



Despair Is Not an Option

A Sustainable World—
Opportunities and Challenges
Where do we go from here?
Policy and Sustainability

UC Berkeley
PH 101

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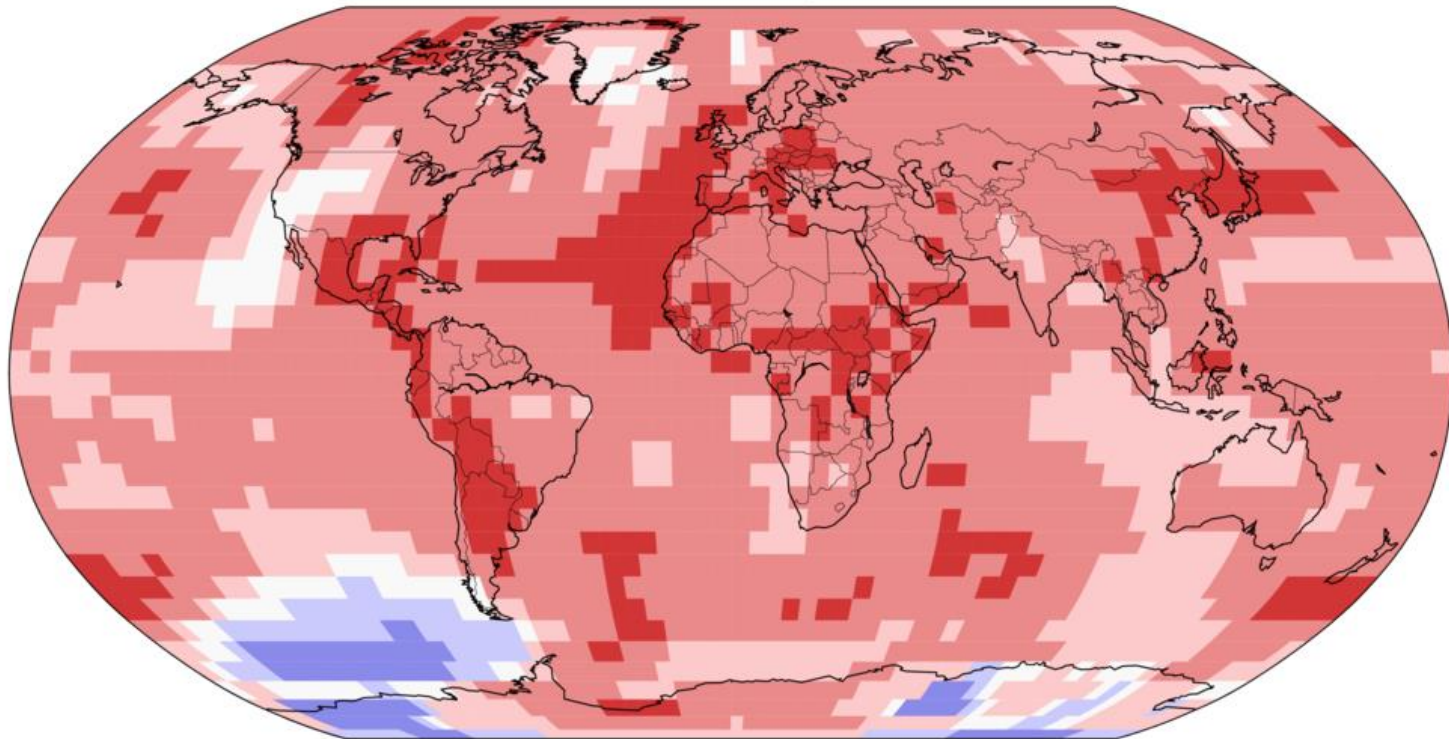
Nor is this an Option.



