Exploration of the consequences of energy policy.

Project 4:

By: Abiza Darla, Aditya Vijay, Ed Eldepssi, Graham Taylor, Landon Shorack

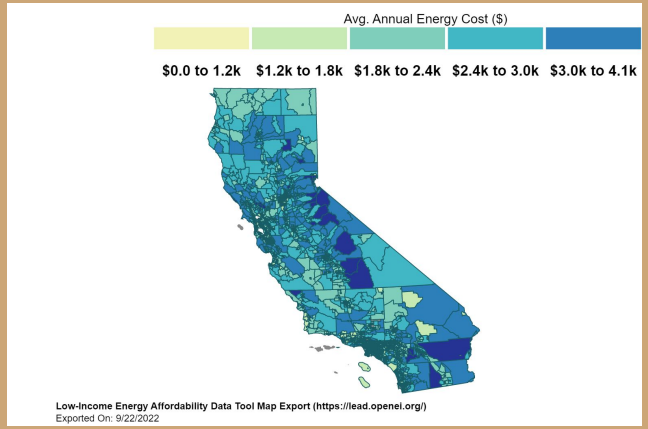
EPA Data on Energy and Social Justice
&
The Low-Income Energy and Affordability Tool

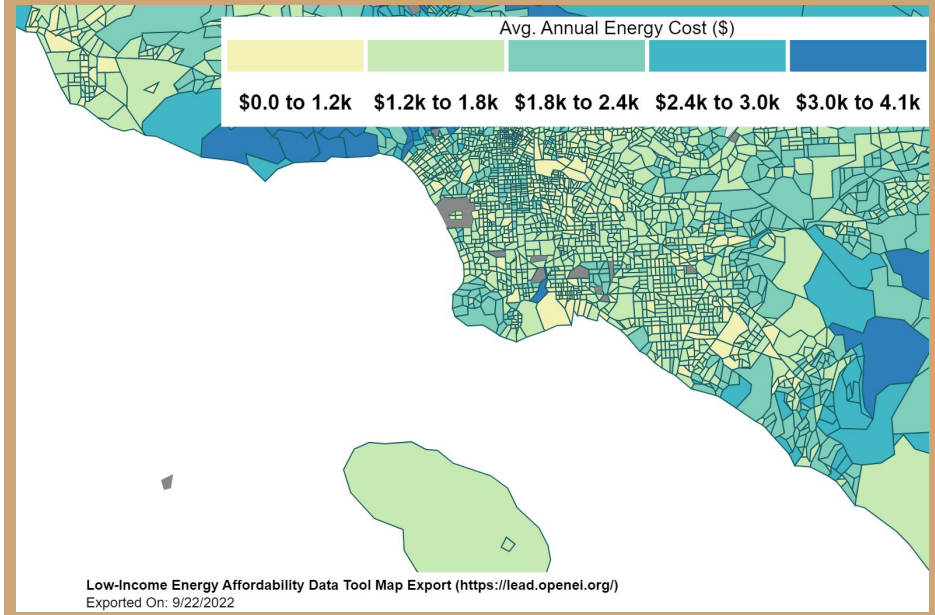
What is the EPA data set?

- It contains data on environmental hazards.
- It contains data on demographic information.

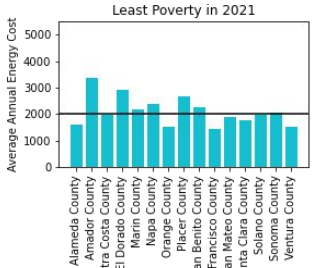
- It is based on geographic data. It has data for each Census Block.
  - California has 23,212 such blocks.

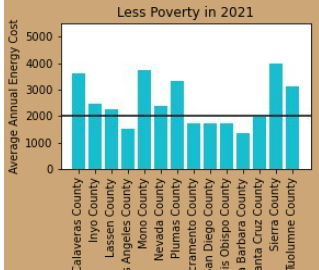
LEAD data set and what it shows:

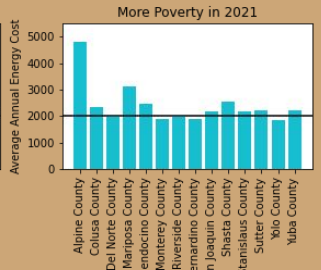


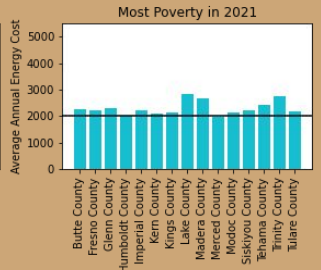


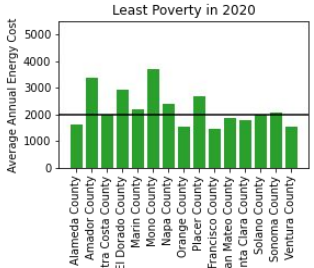
How low income counties experience energy costs:

