Berkeley
Energy &
Resources
Collaborative

Climate Landscape 101

University of California, Berkeley

Welcome to Climate 101

Goals for this session:

- Provide an intro to the Climate Landscape, laying groundwork for future learning
- Provide resources for additional learning

What this is not:

- A comprehensive course on all things Climate

We hope you leave today with:

- A more foundational understanding of climate and all that it entails
- Enthusiasm to keep learning as a BERC member

Who are we?

Nikki Matz

Laura Sievert

Justine Lippens

Ask us about

- All things agriculture
- Microgrids
- Food waste
- Wind power
- ESG
- Forestry

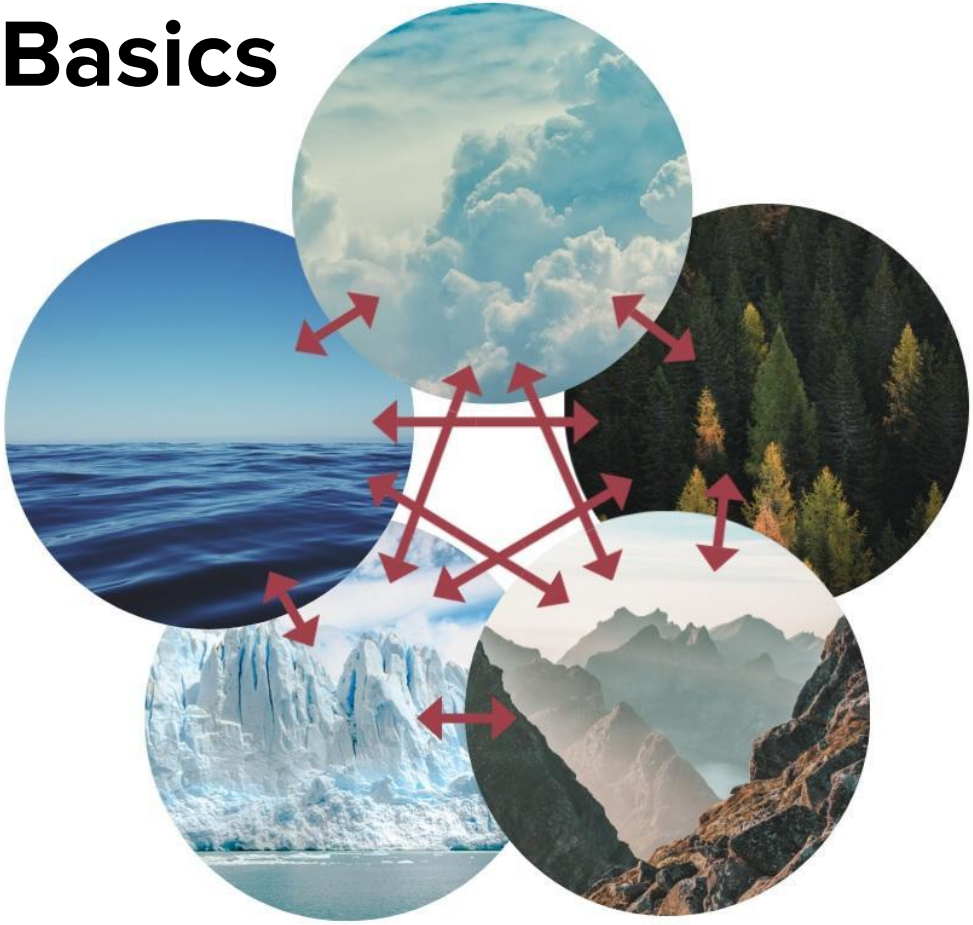
- climate finance
- climate policy
- climate risk disclosures
- community solar
- environmental justice
- degrowth economics

- building decarbonization
- workforce development
- agricultural supply chains/agroforestry
- synthetic biology applied to food (alt protein).

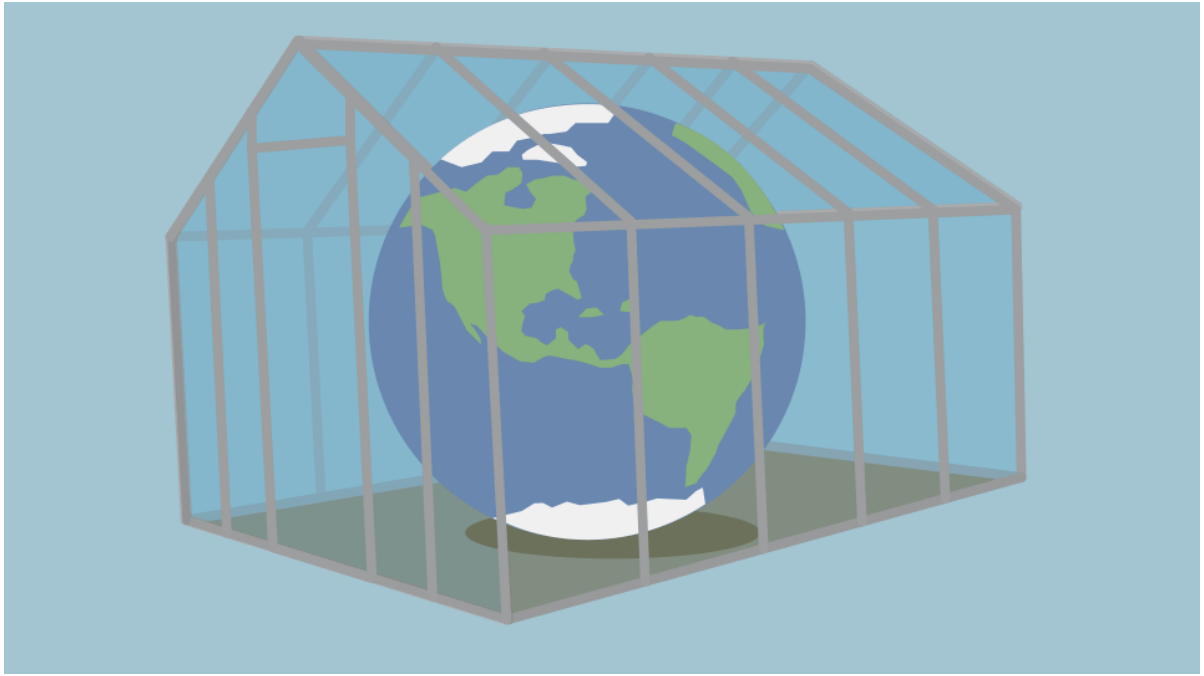
Agenda:

Topic
Climate Basics Why is this a problem? And how are we doing? Top Emitting Sectors Sector-specific Challenges Break Investment Priorities U.S. Climate Policy Just Transition Communicating Climate Climate Toolbox Every Job is a Climate Job

