impacts such as flooding, drought and increases in urban heat islands.

For information on climate impacts in Ohio, contact the State Climate Office at scoo@osu.edu or (614)292-7930.

Source: globalchange.gov/NCA4

Climate change is bad for Ohio

Extreme weather

- More severe heat
 - Extreme heat is the leading cause of weather-related deaths in the US
- More air quality issues
 - 6 Ohio cities among the 20 worst places to live with asthma
- Stronger, more frequent storms
 - Flooding increases water contamination (GI illness, rashes, liver damage, etc)

Source: Policy Matters Ohio

The Columbus Dispatch

Midwest could see damaging winds from derecho

Tuesday June 11, 2013 5:00 PM

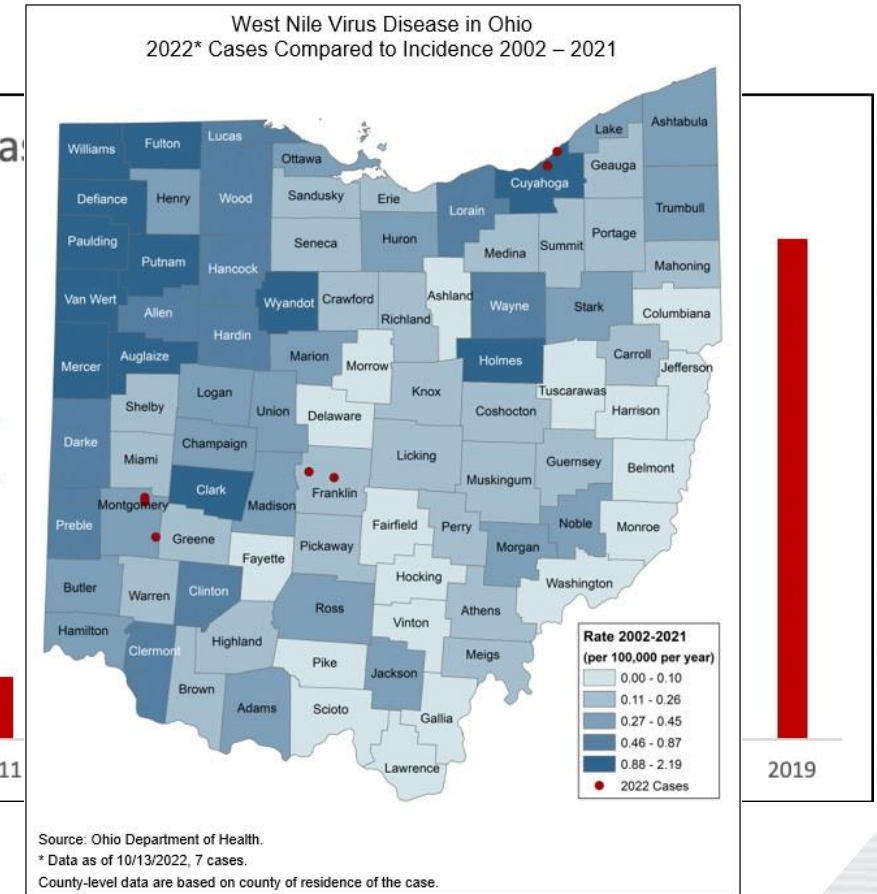
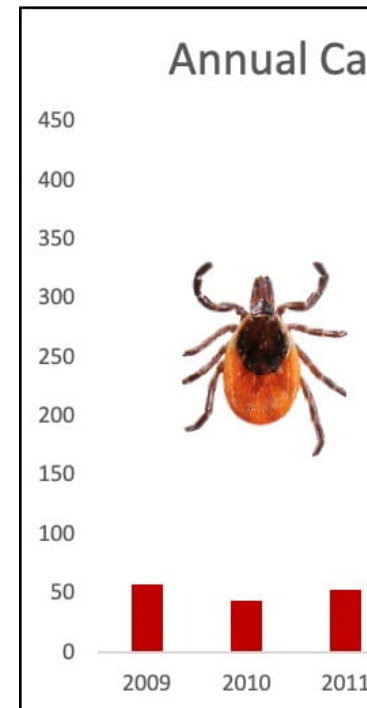