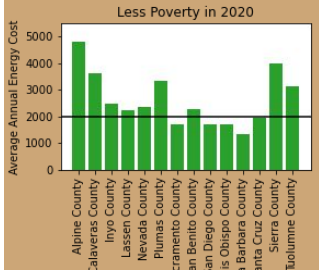


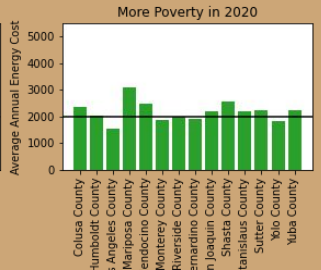


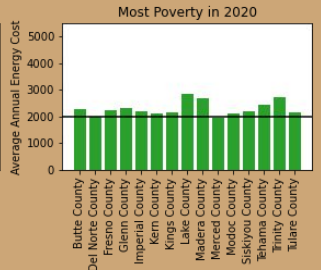


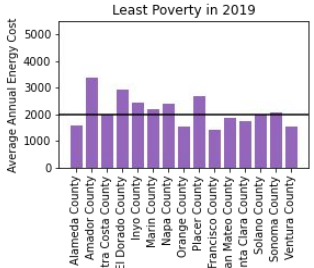


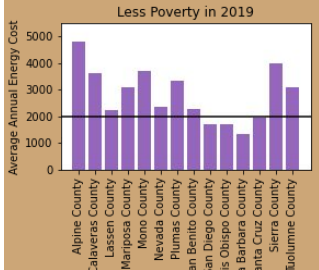


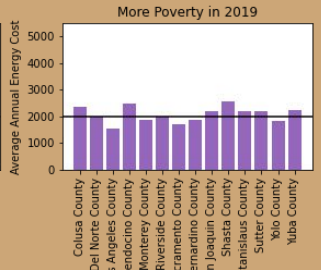


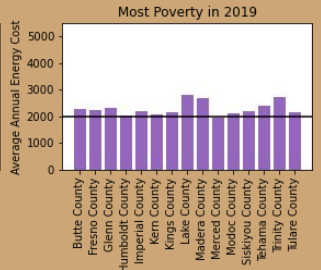




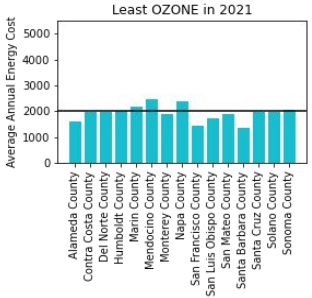


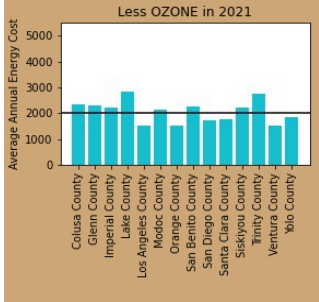


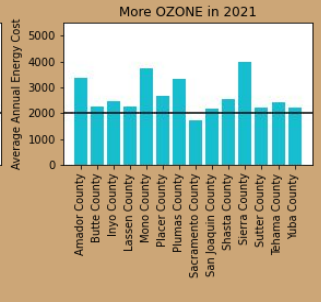


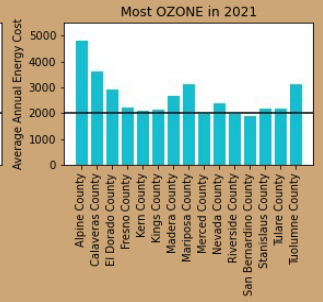


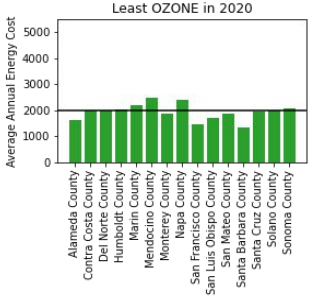
How Ozone levels in counties is related to energy costs:

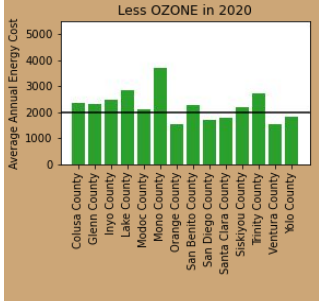


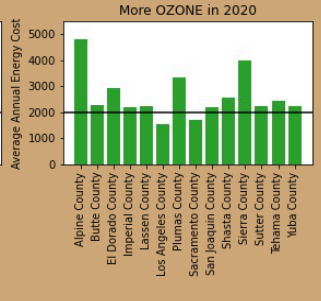


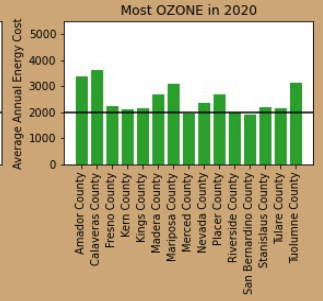


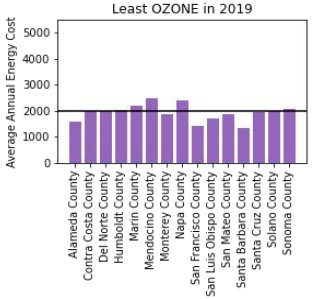


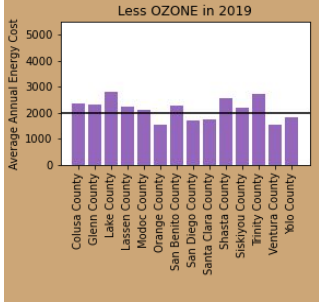


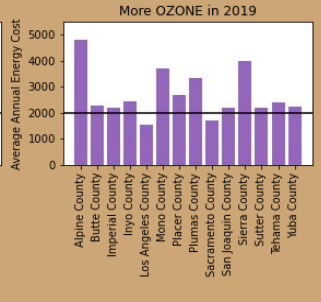


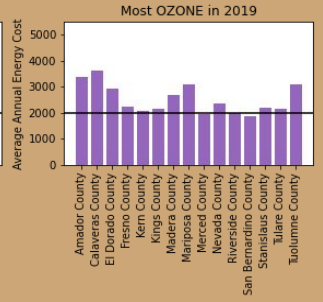










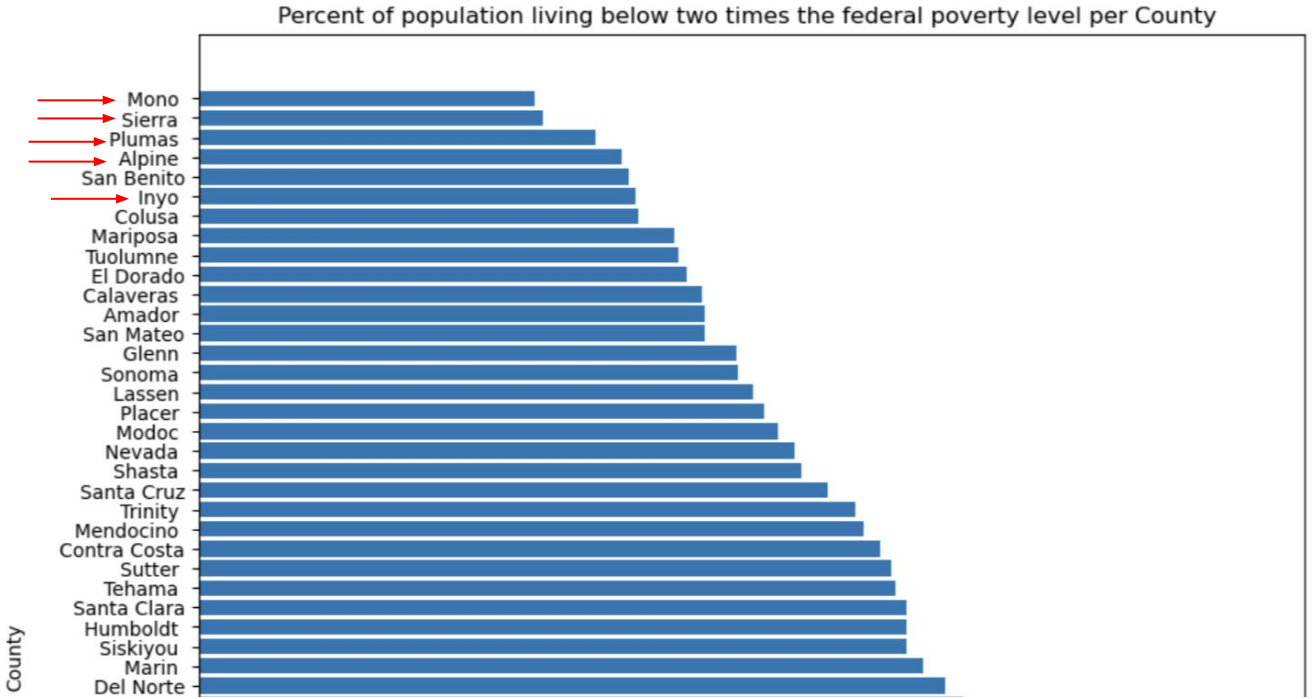


Health, Poverty, and Pollution

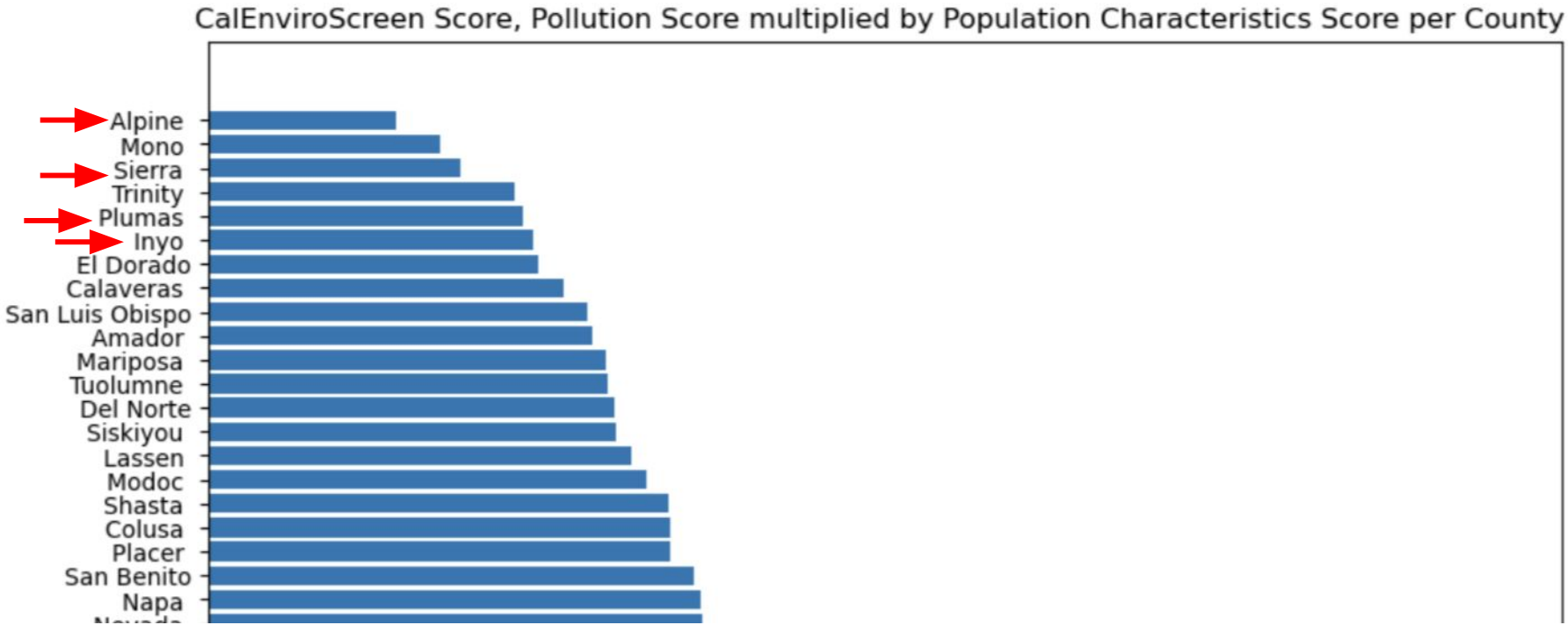
Air Quality and Health