Climate Basics

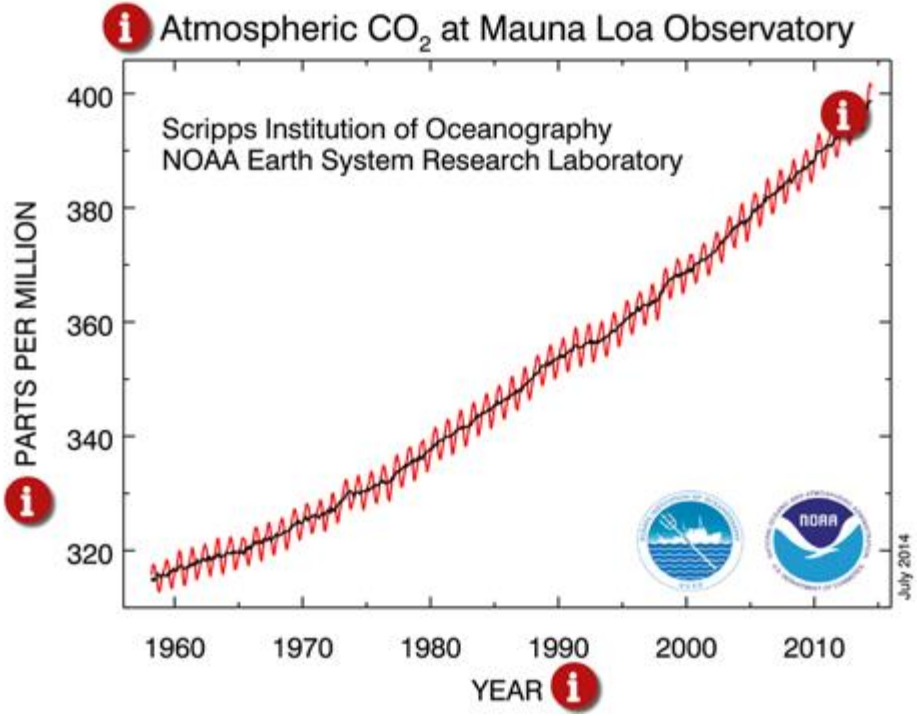


The Greenhouse Effect



Climate is the blanket that you wear at night. You want some layers to keep you insulated but we've been steadily adding blanket after blanket. It's not enough to just stop adding on blankets because we are still stifling.

How do we know? *The Keeling Curve*



Based on measurements taken at the Mauna Loa Observatory in Hawaii since 1958

Global Warming Potential

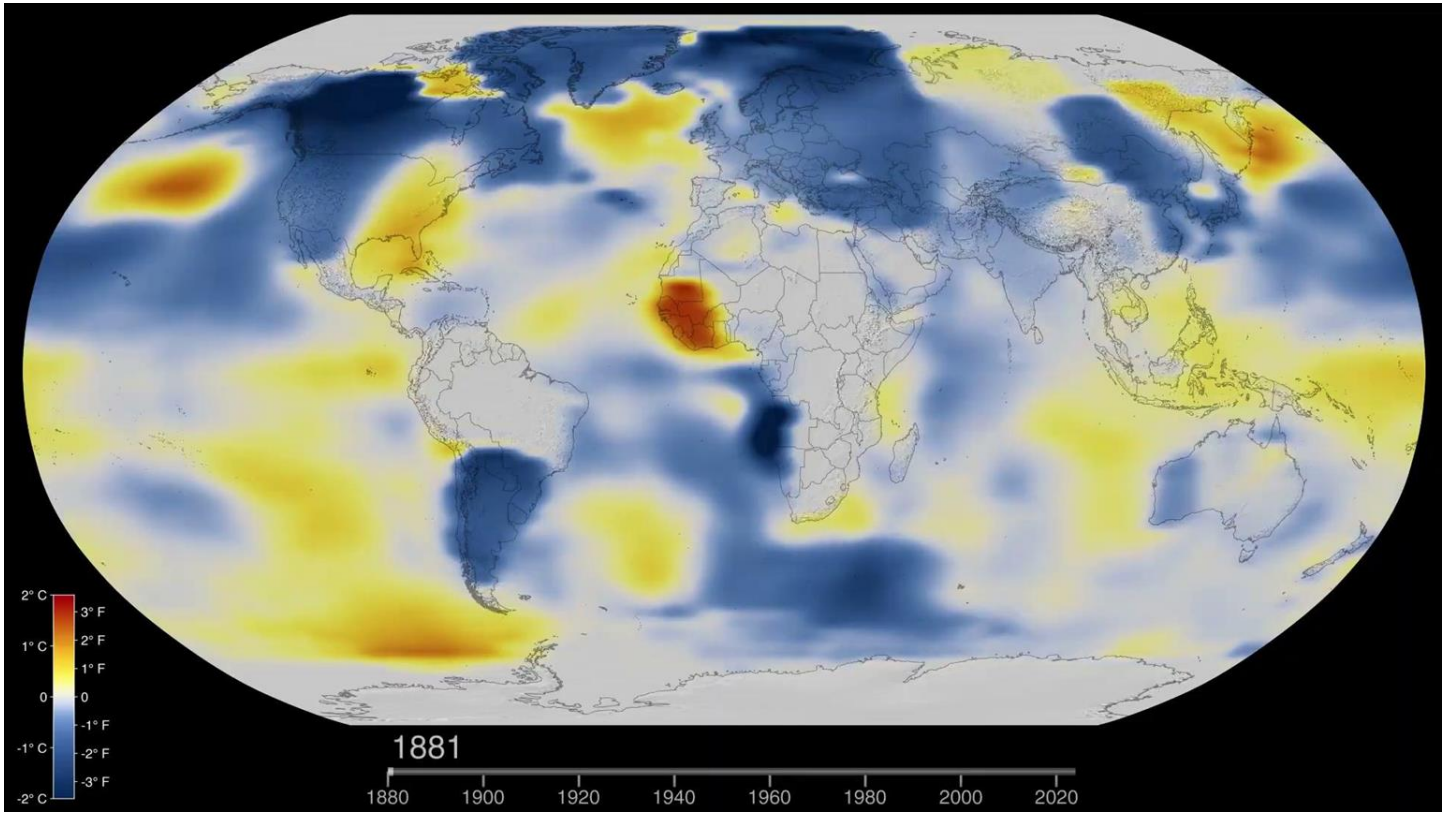
IPCC Global Warming Potential (GWP) values relative to CO_2

Common chemical name or industrial designation	Chemical formula	GWP values for 100-year time horizon		
		Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)	Sixth Assessment Report (AR6)
Major Greenhouse Gases				
Carbon dioxide	CO_2	1	1	1
Methane – non-fossil	CH_4	25	28	27.0
Methane – fossil	CH_4	N/A	30	29.8
Nitrous oxide	N_2O	298	265	273

"Global Warming Potential" (GWP) is a measure of how much a greenhouse gas contributes to global warming compared to carbon dioxide (CO2)

Key Point: Emissions are often quoted in CO_2 equivalents regardless of the actual gas being emitted