Land & Ocean Temperature Percentiles Jan–Oct 2023

NOAA's National Centers for Environmental Information

Data Source: NOAA GlobalTemp v5.1.0–20231107



**Record
Coldest**



**Much
Cooler than
Average**



**Cooler than
Average**



**Near
Average**



**Warmer than
Average**



**Much
Warmer than
Average**



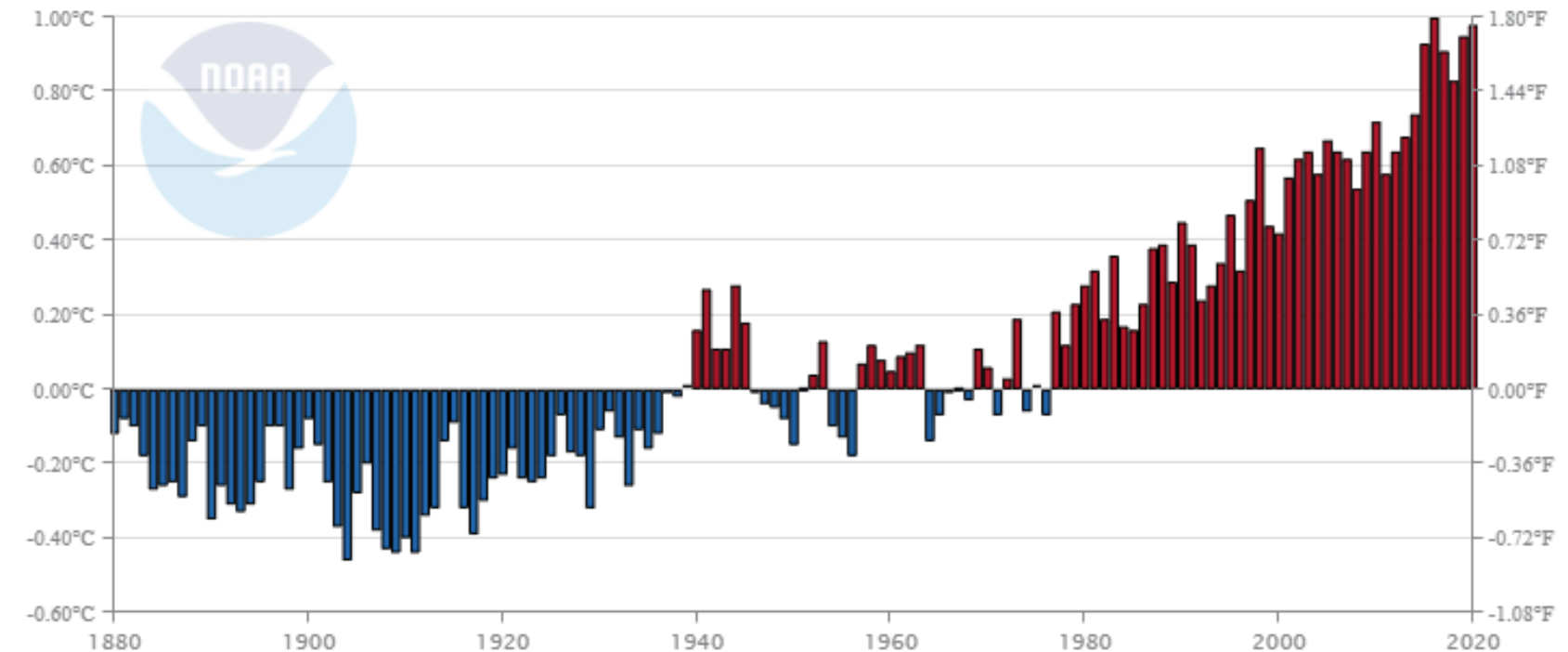
**Record
Warmest**



Global Land and Ocean Annual Temperature Anomalies

Global Land and Ocean

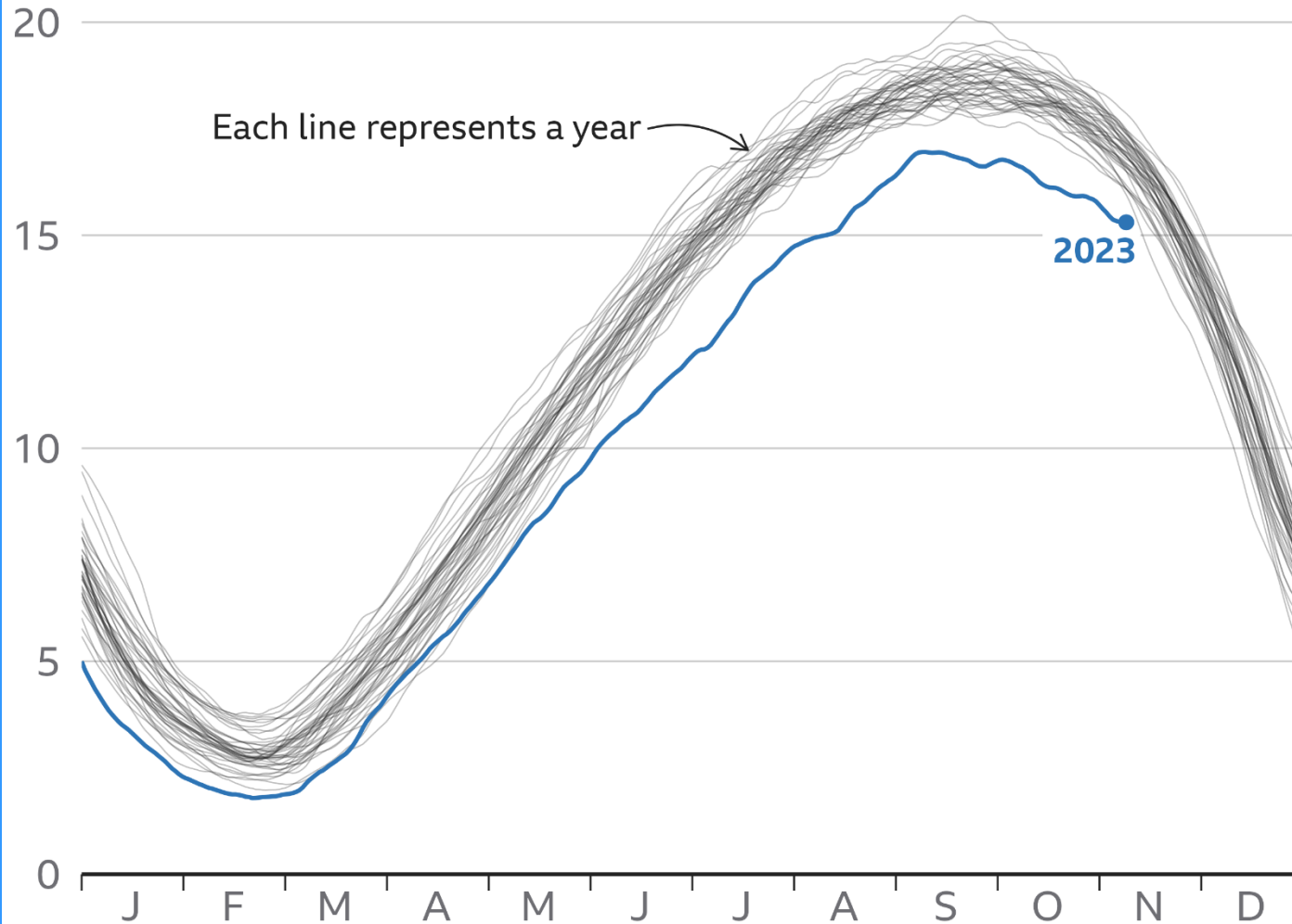
January–December Temperature Anomalies



<https://www.ncdc.noaa.gov/sotc/global>

Antarctic sea-ice far lower than usual in 2023

Daily sea-ice extent in million sq km, 1979-2023

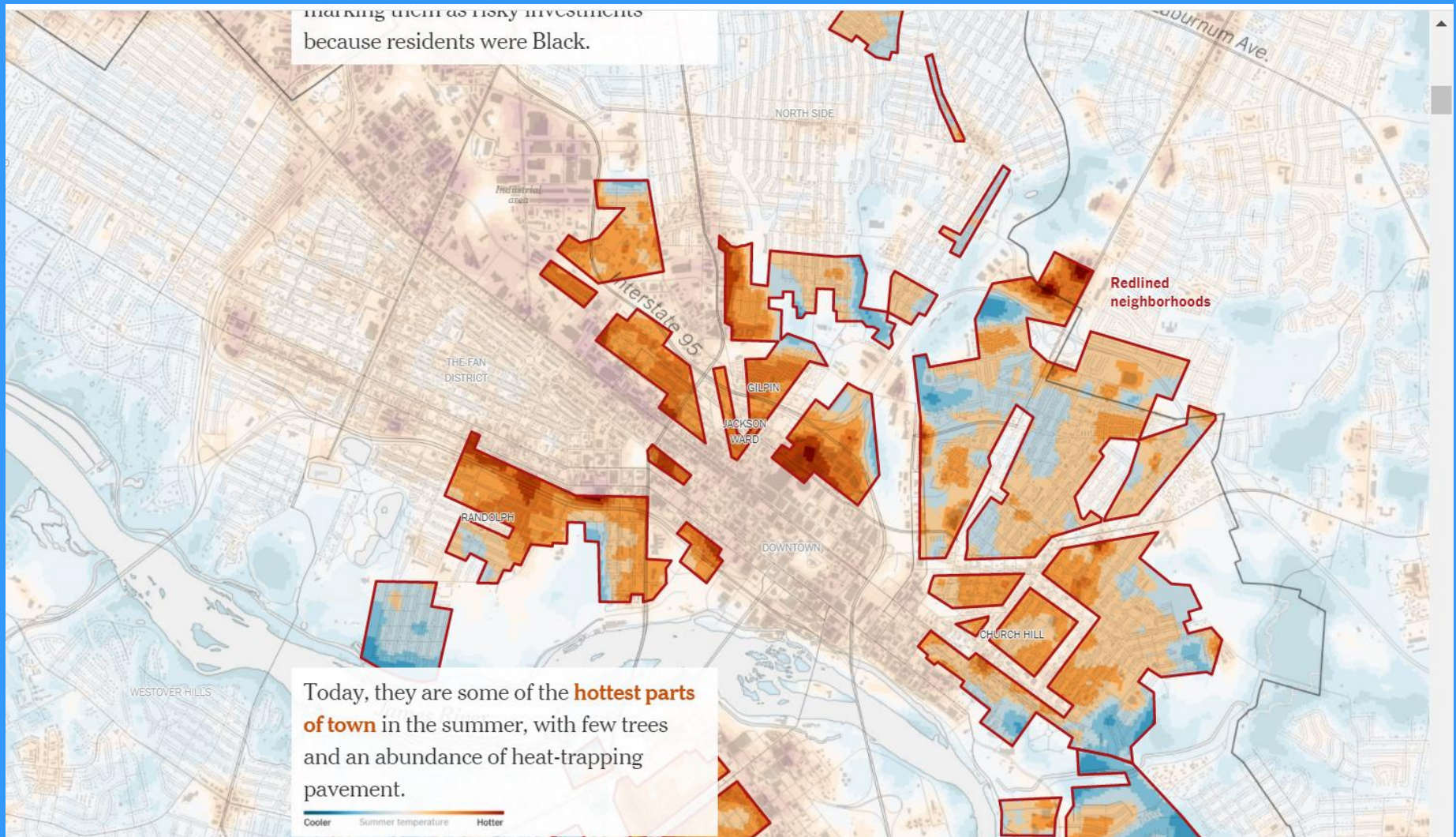


Five-day rolling average of sea-ice extent

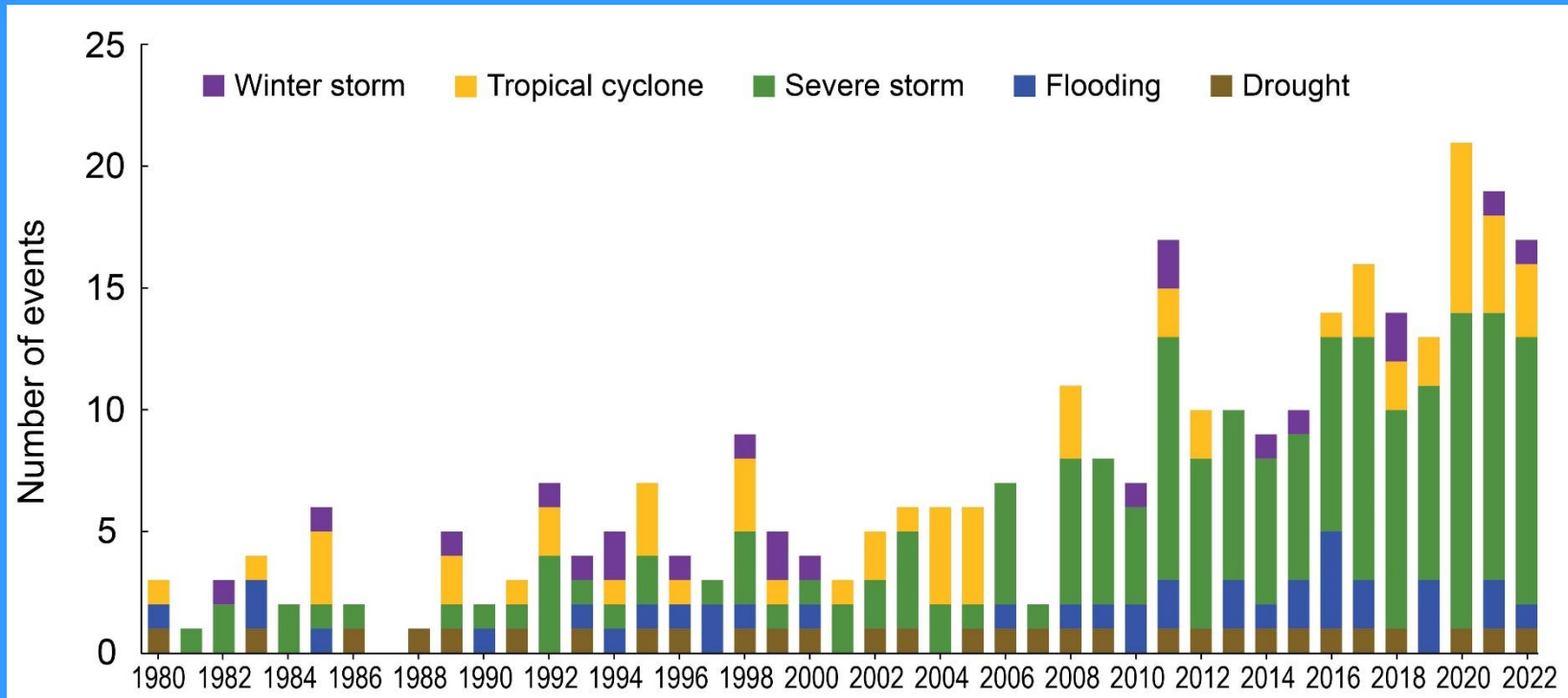
Source: National Snow and Ice Data Center (NSIDC), data to 9 Nov 2023