- The majority of these pollutants are emitted through human activities like burning fossil fuels, vehicle exhaust fumes and emissions from agriculture and industry
- Most Dangerous Pollutants
    - Particulate matter (PM10, PM2.5)
    - Black Carbon
    - Nitrogen oxides (NO and NO2)
    - Ozone (O3)

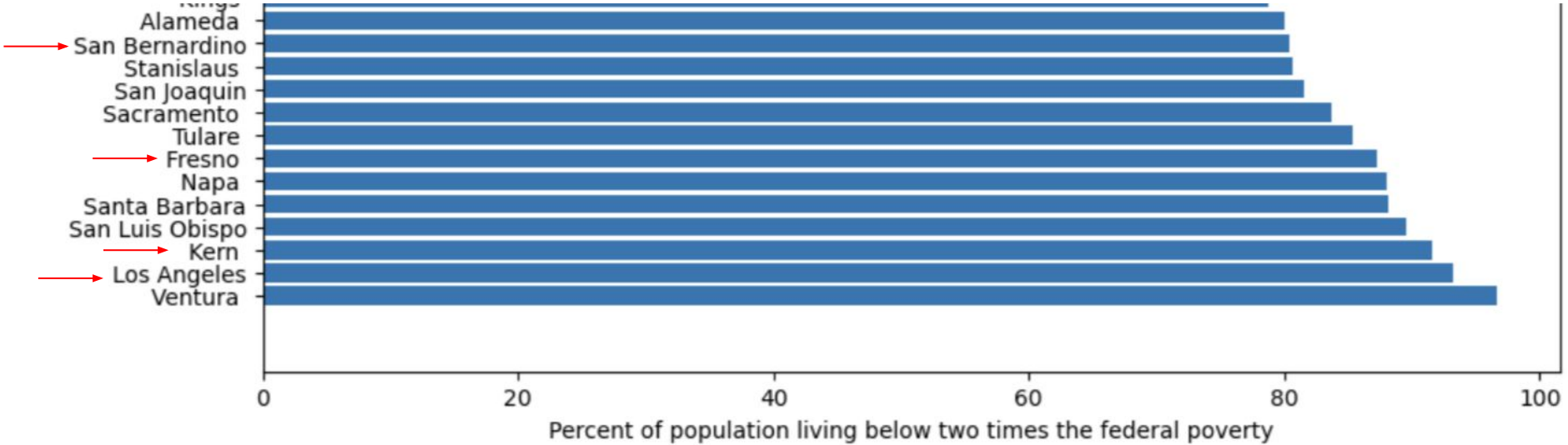
Poverty Per County in CA (Lowest)



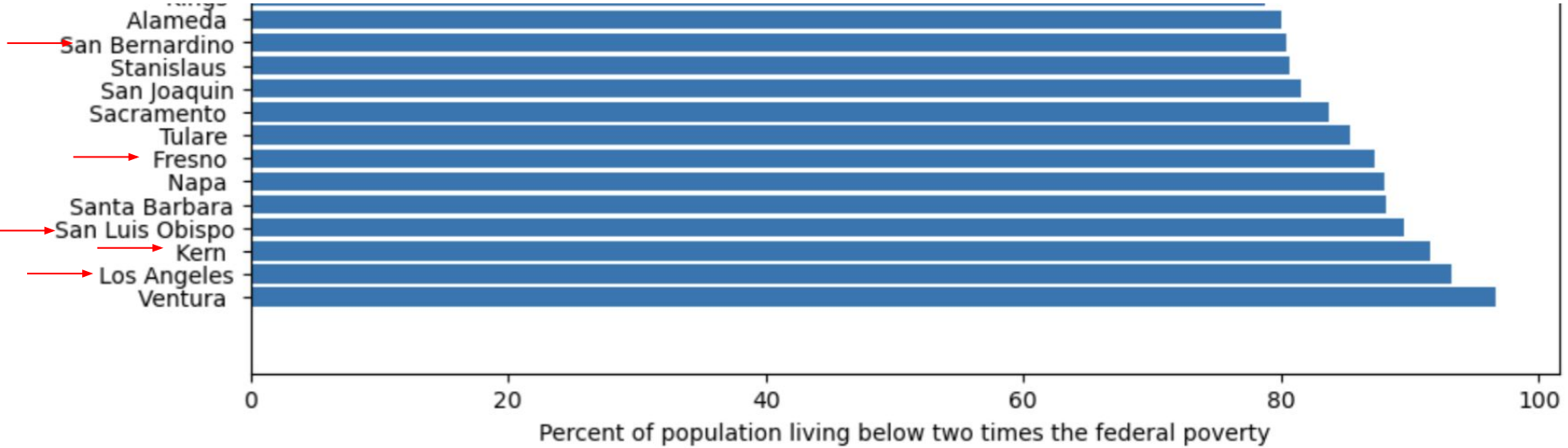
Pollution Score in California (Lowest)