Global Temperature Anomalies from 1880 to 2023

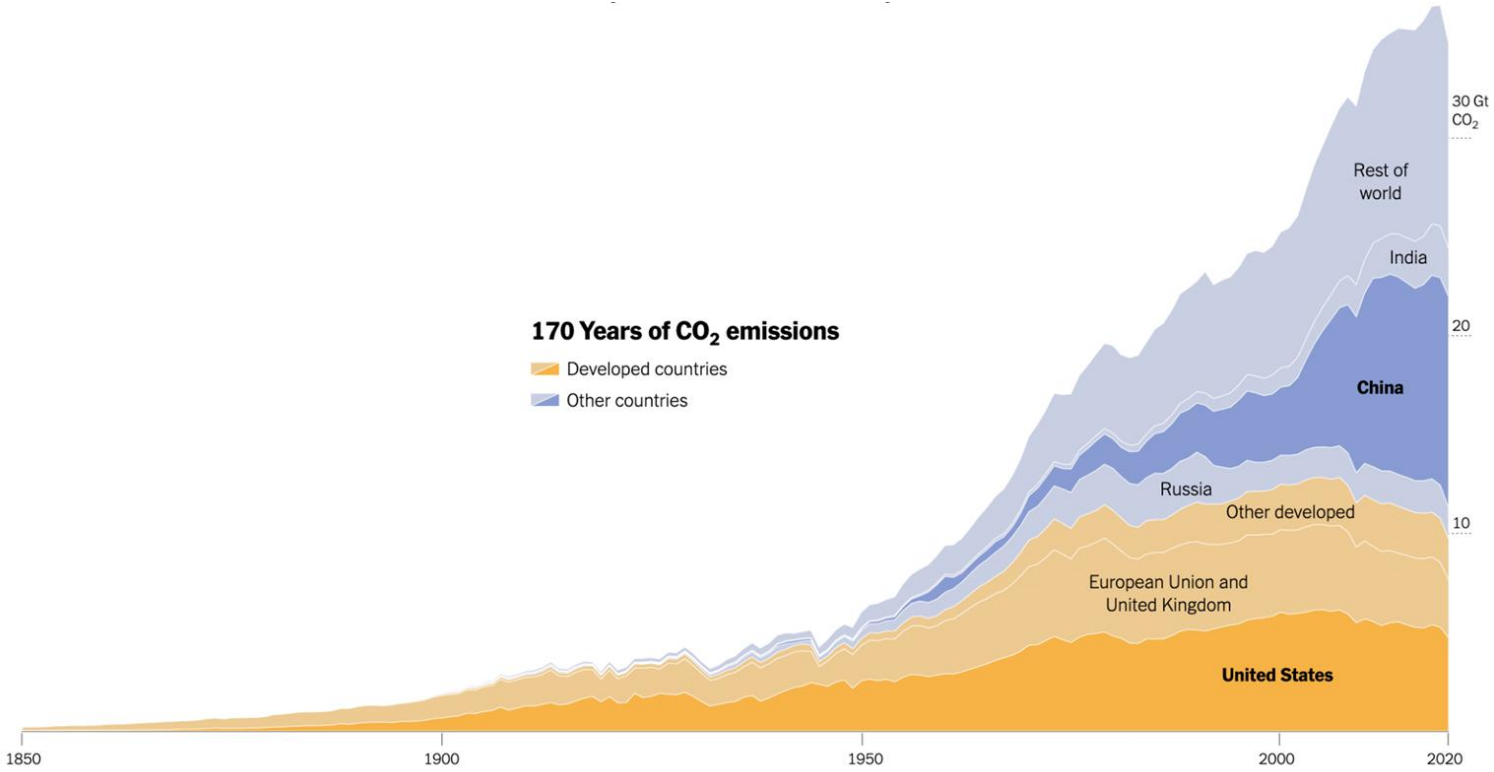



1990
SO, THIS CLIMATE CHANGE THING COULD BE A PROBLEM...
IPCC
1995
CLIMATE CHANGE: DEFINITELY A PROBLEM.
IPCC
2001
YEP, WE SHOULD REALLY BE GETTING ON WITH SORTING THIS OUT PRETTY SOON...
IPCC
2007
LOOK, SORRY TO SOUND LIKE A BROKEN RECORD HERE...
IPCC
2013
WE REALLY HAVE CHECKED AND WE'RE NOT MAKING THIS UP.
IPCC
2019
IS THIS THING ON?
TAP TAP TAP
IPCC


Climate change threatens our existence
Zzz...
Climate change threatens our economy
!!!

Why is this a problem?

Who’s at fault?



Source: Global Carbon Project

What is being doing about it?