This house at the intersection of Milton Avenue and Montrose Way in Clintonville was hit by a fallen tree during a June 2012 storm, with a significant portion of it on top of the house. Courtney Hergesheimer | Dispatch

Climate change is bad for Ohio

Infectious disease

- West Nile Virus
 - Emerged in 2001, 81 fatal cases in OH to date
- Lyme Disease
 - Black legged deer ticks confirmed in OH in 2010



Source: Policy Matters Ohio

Top 10 Hazards for Franklin County

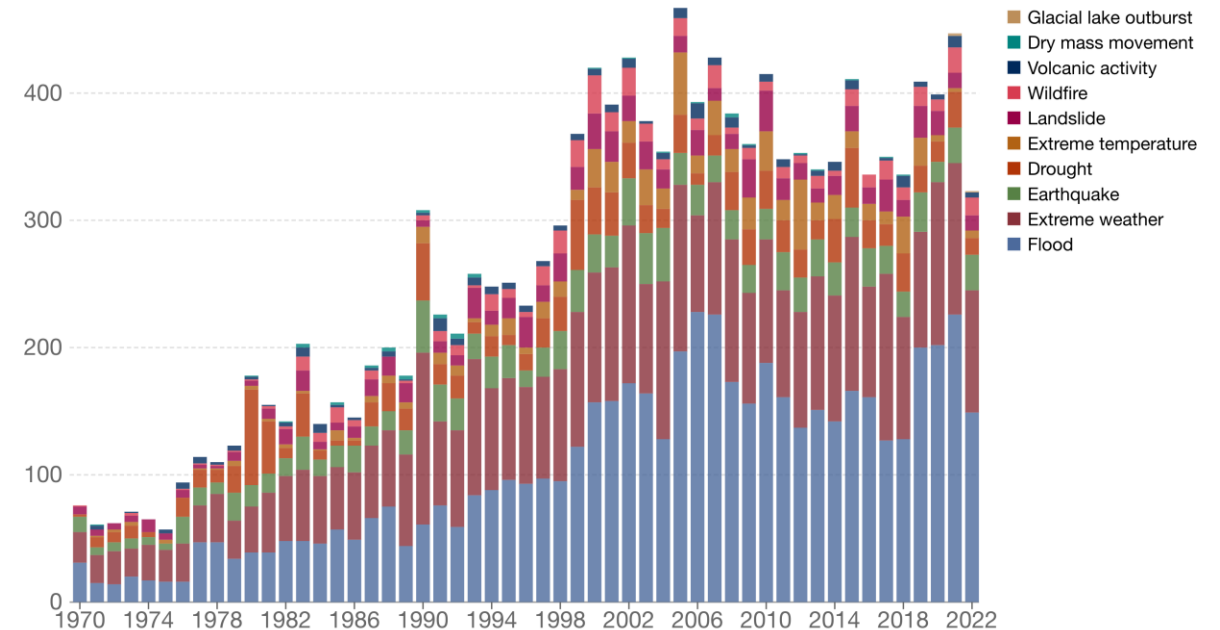
1. Dam/Levee Failure
2. Disease Outbreak
3. Drought
4. Earthquake
5. Extreme Temperature
6. Flooding (inland, flash, stormwater, ice)
7. Geologic hazards (erosion)
8. Invasive species
9. Severe summer/winter weather
10. Tornadoes

Source: Franklin County Emergency Management and Homeland Security (2023)

Global reported natural disasters by type, 1970 to 2022

The annual reported number of natural disasters, categorised by type. This includes both weather and non-weather related disasters.