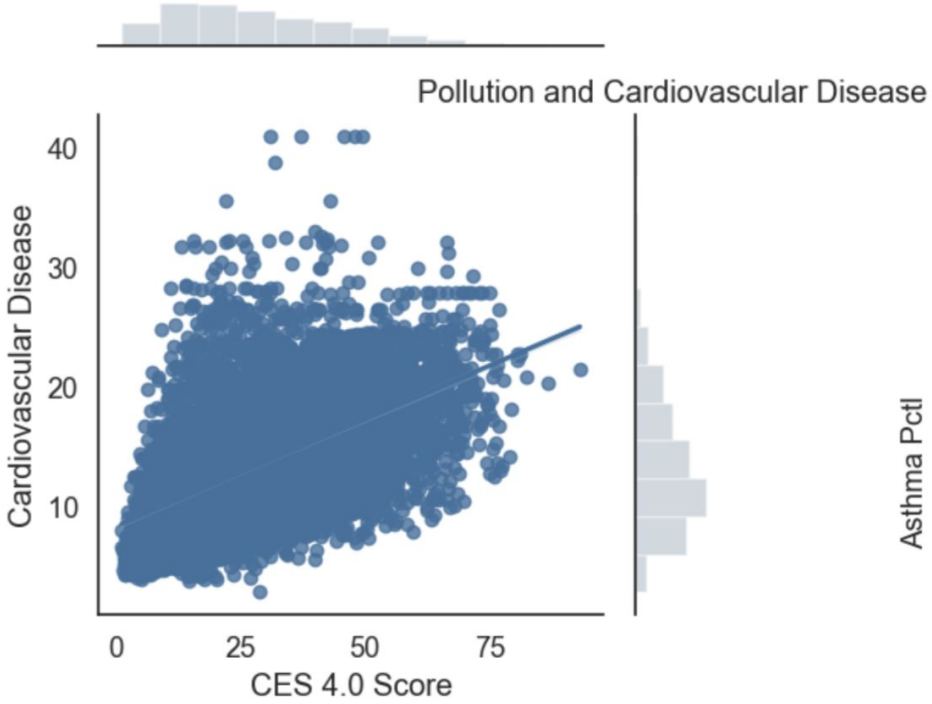
Poverty Per County in CA (Highest)

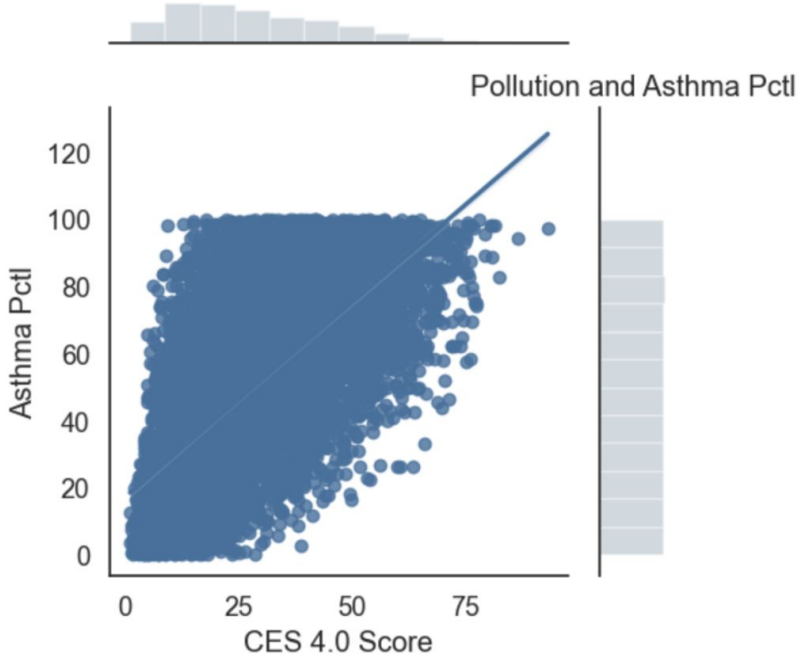


Pollution Per County in CA (Highest)