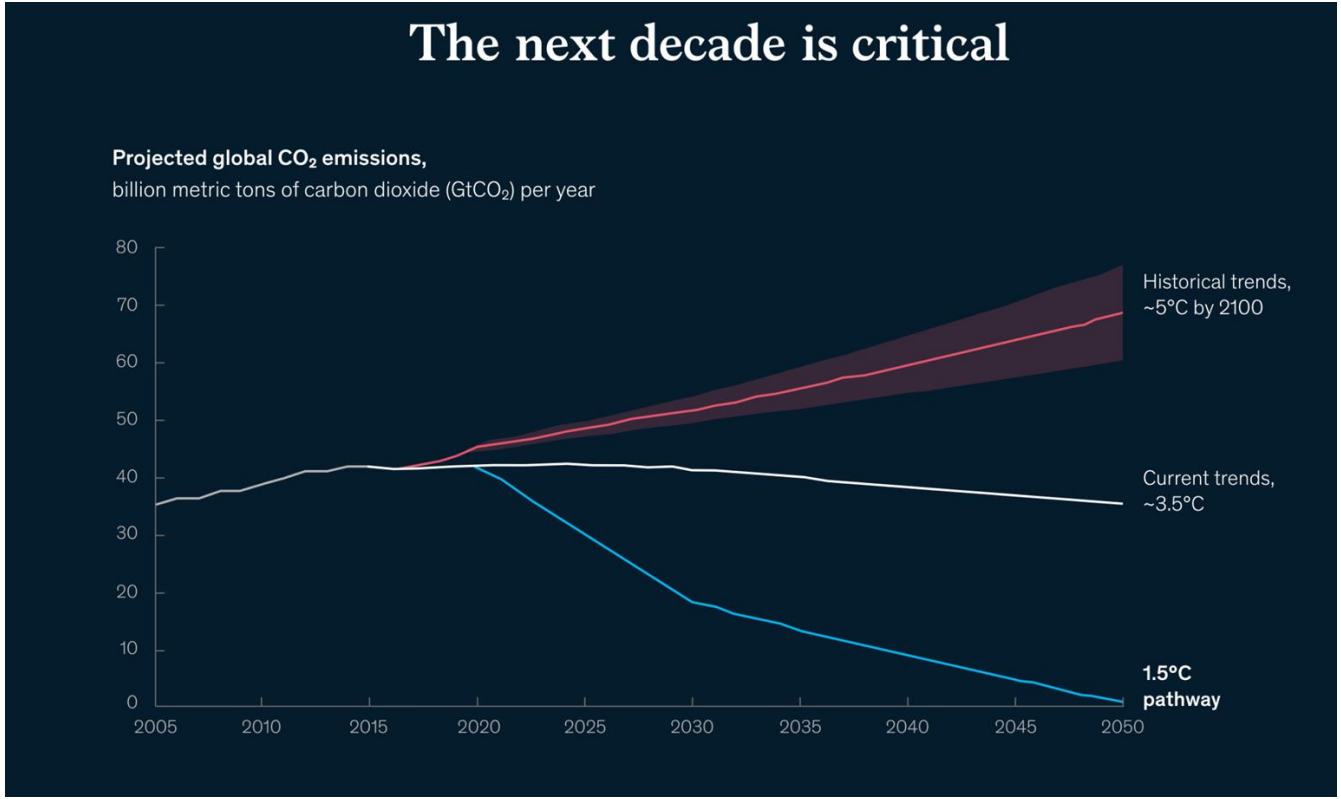
Diplomacy

COPs
Global Methane Pledge

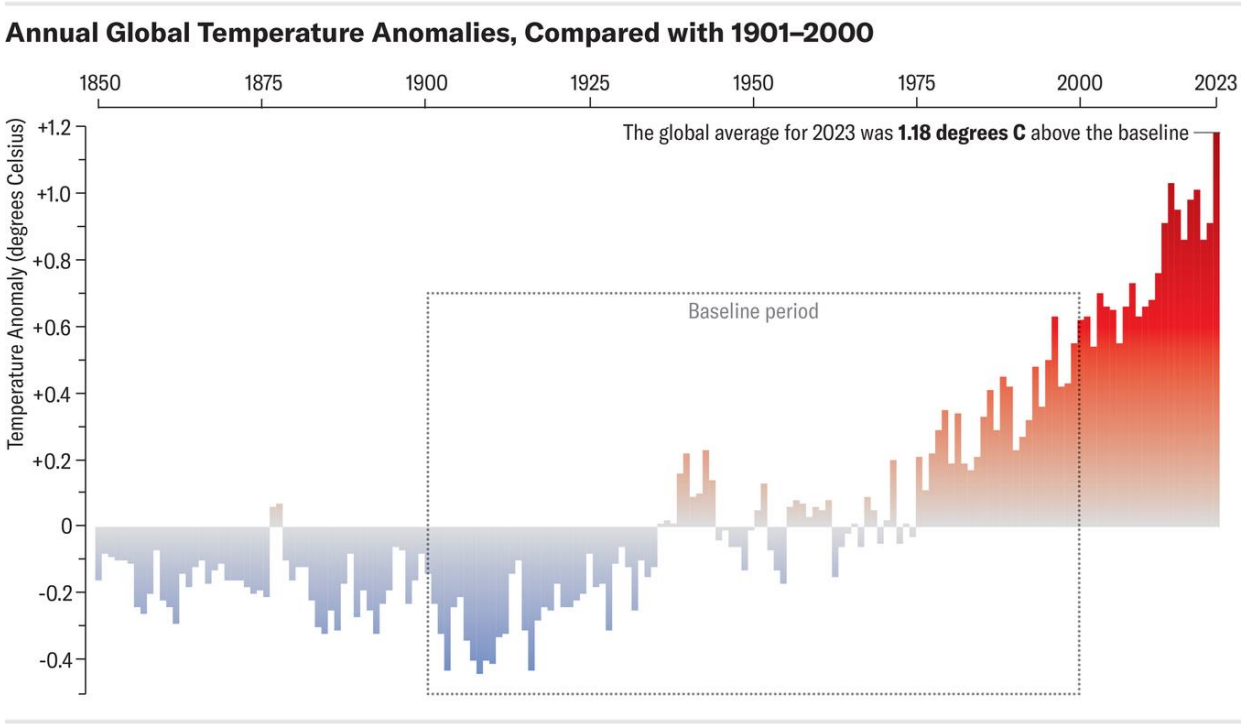
Policy

Corporate Pledges

What are we trying to accomplish?



How are we doing?

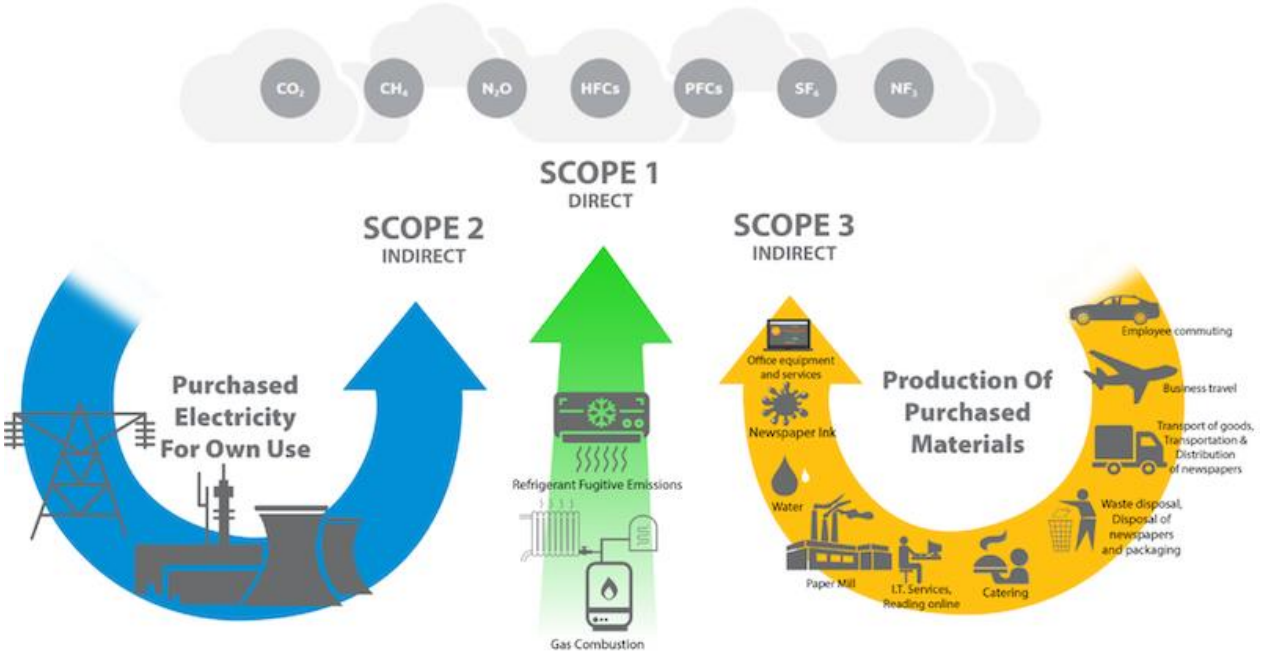


How Much Hotter Is Your Hometown Than When You Were Born?

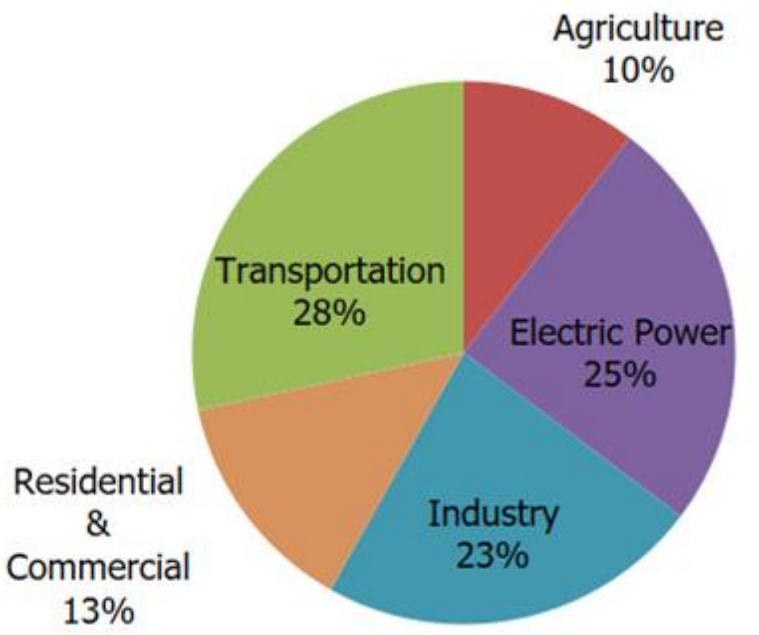
We need to change the whole system

=

Quick vocab - Scope 1, 2, 3



Emissions by Sector



Energy

Issues

- Fossil Fuels release emissions when burned
- About ⅔ of the world's energy comes from fossil fuels
- Solar and Wind are intermittent & not transportable
- Our infrastructure is really old

Solutions

- Use transitional fuel like natural gas
- Expand renewables (solar & wind)
- Innovate transportable or modular options like hydrogen, nuclear
- Update and expand infrastructure & transmission
- Energy efficiency

Transportation

Issues

- Today, most cars, trucks, planes, ships use carbon derived fuels to operate
- Relatively easy to transition consumer vehicles, but very difficult to decarbonize long haul transportation.
- Car centric design has made it expensive to build transit - and dependent on political will

Solutions

- Electrification of cars and trucking fleets
- Investing in transit alongside making cities more bike friendly and walkable
- SAFE (sustainable aviation fuel)

Agriculture

Issues

- Fertilizer releases nitrous oxide emissions
- Cows & rice emit a lot of methane
- Deforestation for farming eliminates carbon sinks
- Biodiversity loss
- Water resources are becoming stressed and farming is part of the issue

Solutions

- Precision Agriculture
- Soil and feed amendments to reduce emissions
- Global policy and scrutiny on deforestation
- Intercropping, rotational grazing
- Irrigation technology

Industrial Decarb

Issues

- Industrial processes require a lot of energy as well as high temperatures which fossil fuels have been perfect for.
- These processes emit a lot of CO2 as a byproduct of their product (ex: cement)
- A lot of buildings and stuff is made every year
- Considered one of the most complex and expensive sectors to decarbonize