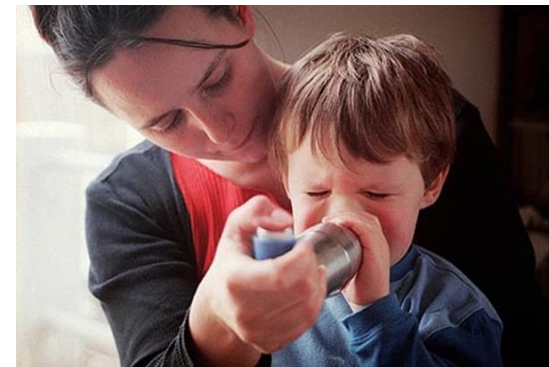
Our World
in Data



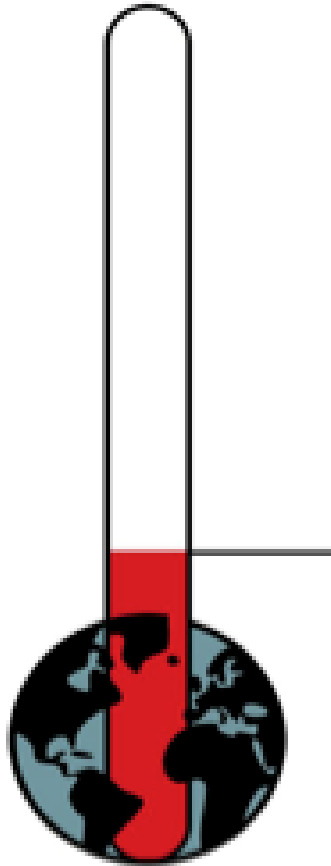
Source: EM-DAT, CRED / Université catholique de Louvain, Brussels (Belgium)
OurWorldInData.org/natural-disasters • CC BY

Climate change is bad for Ohio

- Vulnerable populations most at risk:
- The poor, the very young and very old
- Those with mental and physical handicaps
- Those with chronic health conditions

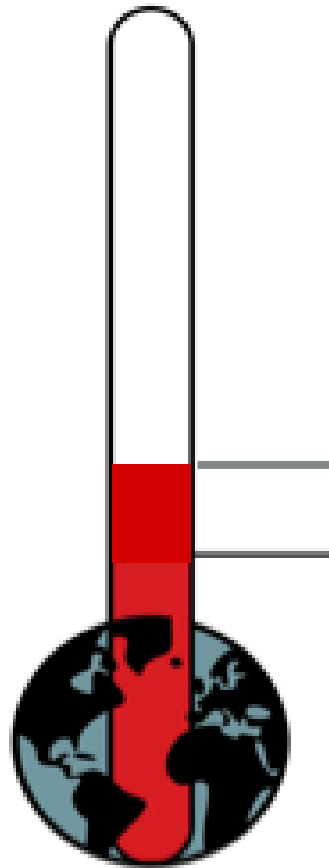


How high is too high?



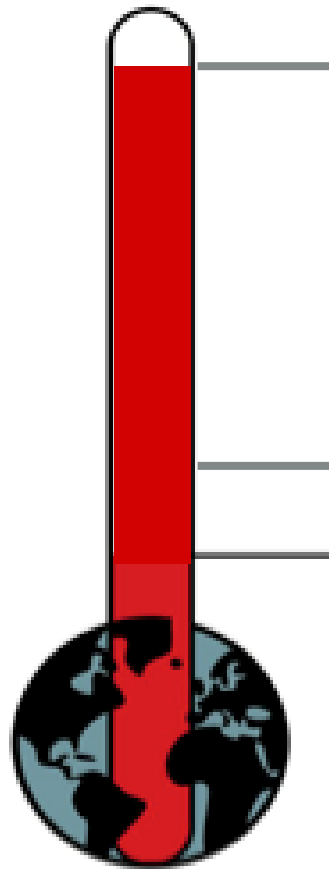
2° F– Observed warming since the industrial revolution (about 1900)

How high is too high?



3.6° F – The goal (with the Paris Agreement)
2° F – Observed warming since the industrial revolution (about 1900)

How high is too high?