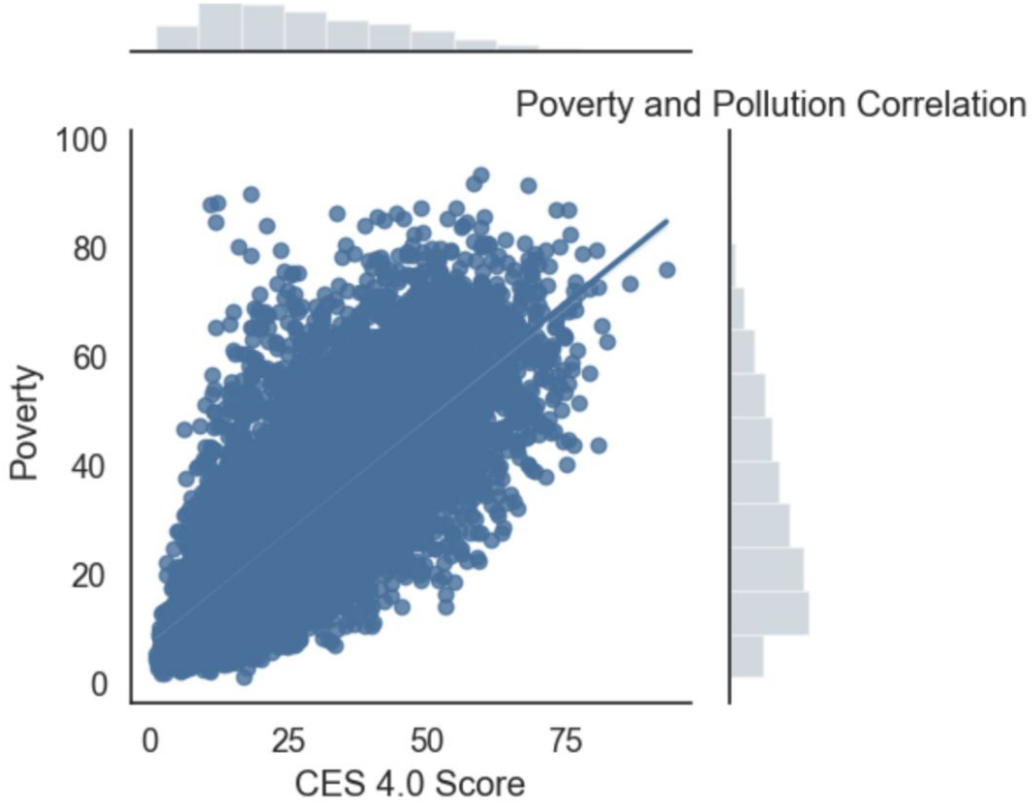


Health and Pollution Correlation