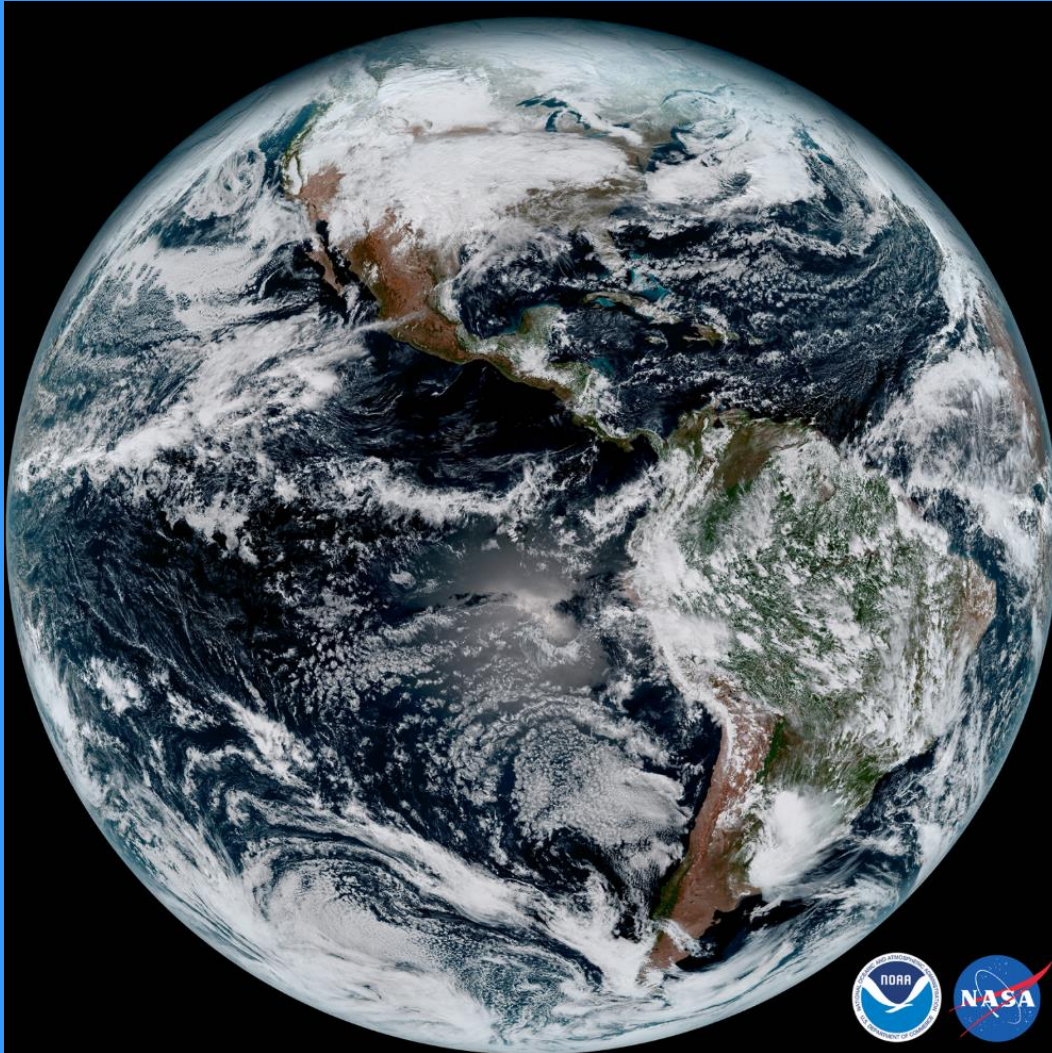


Hottest Areas in Richmond VA 90 years after red-lining



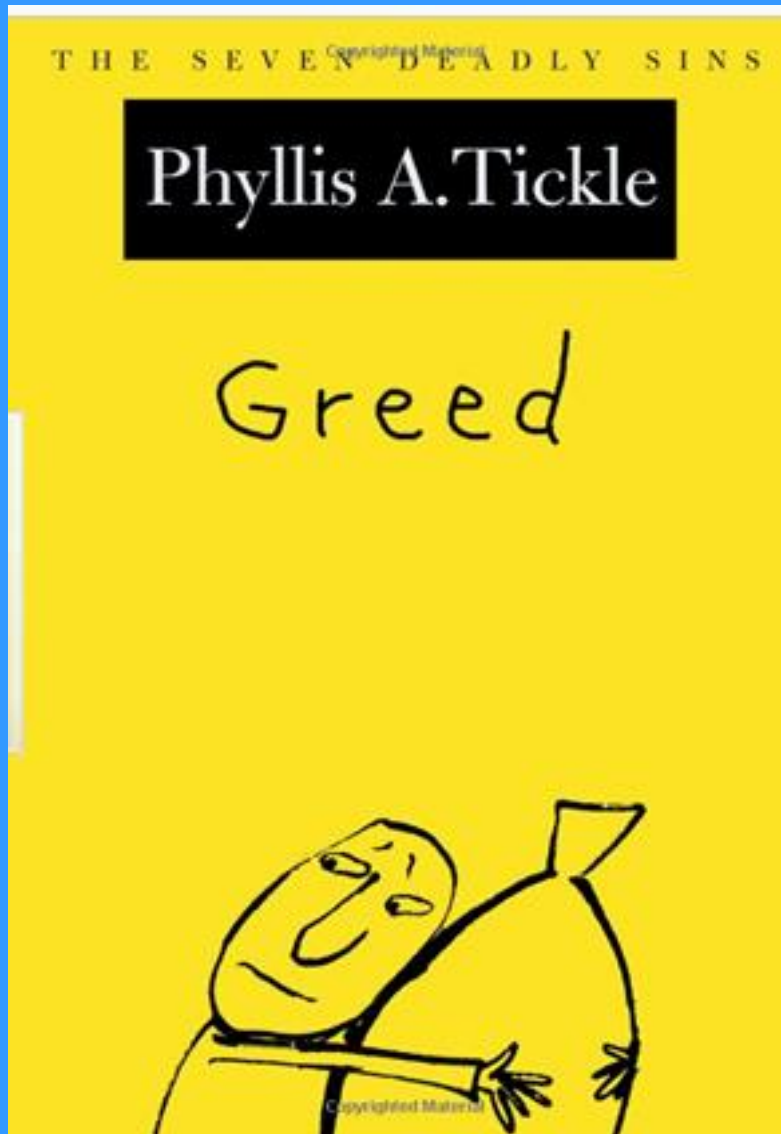
Water-related Billion Dollar US Disasters 1980-2022





A global threat to
humanity...

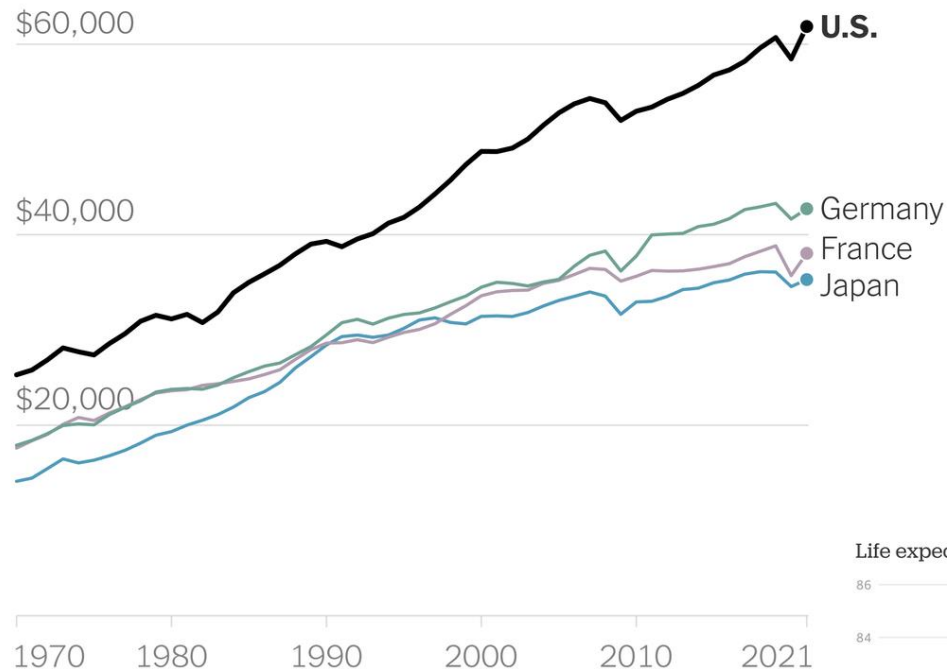
First Earth Photo
Jan 23, 2017
GOES-16 Satellite



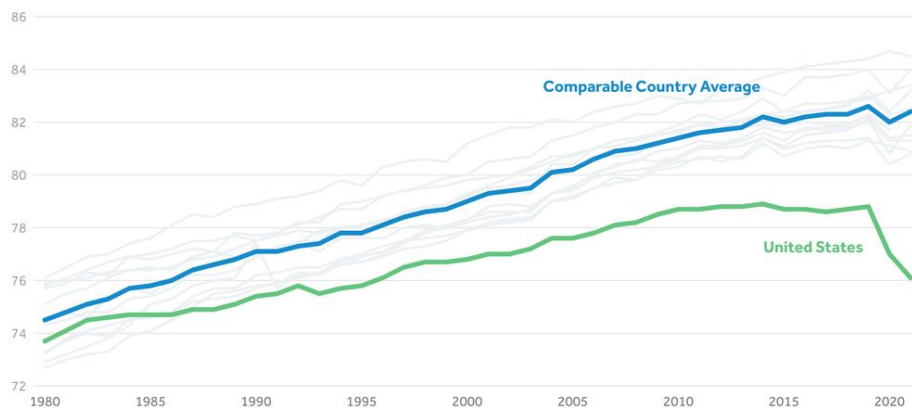
--greed as the 'mother and matrix, root and consort' of all sins.