Solutions

- Technological solutions: steel, cement, hydrogen, new materials..
- Electrification (still quite hard)
- Carbon Capture, Utilization, and Storage (CCUS)
- Energy efficiencies
- Carbon pricing ? (ex: CBAM in Europe)

Buildings

Issues

- Materials (aka embodied carbon)
- Energy Use (heating, cooling, lighting). As the planet get hotter - cooling is more and more of a problem.
- Ressource inefficiencies (water, energy)
- Old building stock

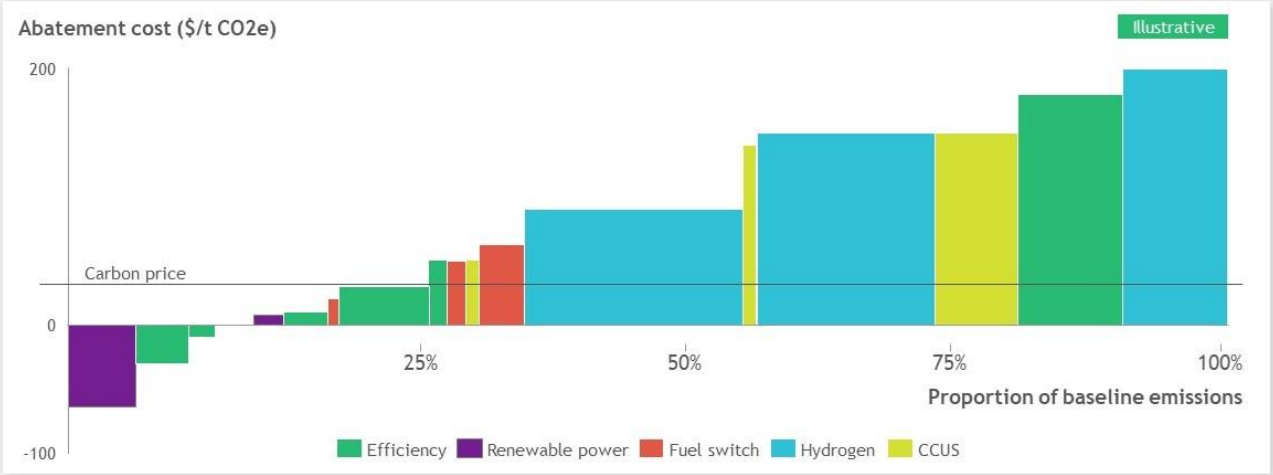
Solutions

- … electrification (surprise surprise)
- Energy efficiency (weatherization = insulation)
- New materials
- Circularity
- Bringing back green to our cities

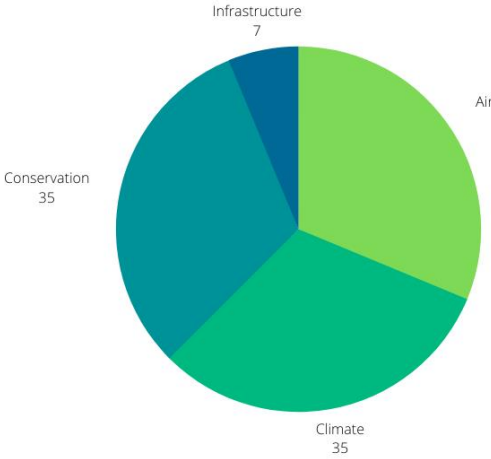
Time for a break

Marginal Abatement Curve

A marginal abatement cost (MAC) curve is a simple way to illustrate a wide range of abatement levers



IRA



AIR POLLUTION
Monitoring, mitigation, and remediation

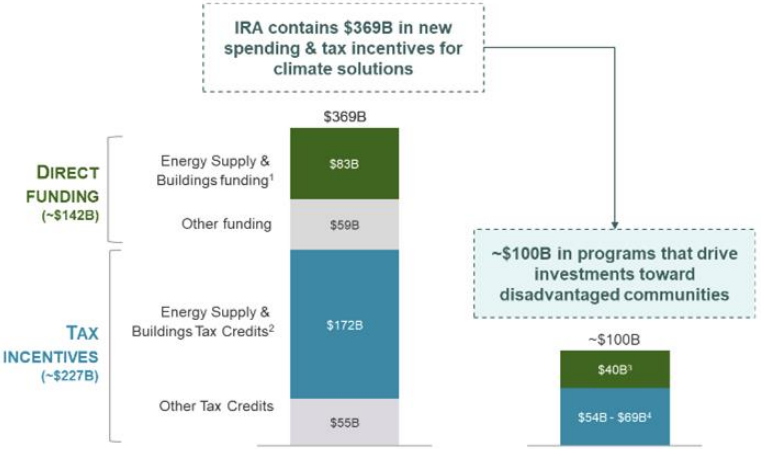
CLIMATE
Climate adaption and resilience, extreme weather preparedness

CONSERVATION
Sustainable forestry practices, maintaining Wildlife Management Areas

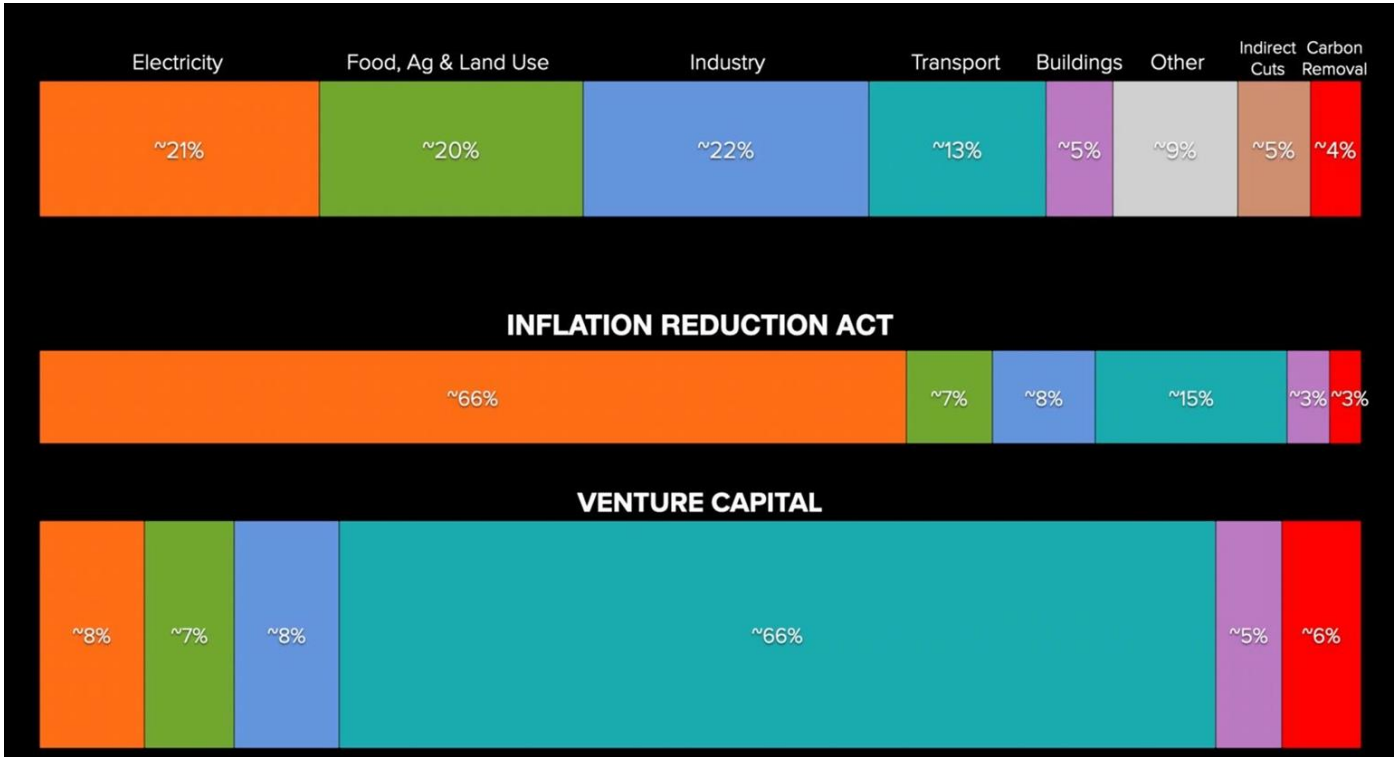
INFRASTRUCTURE
Low-carbon construction materials, upgrade and repair of technology systems

IRA Climate Budget

in billions over 10 years (2022-2031)



Government & Private Markets



Who bears the risk of new investments?