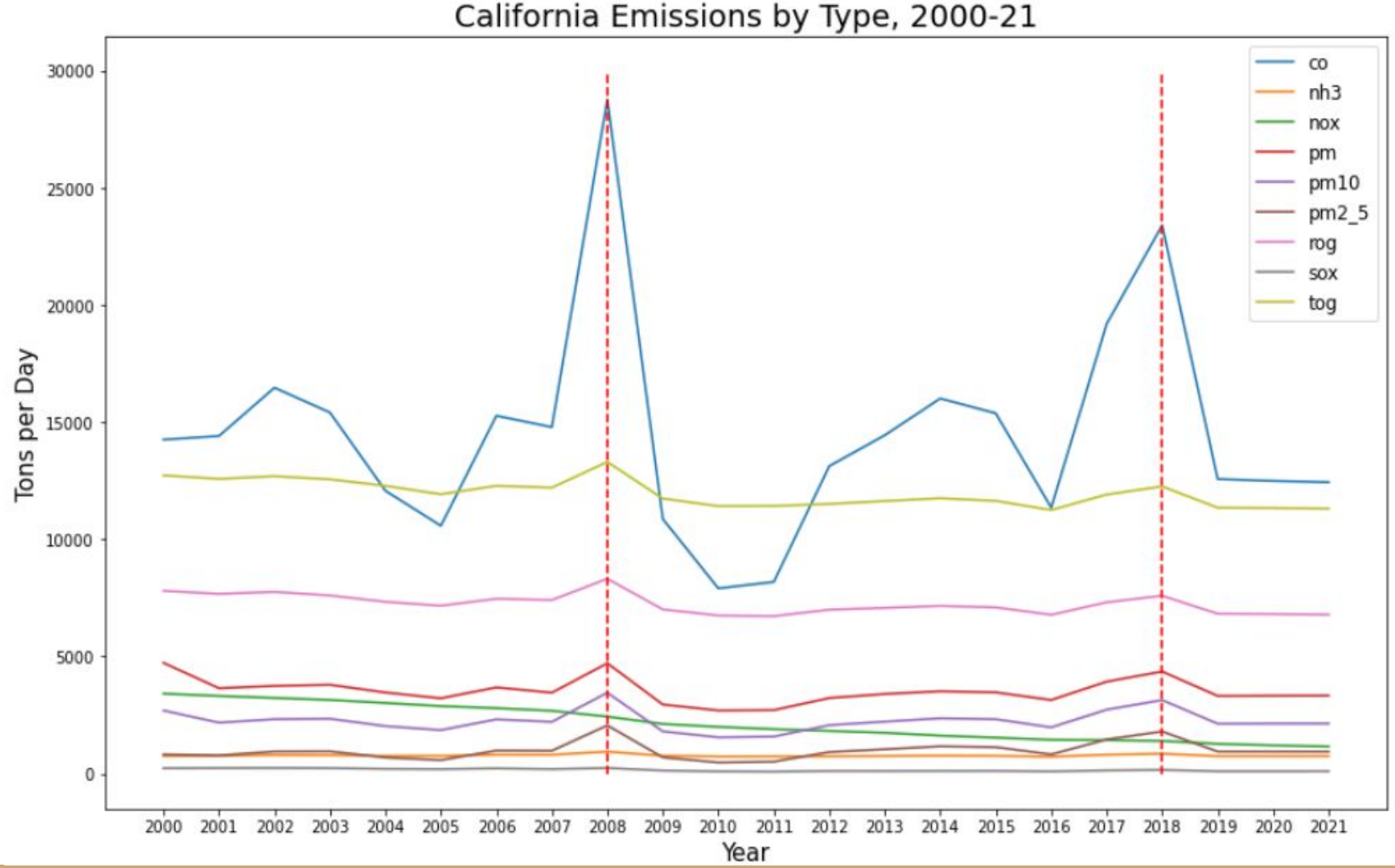


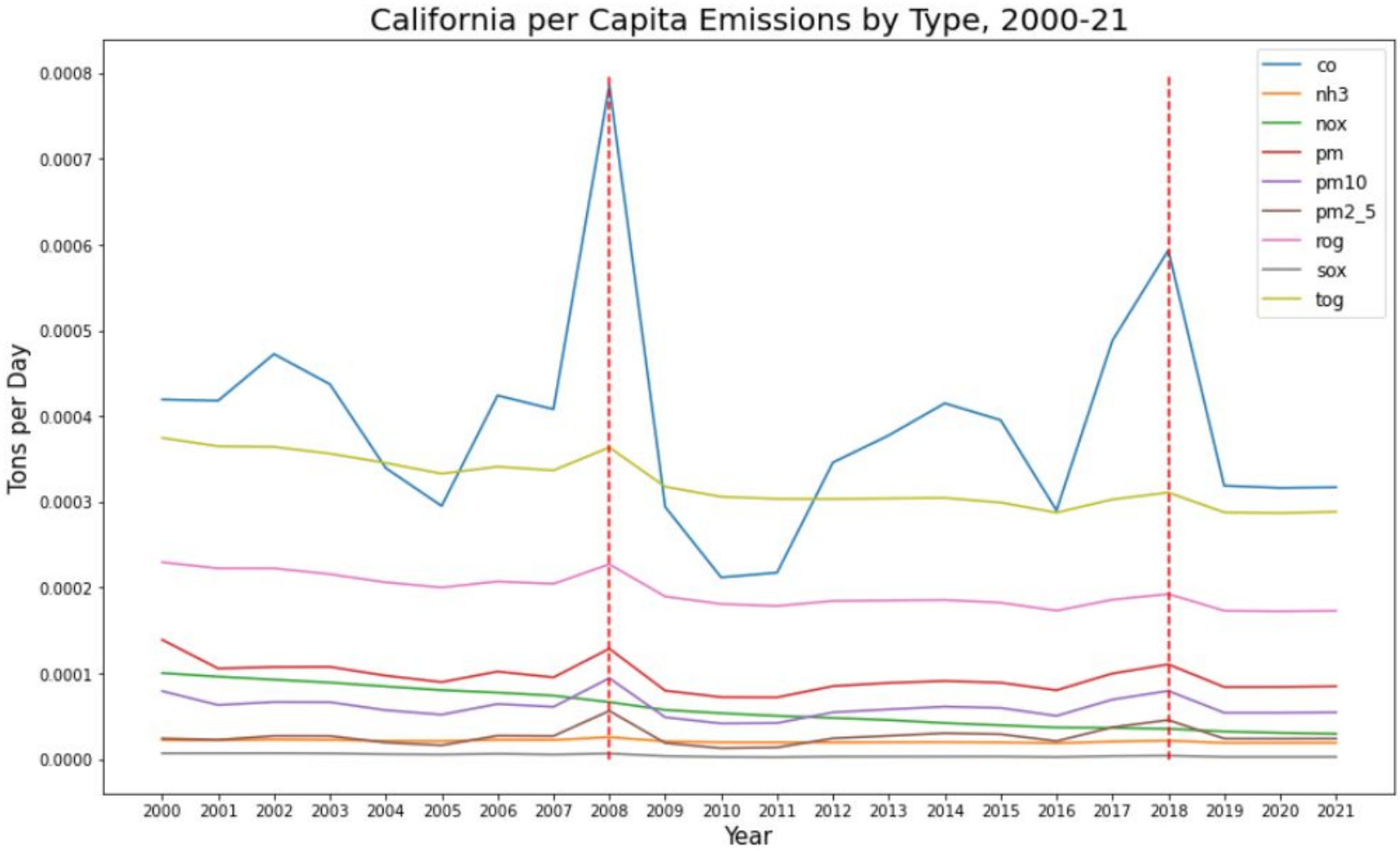


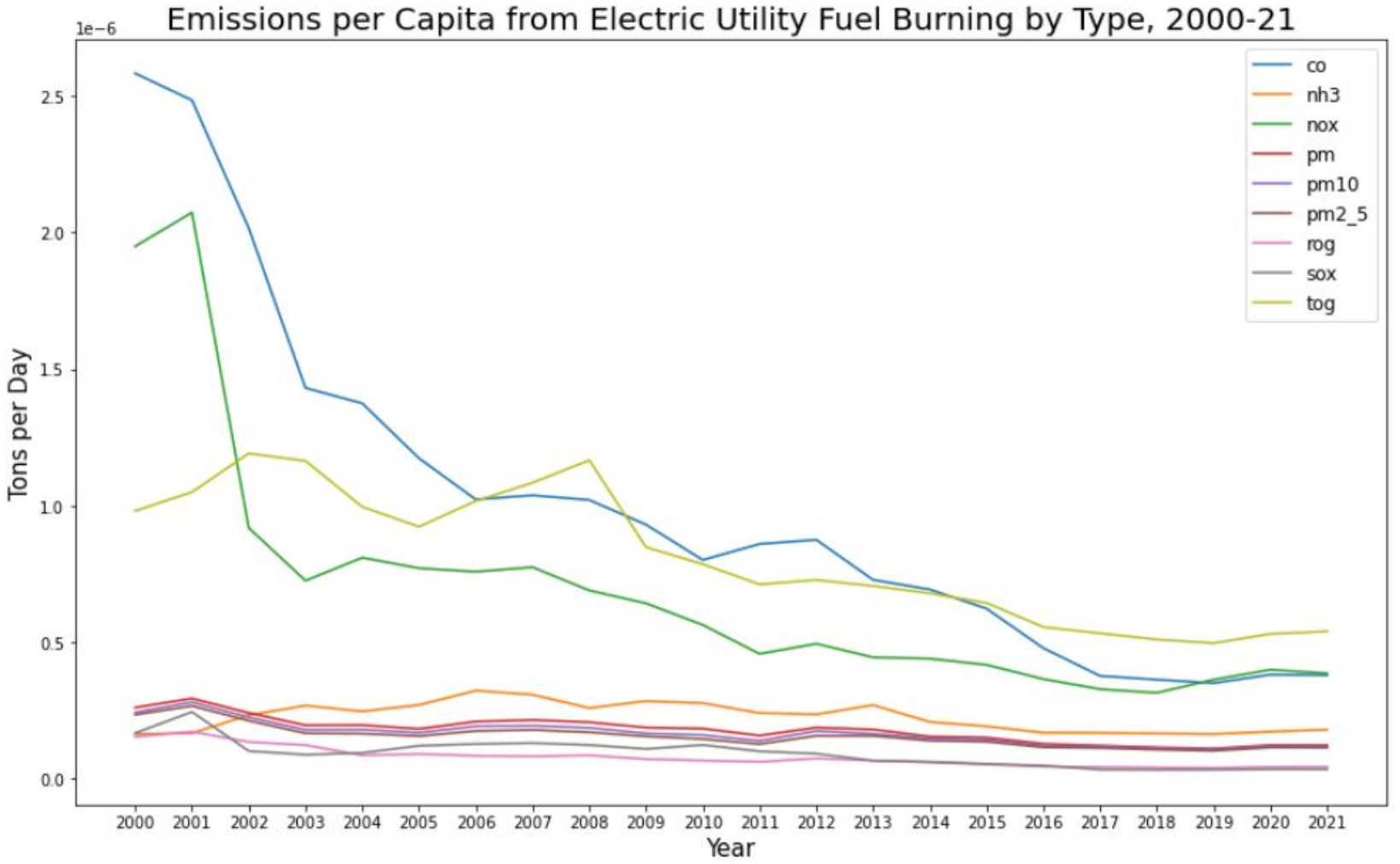