--“The most insidious and least obvious of offenses”...transformed from a specific offense against godliness to a brutal but amoral force of society”

Annual G.D.P. per capita



Life expectancy at birth in years, 1980-2021

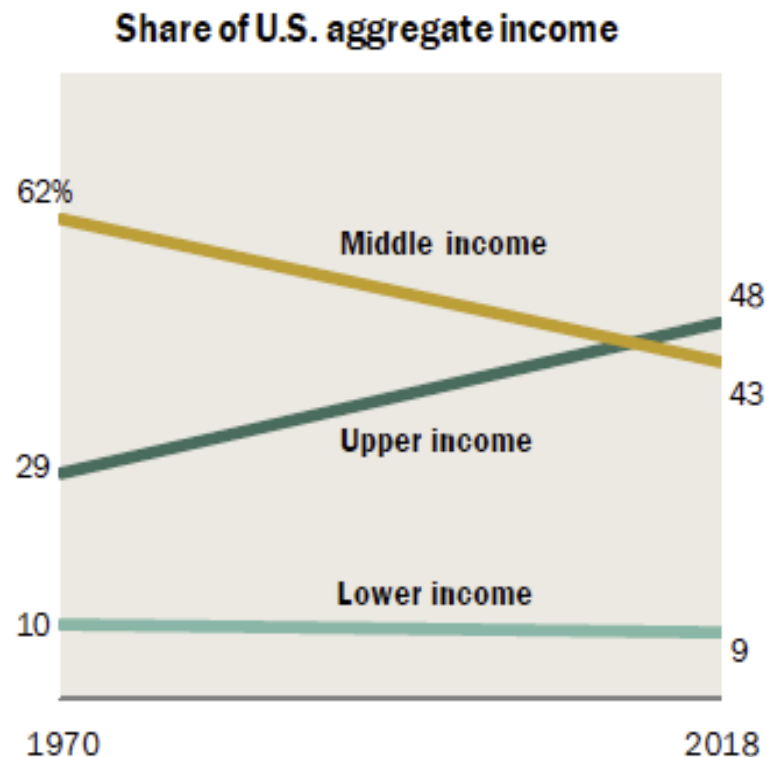
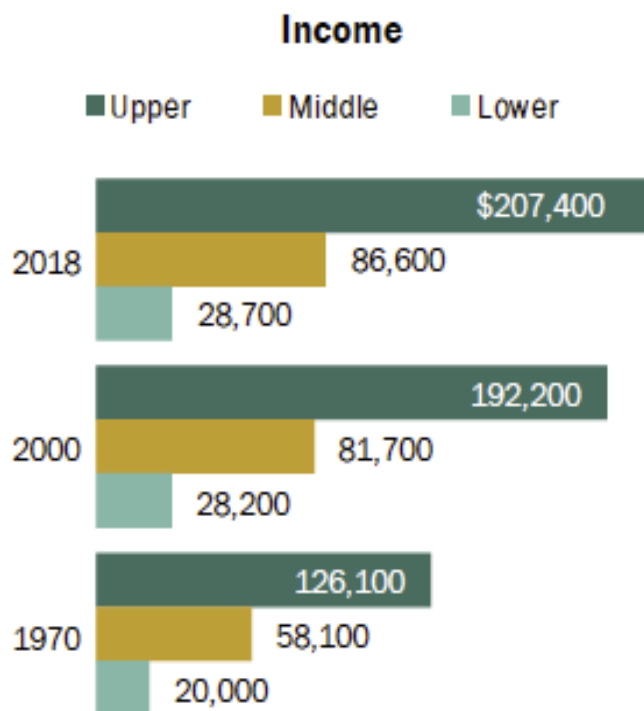


Notes: Comparable countries include: Australia, Austria, Belgium, Canada (except for 2021), France, Germany, Japan, the Netherlands, Sweden, Switzerland, and the U.K. See Methods section of "How does U.S. life expectancy compare to other countries?"

Source: KFF analysis of CDC, OECD, Japanese Ministry of Health, Labour, and Welfare, Australian Bureau of Statistics, and UK Office for Health Improvement and Disparities data

The gaps in income between upper-income and middle- and lower-income households are rising, and the share held by middle-income households is falling

Median household income, in 2018 dollars, and share of U.S. aggregate household income, by income tier

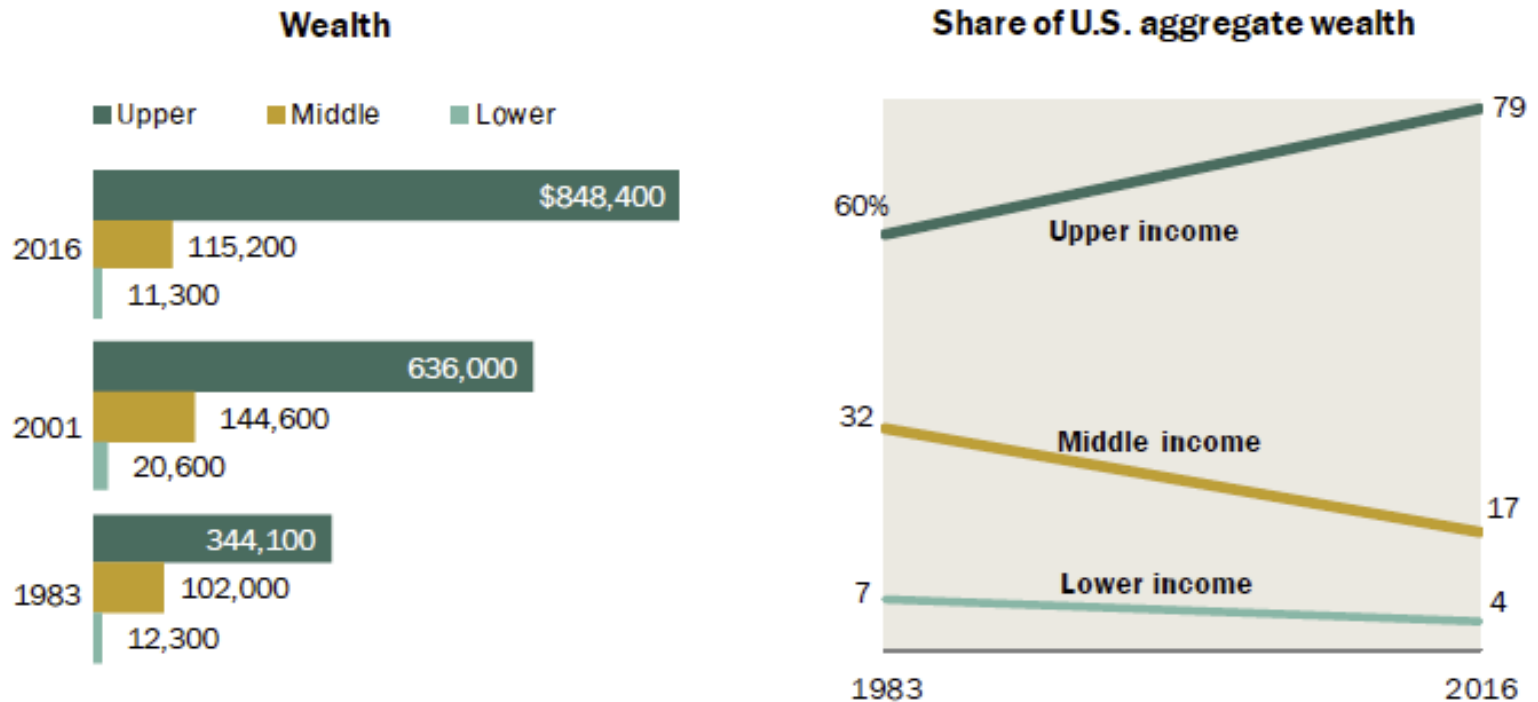


Note: Households are assigned to income tiers based on their size-adjusted income. Incomes are scaled to reflect a three-person household.

Share of US Wealth

The gaps in wealth between upper-income and middle- and lower-income families are rising, and the share held by middle-income families is falling

Median family wealth, in 2018 dollars, and share of U.S. aggregate family wealth, by income tier



Note: Families are assigned to income tiers based on their size-adjusted income.

Source: Pew Research Center analysis of the Survey of Consumer Finances.

"Most Americans Say There Is Too Much Economic Inequality in the U.S., but Fewer Than Half Call It a Top Priority"

PEW RESEARCH CENTER

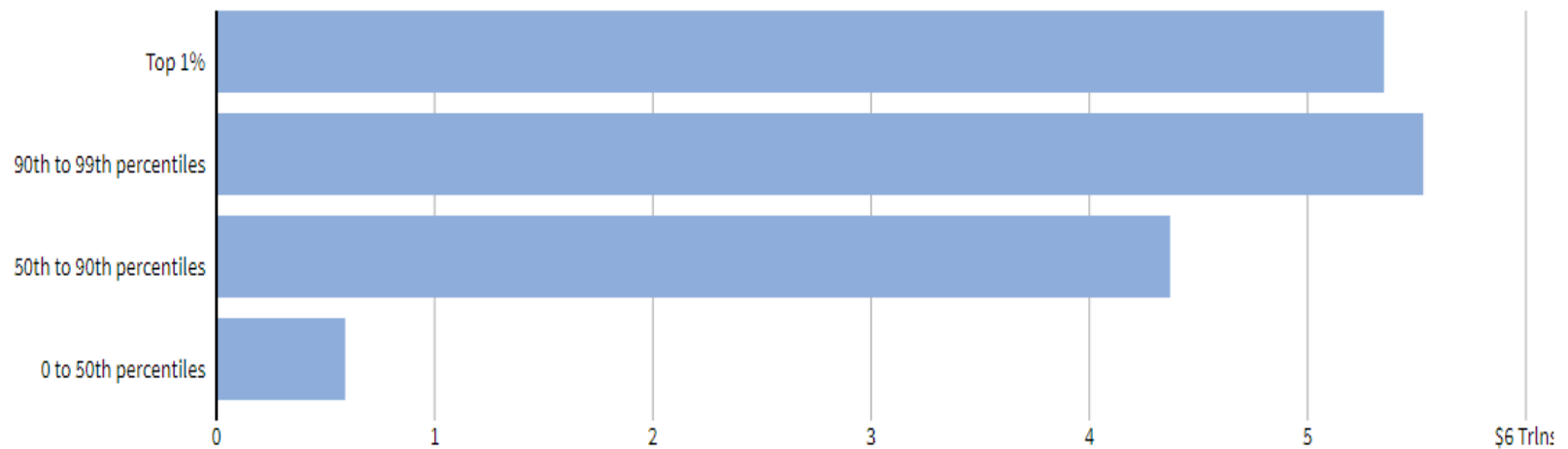
How Was the US Economic Gain of \$15.8 Trillion under Trump Divided--

Household wealth under Trump

President Donald Trump's State of the Union speech touted the "inclusive" economic gains generated since he took office in 2017. Federal Reserve data give a different view about how an additional \$15.8 trillion in household net worth has been divided. Whites, college grads and baby boomers were the big winners.

OF \$15.8 TRILLION...

...the poorest half of households got about \$600 billion.



Reuters graphics.