Private Equity

Venture Capital

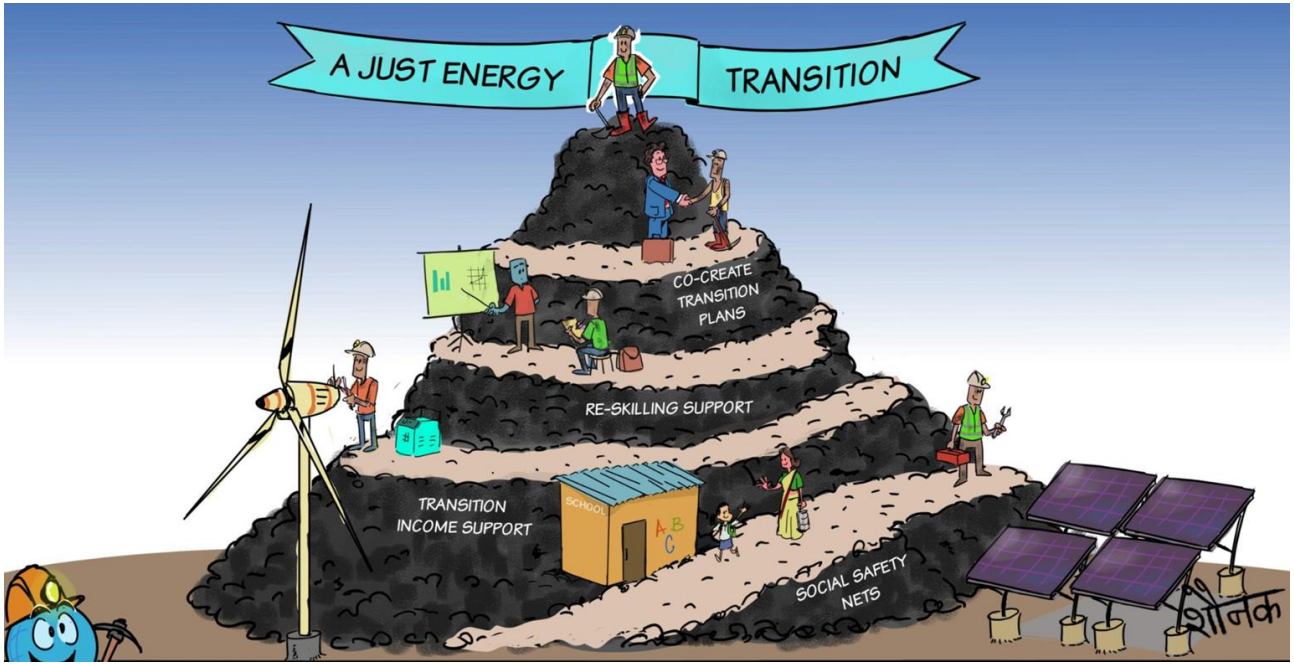
Banks

Government

Financing Landscape

Public Funding *Federal and state rebates / rants* *Federal and state bonds*	**Philanthropy** *Grants and PRI*	**Traditional Private Capital** *Loans, lines of credit / revolver, etc.*	**Green Banks / CDFIs**
Venture Capital	**Tax Incentives** *IRA, PACE*	**Utility** *On-bill financing, net metering*	**Other** *Crowdfunding*

Just Transition



Richmond, CA

<10 miles from UC Berkeley

Richmond, CA

83% residents are people of color (as compared to 60% in broader county)

North Richmond, CA

97% POC

25% below national poverty line

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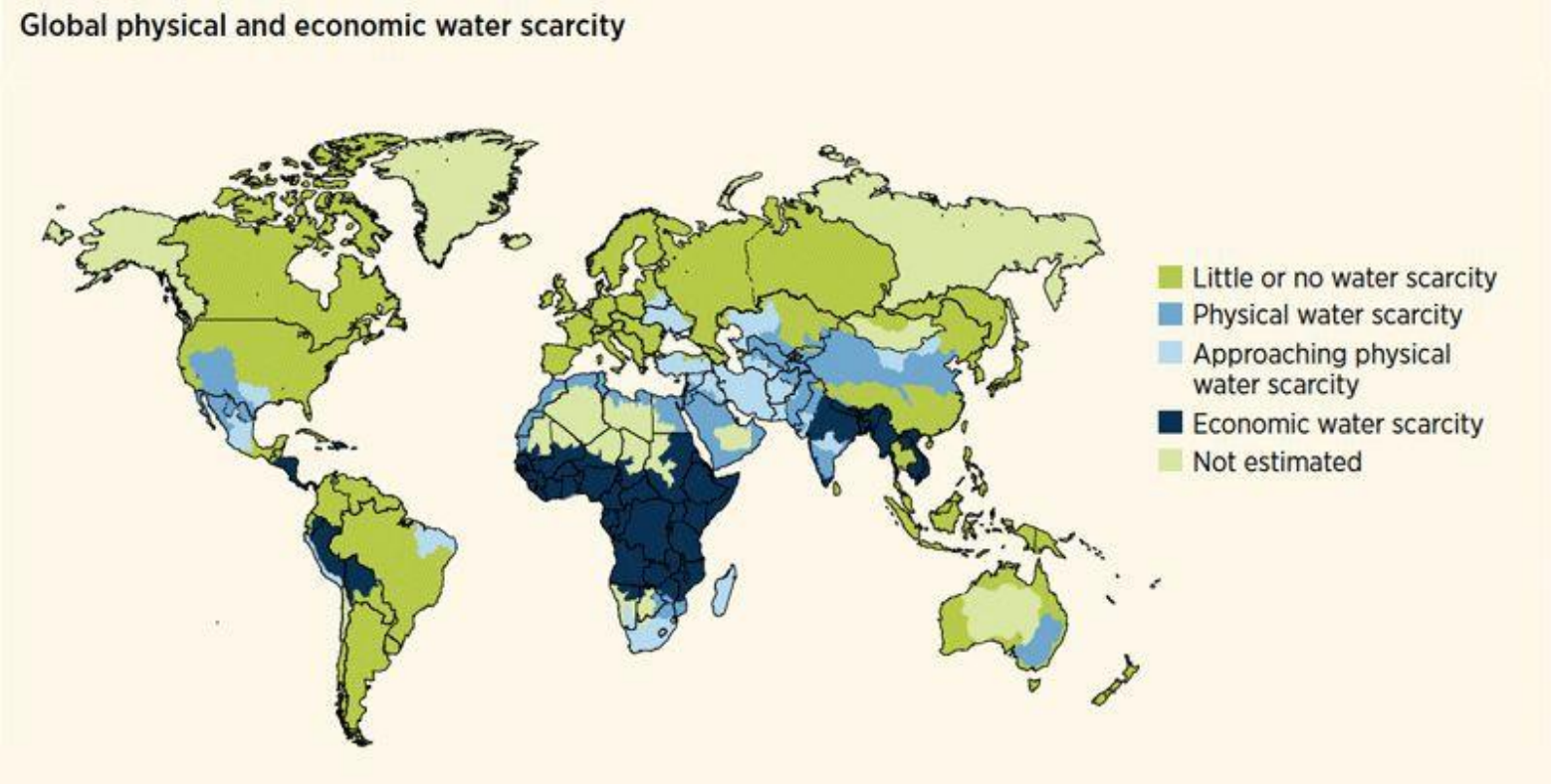
350 toxic sites