8.0° F – 2100 Projection (worst case)

- Highest temps in 30 million years
- Sea level rise of ~8 feet
- Drought on 40% of inhabited land
- Half of known species extinct

3.6° F – The goal (with the Paris Agreement)

2° F – Observed warming since the industrial revolution (about 1900)

Can we do anything about it?



Which of the following actions do you think would reduce the rate of climate change?

1. Switching from fossil fuels to renewable energy
2. Increasing use of public transportation
3. Planting trees
4. Reducing toxic waste (nuclear, chemical)
5. Banning aerosol spray cans
6. Improving building insulation
7. Eating less beef
8. Contacting your representatives to support climate policy

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- 8. Contacting your representatives to support climate policy**

Which of the following actions do you think would reduce the negative impacts of climate change?

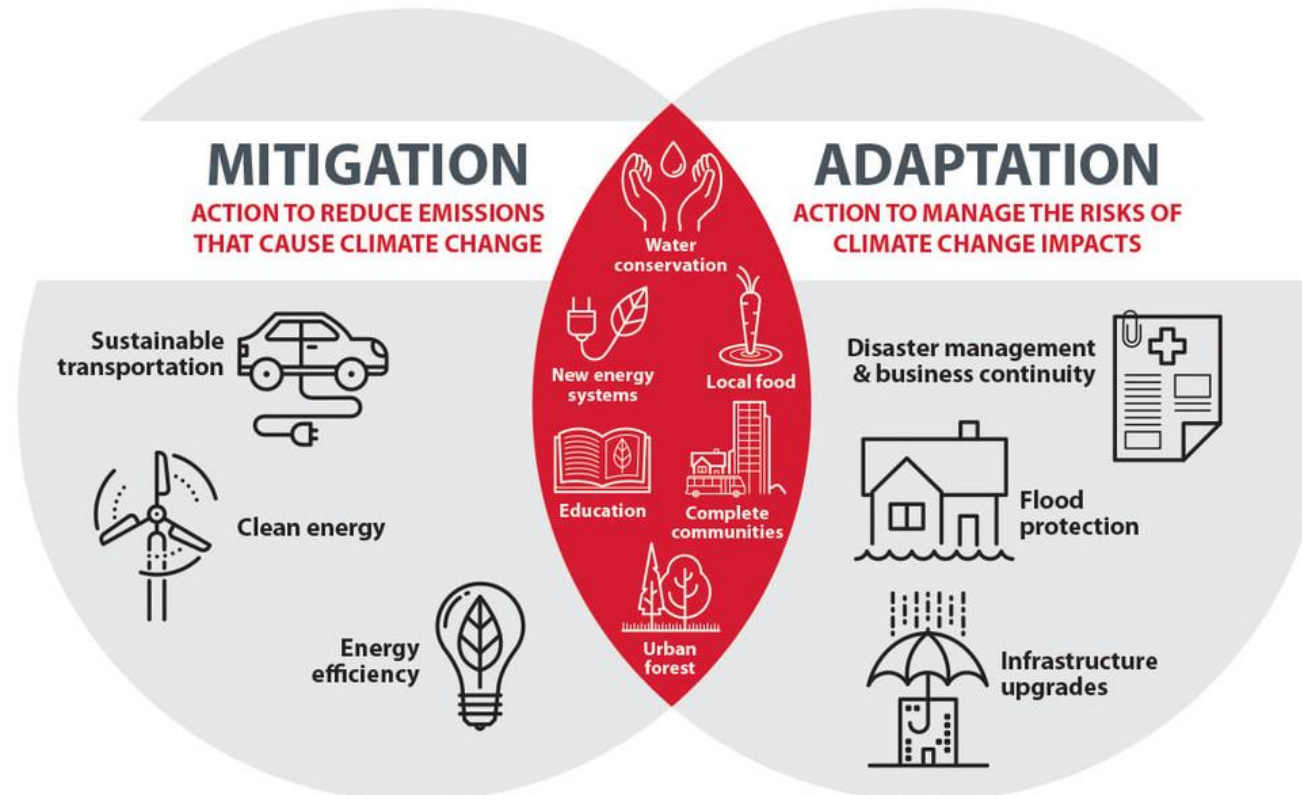
1. Modernizing the energy grid
2. Increasing the availability of cooling centers
3. Developing emergency preparedness plans
4. Investing in green infrastructure
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6. Mapping and planning for protection of vulnerable communities
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We can do something about it!