SUSTAINABILITY

Exxon Knew about Climate Change almost 40 years ago

A new investigation shows the oil company understood the science before it became a public issue and spent millions to promote misinformation

By Shannon Hall on October 26, 2015  24 [Véalo en español](#)



The company's knowledge of climate change dates back to July 1977, when its senior scientist James Black delivered a sobering message on the topic. *Credit: Getty Images/MASS*

Exxon was aware of climate change, as early as 1977, 41 years before it became a public issue, according to a recent investigation from InsideClimate News. This knowledge did not prevent the company (now ExxonMobil and the world's largest oil and gas company) from spending decades refusing to publicly acknowledge climate change and even promoting climate misinformation—an approach many have likened to

“...investigation shows the oil company understood the science... and spent millions to promote misinformation”

Institute of Medicine

*The purpose of public health is
to fulfill society's interest in
assuring the conditions in which
people can be healthy*

We Need To “Turn Down All The Dials”

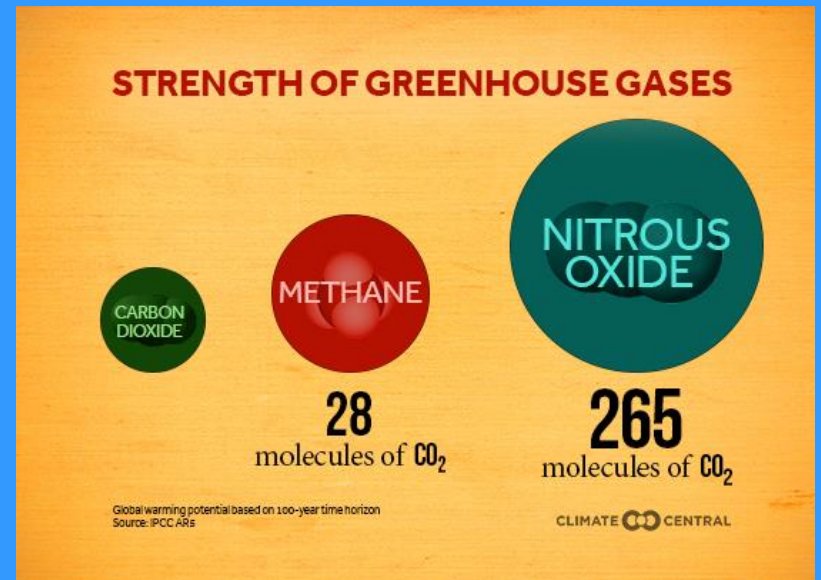
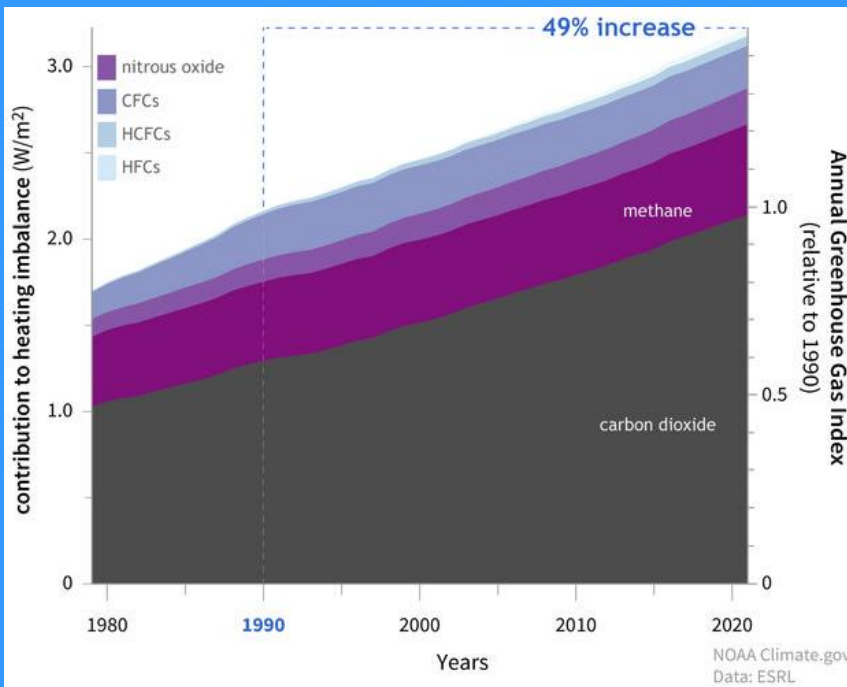
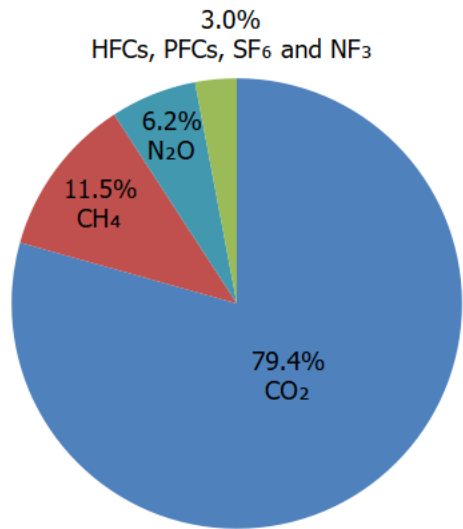
- Methane, Refrigerants, Nitrous Oxide, CO₂
- Tax Subsidies for Fossil Fuel Extraction
- Investor non-accountability.
- Subsidies for Useless and Harmful Ag
- Deforestation
- Transportation Pollution
- Non-biodegradable materials
 - Pesticides, Plastics, Flame retardants.

We Need To Turn Up These Dials










- Reuse of existing infrastructure, less waste.
- Solar Energy Capture: Wind, Sunlight.
- Engine Efficiency
- Superconductors
 - Electricity powered, Ships, Trains, Trucks, Cars, Bikes (with safe bikeways), Aircraft
- Geothermal heating, area-wide and local.
- New safe energy sources: Fission, Micronuclear (maybe).

We Need To Turn Up These Dials

- Taxes on carbon, methane, & other emissions.
- Disincentives and Accountability for Energy Overuse.
- Water capture and reuse.
- Heat and Cold Capture.
 - Broad scale use of high efficiency heat exchangers.
- Turn up Leadership!
“Never, Never, Never, Never Give Up”
(Churchill)



Anaerobic Digestion of Organic Wastes

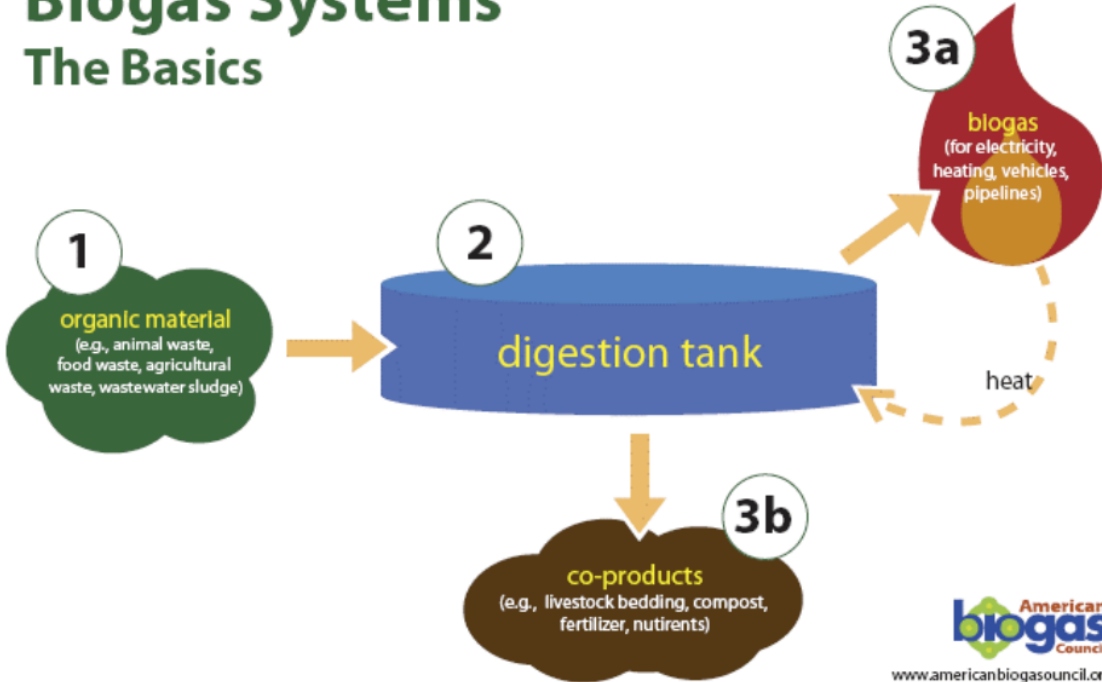
CalRecycle  Programs  Recycle  Government  Business  Get Involved  News  About Us  Help  Search

reaction rates compared to thermochemical processes.

High moisture feedstocks, such as food waste and green waste, are generally good candidates for biochemical processes.

Energy products from biochemical processes include biogas (primarily methane and carbon dioxide) and ethanol (bioethanol). Biogas can be used to produce electricity, fuel, or renewable natural gas. According to the [U.S. Department of Energy](#), other biofuels, such as biobutanol and dimethyl ether, are being investigated and could become important biofuels.