25% asthma rates (13% national average)

2nd highest city asthma deaths in the country

Sources:
https://datausa.io/profile/geo/richmond-ca/
https://www.ehn.org/pollution-poverty-richmond2-2645571744.html
https://clear.ucsf.edu/reach
https://aafa.org/wp-content/uploads/2023/09/aafa-2023-asthma-capitals-report.pdf

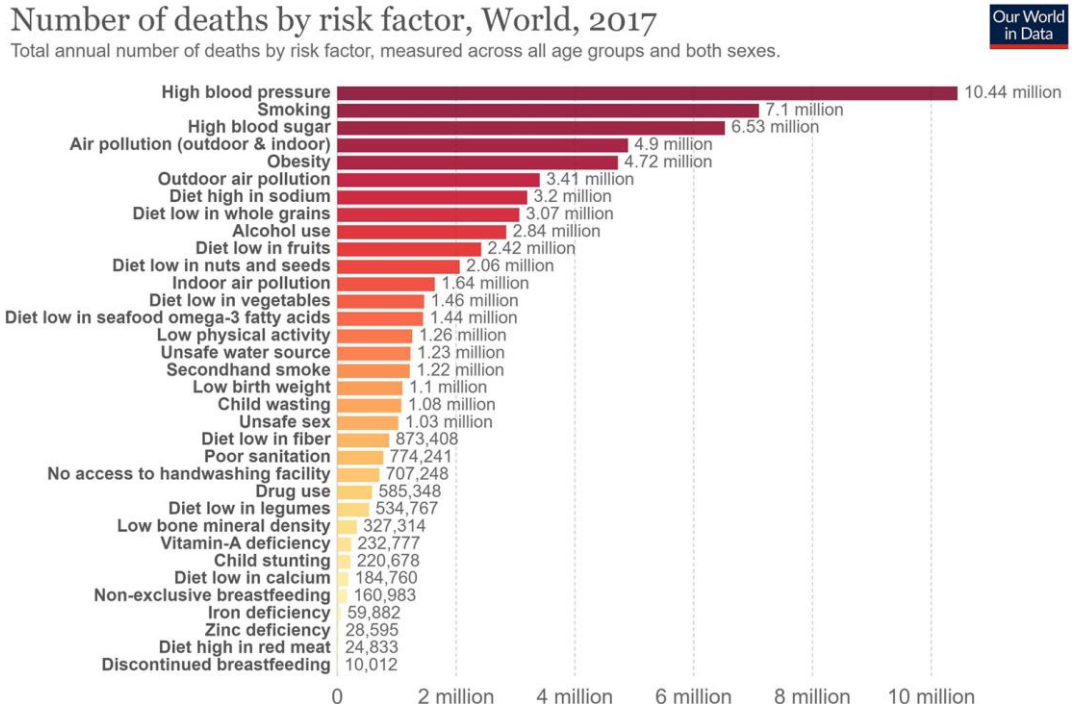
Water stress



Source: UN Water

Air pollution threatens global health

- Air pollution is the **fourth leading cause of death globally**

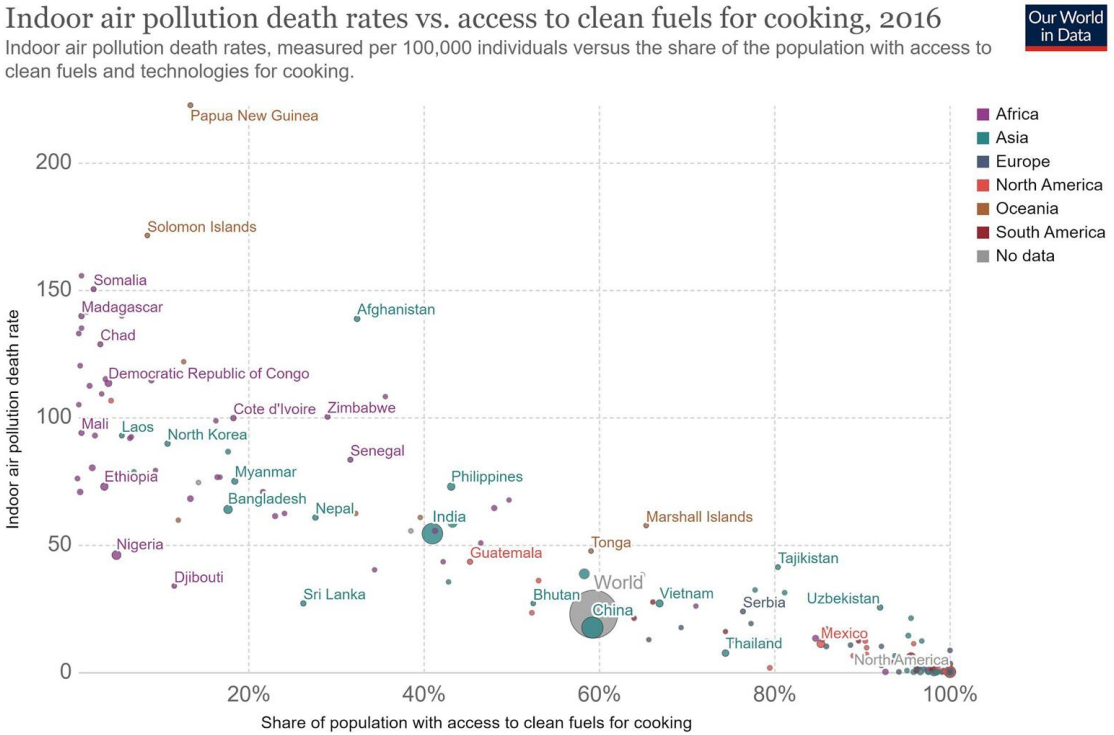


Source: IHME, Global Burden of Disease (GBD), My World in Data

“Indoor” air pollution

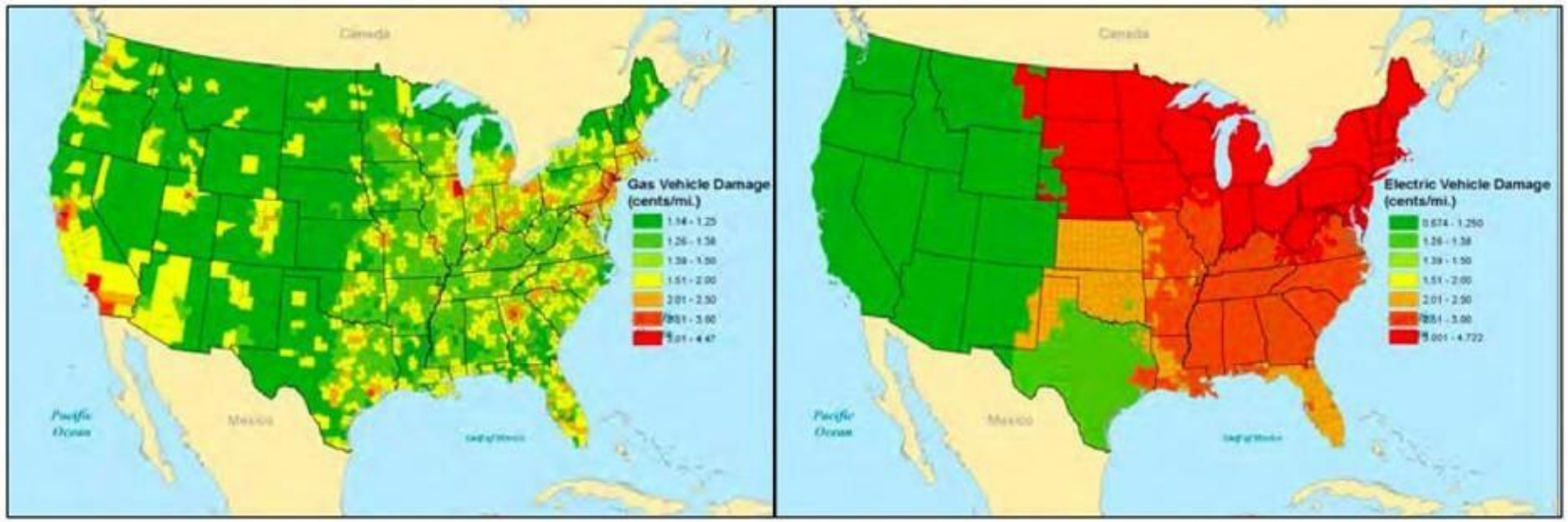
Primarily caused by **burning solid fuel** – such as firewood, crop waste, and dung – **for cooking and heating**