Building Climate Resilience



Source: <https://www.calgary.ca/UEP/ESM/Pages/Energy-Savings/Climate-Change.aspx?redirect=/climateprogram>

“We” are doing something about it!

What We Hope to Accomplish by 2025



Carbon Sequestration

Remove the CO₂ equivalent of 150,000 cars from the road annually through natural climate solutions including better forest management, habitat protection and sustainable agriculture



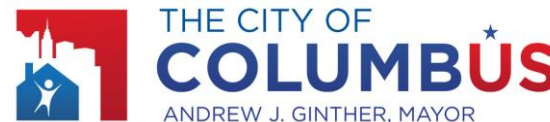
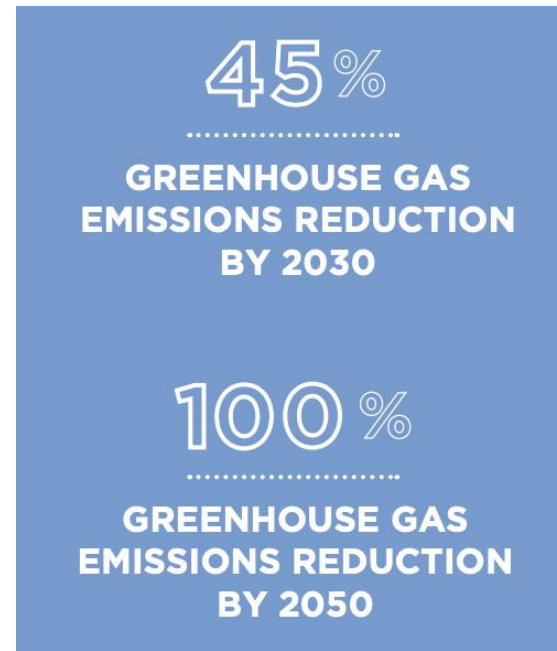
Renewable Energy Infrastructure

Accelerate the build-out of renewable energy in ways that support nature, people and the climate



Clean Energy Advocacy

Strengthen bipartisan support for climate action and improve the narrative around climate change



OFFICE OF ENVIRONMENT & SUSTAINABILITY MENU ▾

Take Action - 2023 Green Cincinnati Plan

The Green Cincinnati Plan (GCP) is the City's guiding plan and community vision to address climate change, bolster the environmental resilience of the city and its neighborhoods, and equitably mitigate and repair the impacts of climate change. The

Takeaways for today

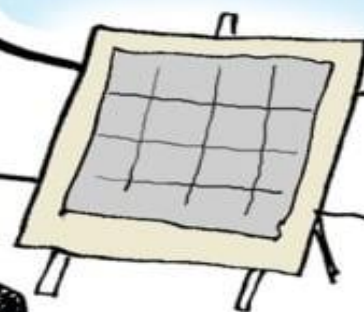
- Climate change is real
- Current climate change is caused by people
- Climate change is having (and will have) negative impacts on people in your communities and throughout Ohio
- We can do (and are doing) something about it



CLIMATE SUMMIT

WHAT IF IT'S
A BIG HOAX AND
WE CREATE A BETTER
WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- etc. etc.



Thank you!

For more information on the changing climate, expected impacts in the Midwest/Ohio, and paths forward, please visit:

<https://nca2018.globalchange.gov/> - CH 21 Midwest

<https://ohiopha.org> Ohio PH Climate Resilience Coalition

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