Biogas Systems The Basics



The diagram illustrates the biogas production process in three main stages:

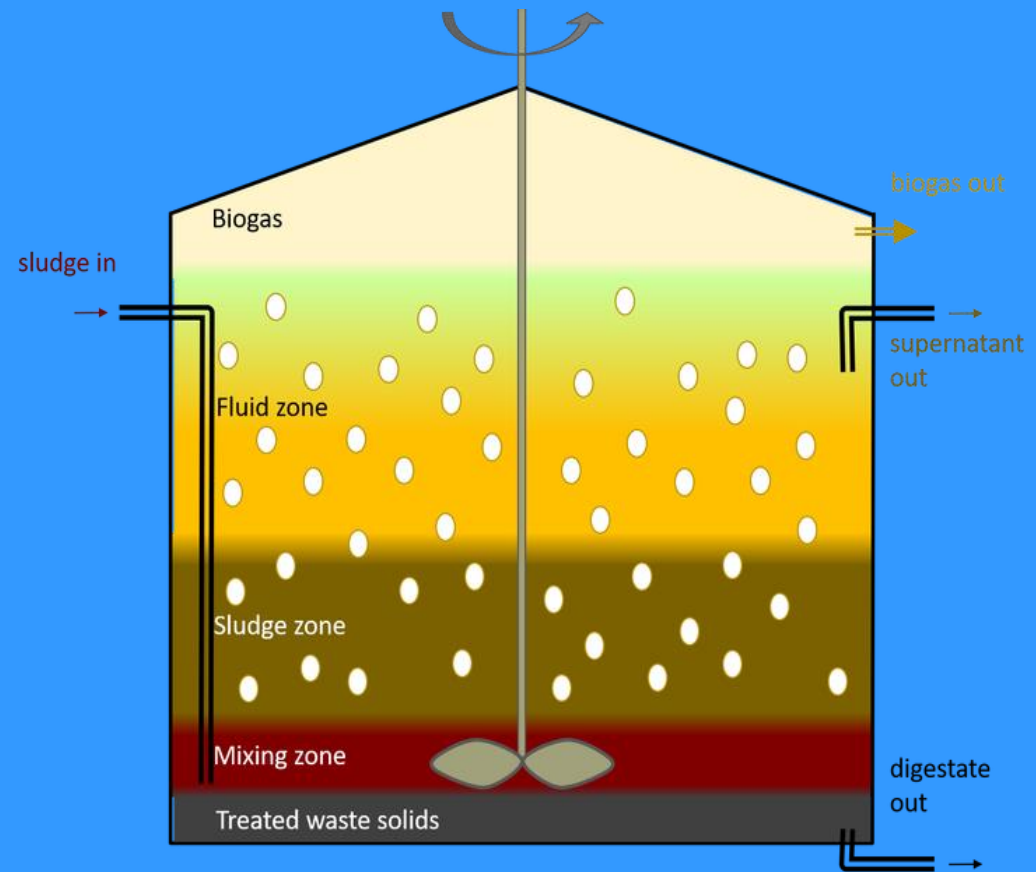
- 1 organic material** (e.g., animal waste, food waste, agricultural waste, wastewater sludge) enters the system.
- 2 digestion tank** where the material is processed.
- 3a biogas** (for electricity, heating, vehicles, pipelines) is produced from the tank.
- 3b co-products** (e.g., livestock bedding, compost, fertilizer, nutrients) are also produced from the tank.

A dashed arrow labeled "heat" indicates that heat is used to maintain the temperature of the digestion tank, which is supplied by the biogas produced.


www.americanbiogasouncil.org

Good Solutions Solve Multiple Problems

Prior sewage treatment produced large amounts of methane and other gases, sludge (often hauled to sea or landfills), used large amounts of electricity, and discharged poorly treated water to bays and rivers.





EBMUD installed two high-efficiency (38%) methane burning 4.5 MW turbines with ultra-low emissions.

The treatment plant now can supply its own electric power and saves \$2.5million/year plus sells \$500,000 a year of power to PGE.

Where do we go from here?

Stop Subsidizing Lose-Lose Agricultural Practice and Megafarming

RESEARCH ARTICLE | ENVIRONMENTAL SCIENCES | 



Environmental outcomes of the US Renewable Fuel Standard

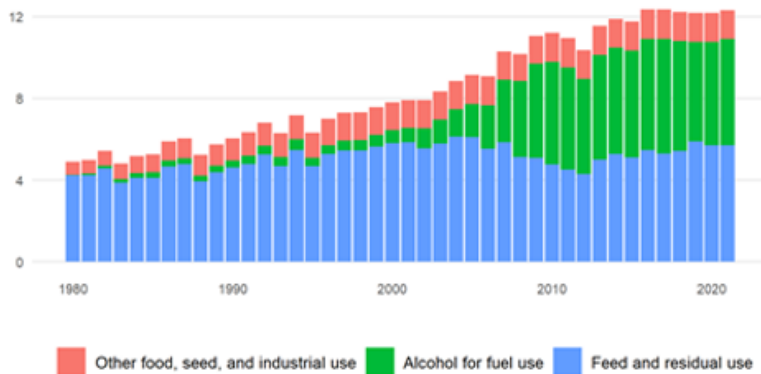
Tyler J. Lark , Nathan P. Hendricks , Aaron Smith  , and Holly K. Gibbs [Authors Info & Affiliations](#)

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February 14, 2022 | 119 (9) e2101084119 | <https://doi.org/10.1073/pnas.2101084119>

U.S. domestic corn use

Billion bushels



Updated: June 2021.
Source: USDA, National Agricultural Statistics Service.

Corn-Based Ethanol Pollutes More Than Gas, Study Finds



By Cristen Hemingway Jaynes | Feb 16, 2022 15:11PM EST

ENERGY

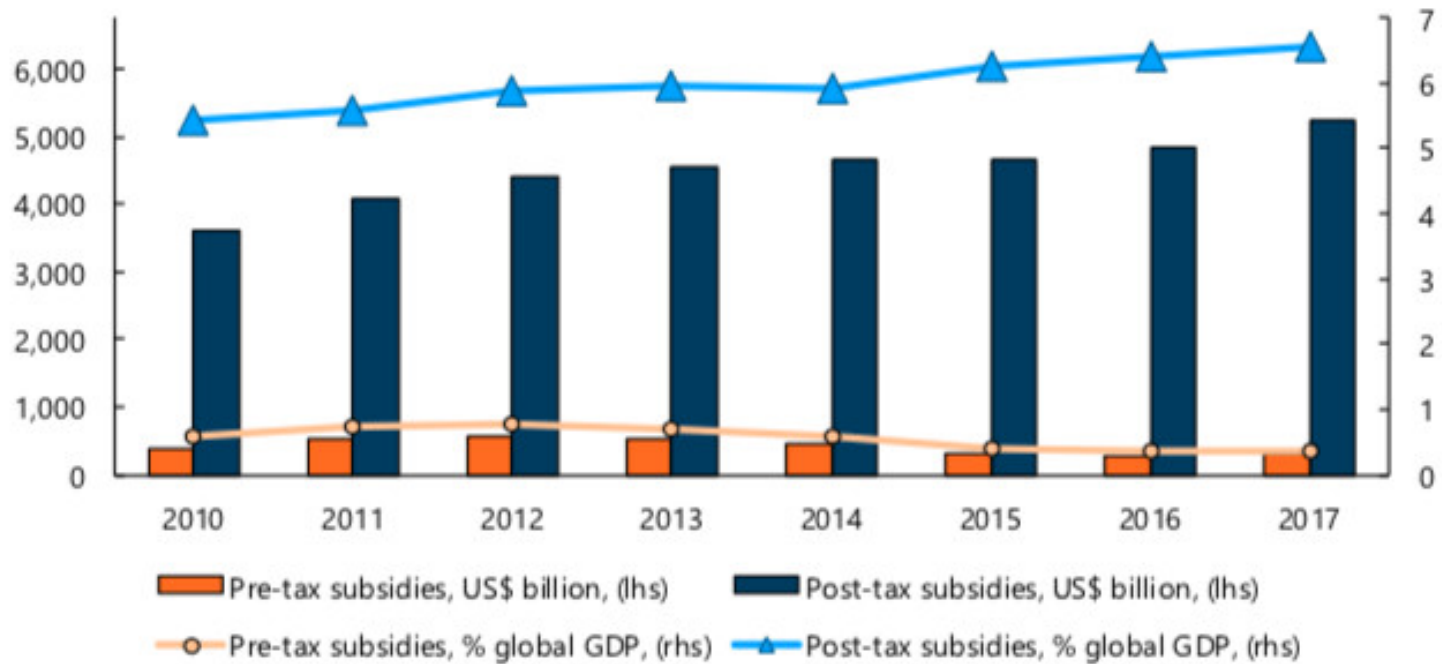


An ear of corn and a beaker of 200 proof ethanol produced at an ethanol production facility in Illinois. Photo Illustration by Scott Olson / Getty Images

For years, corn-based [ethanol](#) has been mixed with the [gasoline](#) sold at gas stations across the U.S., but a recently published study has found that its [carbon](#) intensity is “likely at least 24% higher” than gas, Roadshow by CNET reported.

Global Fossil Fuel Subsidies

International Monetary Fund



Carbon Pollution Is Pollution

Tax What Is Unhealthy



THE TAX POLICY CENTER'S

Briefing Book

A citizen's guide to the fascinating (though often complex) elements of the US tax system.

Table of Contents

TAX POLICY CENTER BRIEFING BOOK

Key Elements of the U.S. Tax System

What is a carbon tax?

ENERGY AND ENVIRONMENTAL TAXES < 3/3

BUSINESS TAXES

Q. What is a carbon tax?

A. Emissions of carbon dioxide and other greenhouse gases are changing the climate. A carbon tax puts a price on those emissions, encouraging people, businesses, and governments to produce less of them. A carbon tax's burden would fall most heavily on energy-intensive industries and lower-income households. Policymakers could use the resulting revenue to offset those impacts, lower individual and corporate taxes, reduce the budget deficit, invest in clean energy and climate adaptation, or for other uses.