Access to clean cooking fuels is a strongly correlated with indoor air pollution deaths



Source: IHME, Global Burden of Disease (GBD), My World in Data, NSW Health; World Bank

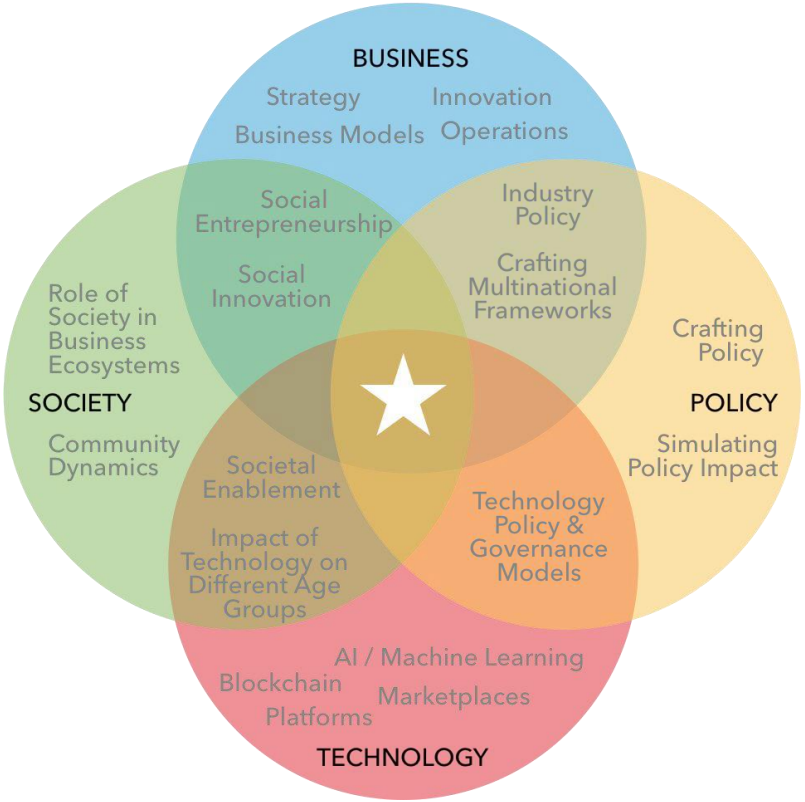
Climate change and air pollution



https://podcasts.google.com/feed/aHR0cHM6Ly9yc3MuYXJ0MTkuY29tL3RoZS1lbmVyZ3ktZ2FuZw/episode/Z2lkOi8vYXJ0MTktZXB
pc29kZS1sb2NhdG9yL1YwL1ZuSlN1MkNaMHZkcDB6T09TVVJRLVFrYXlNQzJxUTdOWWxKeXI4N1ZRQ3c?hl=en&ved=2ahUKEwi 86N6tyuHrAhU6JTQIHSvHBvkQieUEegQIDRAO&ep=6

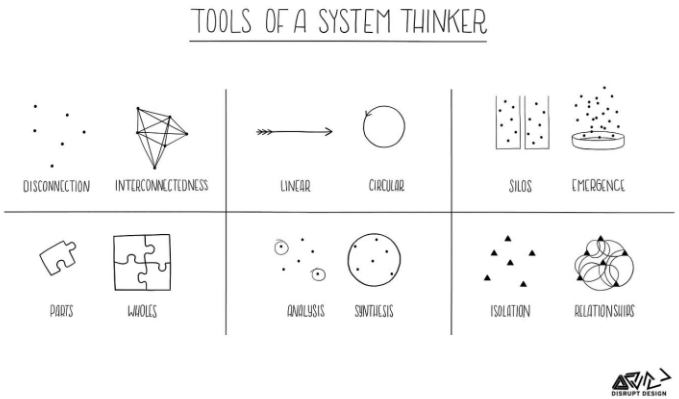
Communicating Climate

Room for everyone



No silver bullet

Tool Box

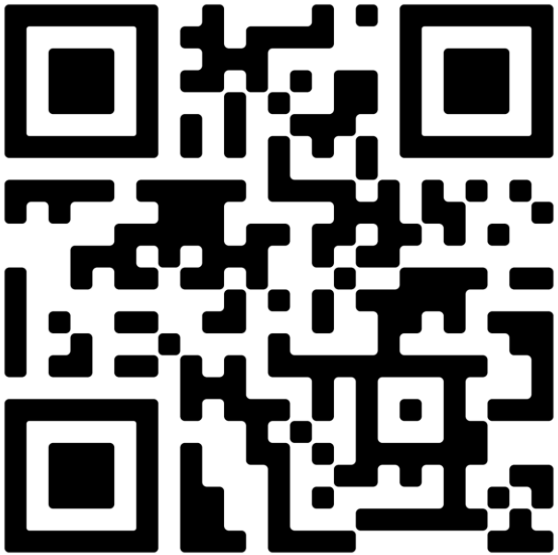

TOOLS OF A SYSTEM THINKER
DISCONNECTION
INTERCONNECTEDNESS
LINEAR
CIRCULAR
SILOS
EMERGENCE
PARTS
WHOLES
ANALYSIS
SYNTHESIS
ISOLATION
RELATIONSHIPS
DISRUPT DESIGN


ANALYSIS PARALYSIS
intensive failure
FEAR
rejection
PARALYSIS
I should think about this more first...
REPEAT

Climate Grief / Cognitive Dissonance

"Yes, the planet got destroyed. But for a beautiful moment in time we created a lot of value for shareholders."

Notion Plug



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Upcoming BERC Events

9/27	Symposium abstract due Tour of Noya demo facility
10/11	BERC Resources Symposium

berc.berkeley.edu/calendar

BERC

FALL SYMPOSIUM 2024

LAND USE SOLUTIONS

The Berkeley Energy & Resources Collaborative Fall Symposium is a dynamic one-day, student-run conference at UC Berkeley. This year's theme is land use solutions. On October 11th, 2024, we will convene to explore innovative strategies to respond to the urgent land use challenges accompanying rapid decarbonization and climate impacts. We hope you'll join us for an exchange of ideas amidst this transformative era in the industry.

11 October 2024, 9am-5pm
Chou Hall (Spieker Forum)
Haas School of Business

ENERGY INSTITUTE AT HAAS
WILSON SONSINI
EDF Innovation Lab
PG&E Pacific Gas and Electric Company
BERKELEY LAB
Prelude Ventures
TotalEnergies
SOUTHERN CALIFORNIA EDISON Energy for What's Ahead

Thank you

Q&A