Container Ships in LA/LB Harbor



<https://clearseas.org/en/air-pollution/>

U.S. Imports & Exports

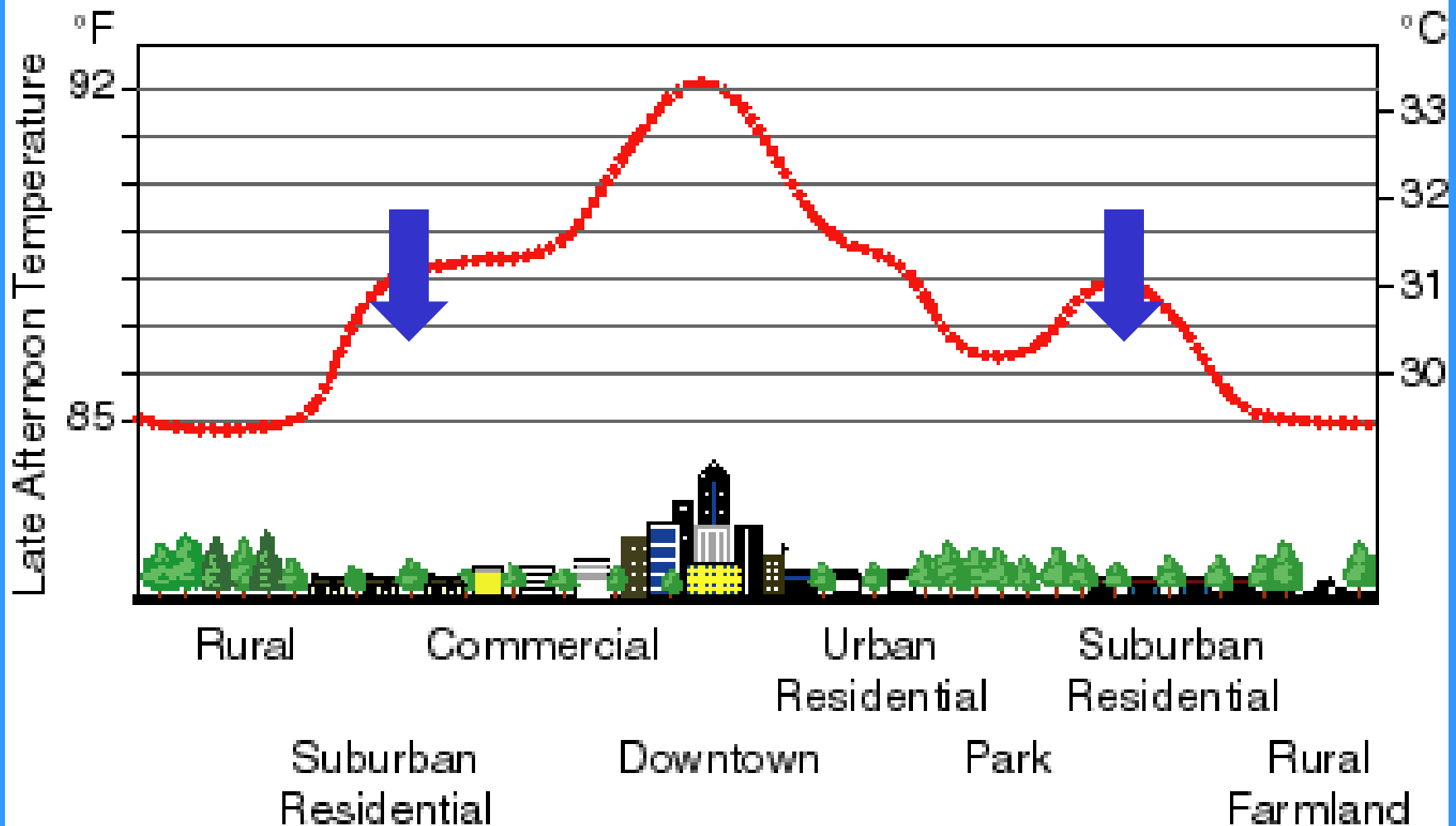
IMPORTS \$3.1 trillion

EXPORTS \$2.5 trillion



The Heat Island

Sketch of an Urban Heat-Island Profile



The Health Benefits of Natural Spaces

ISGlobal

ADULTS

- Stress reduction
- Improved life expectancy
- Better general mental and physical health
- Improved cognitive performance
- Improved sleep quality
- Reduction in cancer risk



CHILDREN

Improvements in:

- Attention capacity
- Concentration
- Emotional and behavioural development
- Coordination
- Balance
- Agility
- Self-confidence
- Self-discipline
- Social skills
- Weight of newborns



• Further studies are needed to confirm these results

Superblocks to increase green space reduce air pollution and traffic



Barcelona

(Mueller et al Env. Int. 2020)

Atlanta

Barcelona



0 10 20 (km)



0 10 20 (km)

| | |
|-----------------------------------|-----------------------------|
| POPULATION: | 5.25 MILLION |
| URBAN AREA: | 4,280 KM² |
| TRANSPORT | |
| CARBON EMISSIONS: | 7.5 |
| TONNES CO ₂ PER PERSON | |
| (PUBLIC + PRIVATE | |
| TRANSPORT) | |

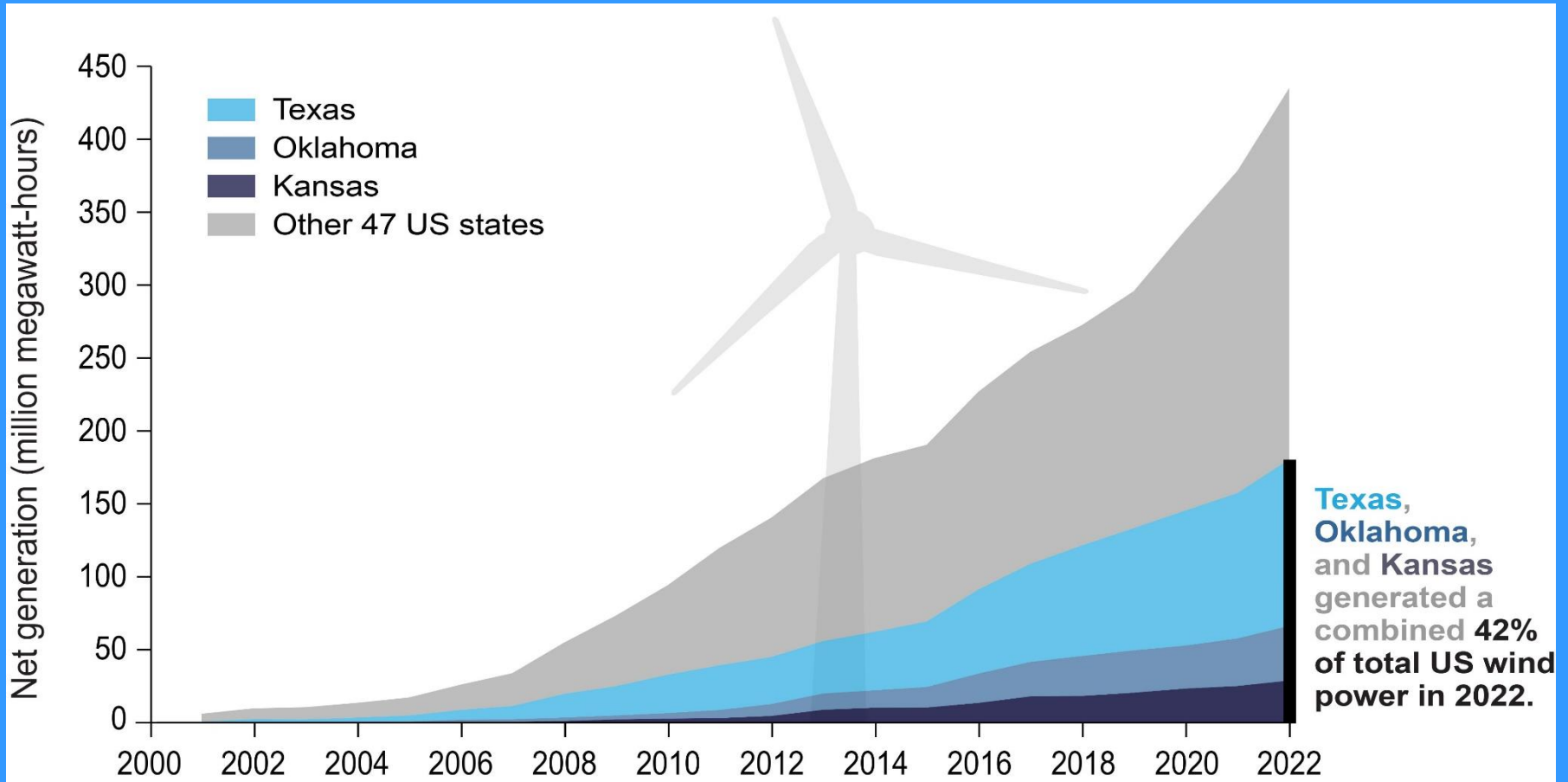
| | |
|-----------------------------------|---------------------------|
| POPULATION: | 5.33 MILLION |
| URBAN AREA: | 162 KM² |
| TRANSPORT | |
| CARBON EMISSIONS: | 0.7 |
| TONNES CO ₂ PER PERSON | |
| (PUBLIC + PRIVATE | |
| TRANSPORT) | |

Where do we go from here? Put People To Work



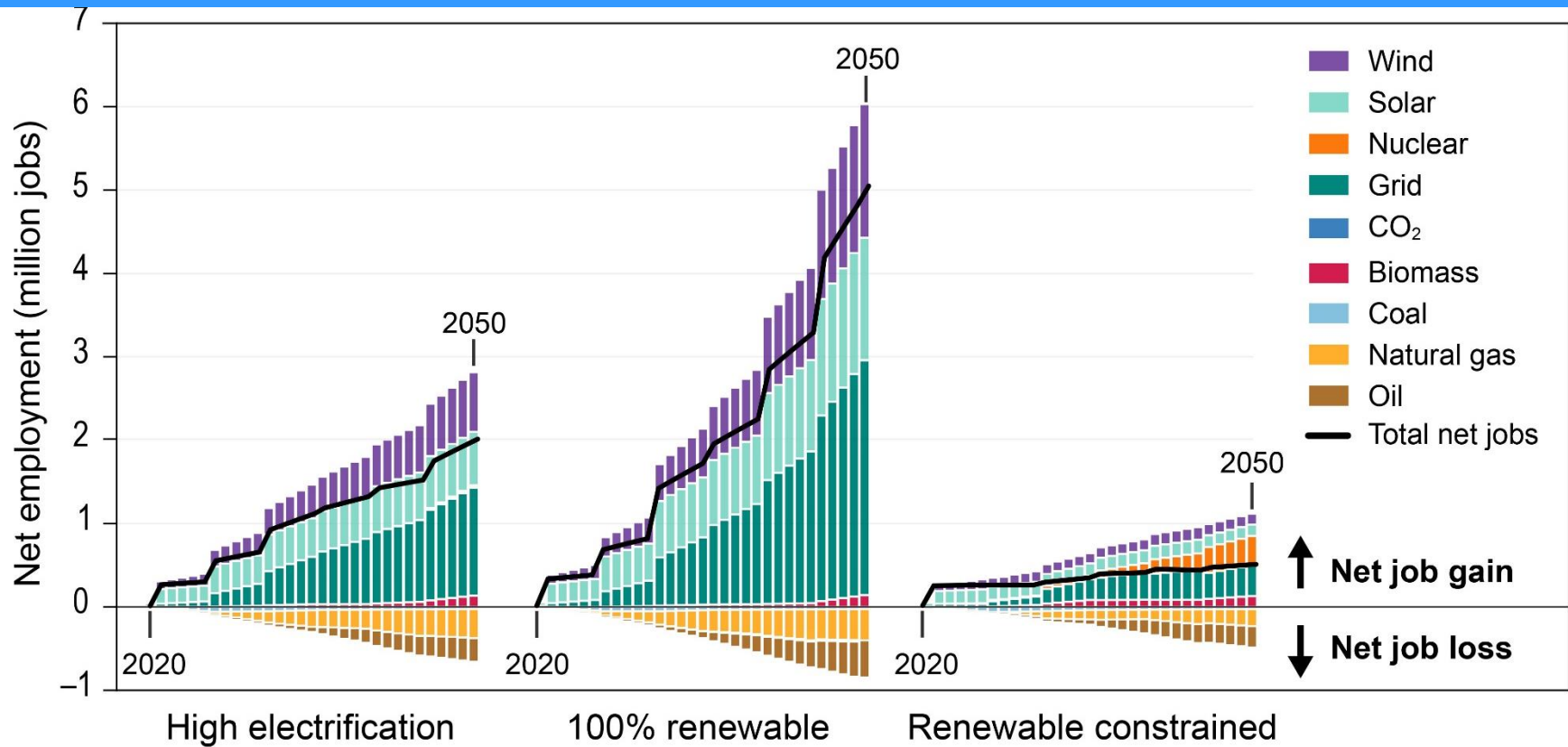
Net Generation of Electricity from Wind

2001-2020

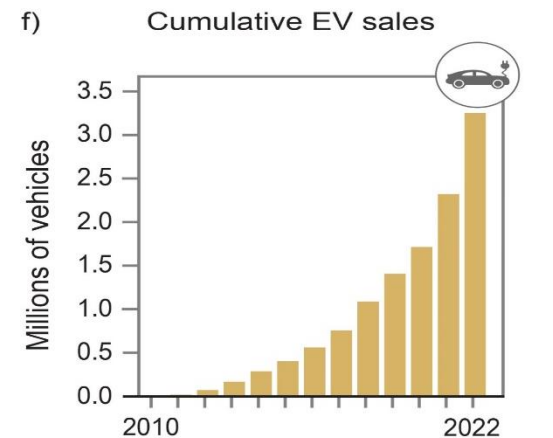
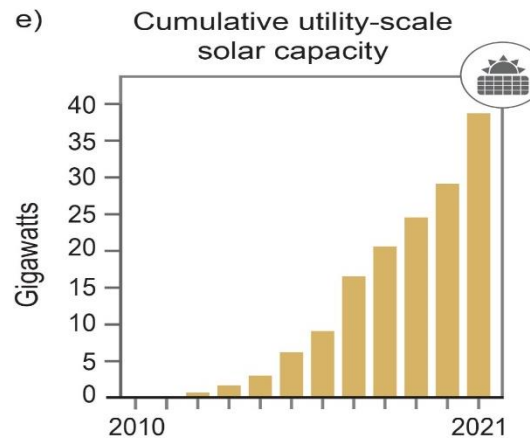
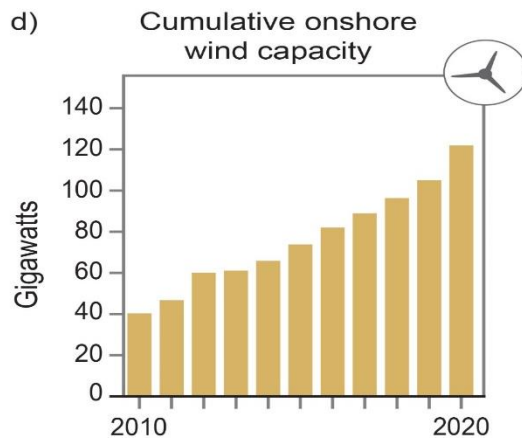
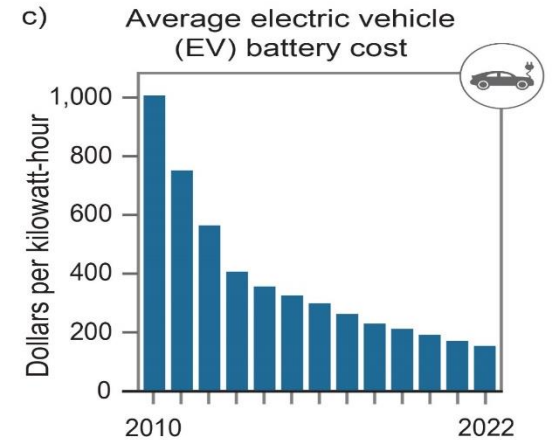
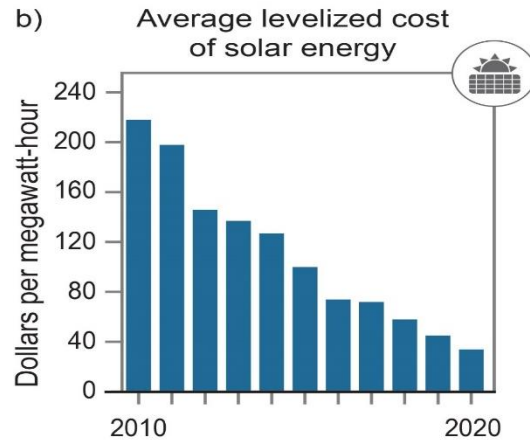
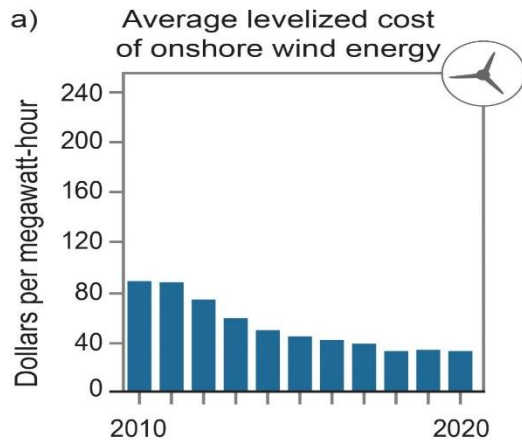


Energy Employment for Alternative Net-Zero Pathways

Projected 2020-2050



Trends and Costs in Low Carbon Energy Tech in the US





Our Children's Trust

We are the world's only not-for-profit law firm representing young people and their legal right to a safe climate.

We are Youth v. Gov

2023 MID-YEAR REVIEW: WHAT WE'VE ACCOMPLISHED - TOGETHER!



Navahine F. v. Hawai'i Department of Transportation Plaintiffs are Headed to Trial June 24 - July 12, 2024!

[Learn More](#)



Kalā

"This lawsuit is important to me because it gives my generation a platform to highlight, for the rest of the world, the urgency of the climate crisis. More specifically, the ways in which this climate emergency is affecting Indigenous youth and communities."

Navahine F. v. Hawai'i Department of Transportation

Juliana v. U.S. have greenlight to head to TRIAL!
Take Action Today: Tell U.S. Department of Justice to Let the Youth Be Heard!



MENTAL HEALTH AND OUR CHANGING CLIMATE:
IMPACTS, IMPLICATIONS, AND GUIDANCE
March 2017

AMERICAN PSYCHOLOGICAL ASSOCIATION

CLIMATE for HEALTH.

ecoAmerica
building climate leadership

NURSES CLIMATE CHALLENGE ABOUT NURSE CLIMATE CHAMPIONS RESOURCES REGISTER/SIGN IN

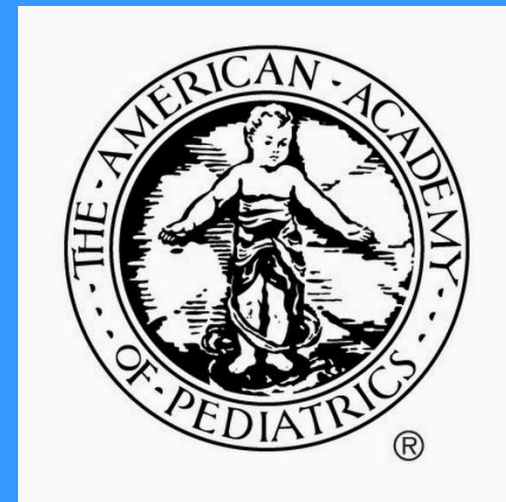
Nurses Climate Challenge

Medical Students for a Sustainable Future

HOME ABOUT WATCH OUR EARTH DAY VIDEO TAKE ACTION MEMBER VOICES JOIN US!

"As future doctors, we recognize the urgency of addressing climate change and the critical need for action."

CLIMATE CHANGES HEALTH



From original Greek ~400 BC...
Who was the Author?

*Ars Longa,
Vita Brevis*

Life is short,
and craft long,
opportunity fleeting,
experimentations
perilous,
and judgment
difficult.



Mural at the Old Town Hall
in Göttingen, Germany.

Hippocrates

DESIGNING HEALTHY COMMUNITIES



RICHARD J. JACKSON WITH STACY SINCLAIR

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November 27, 2023