Poverty And Pollution Correlation

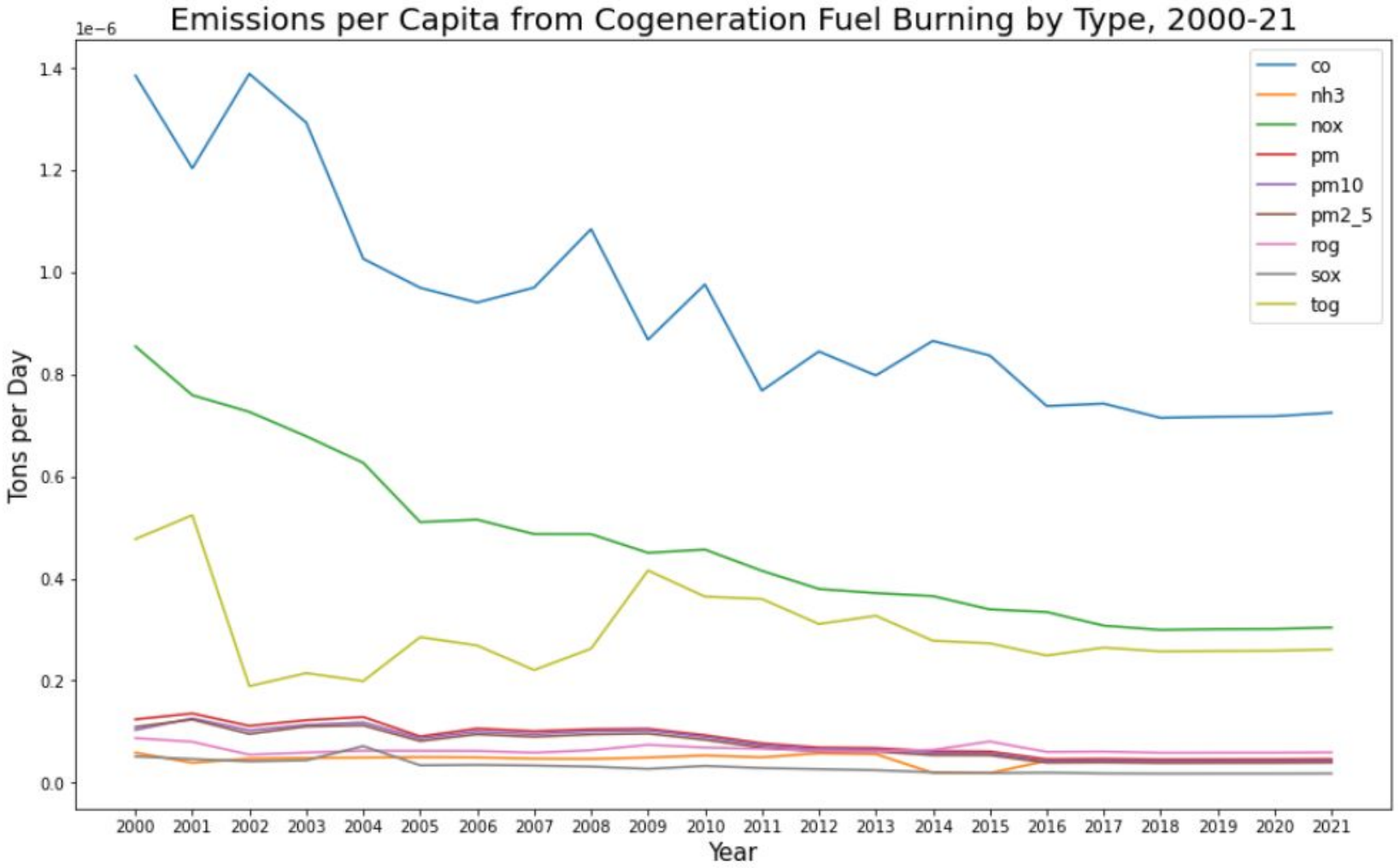


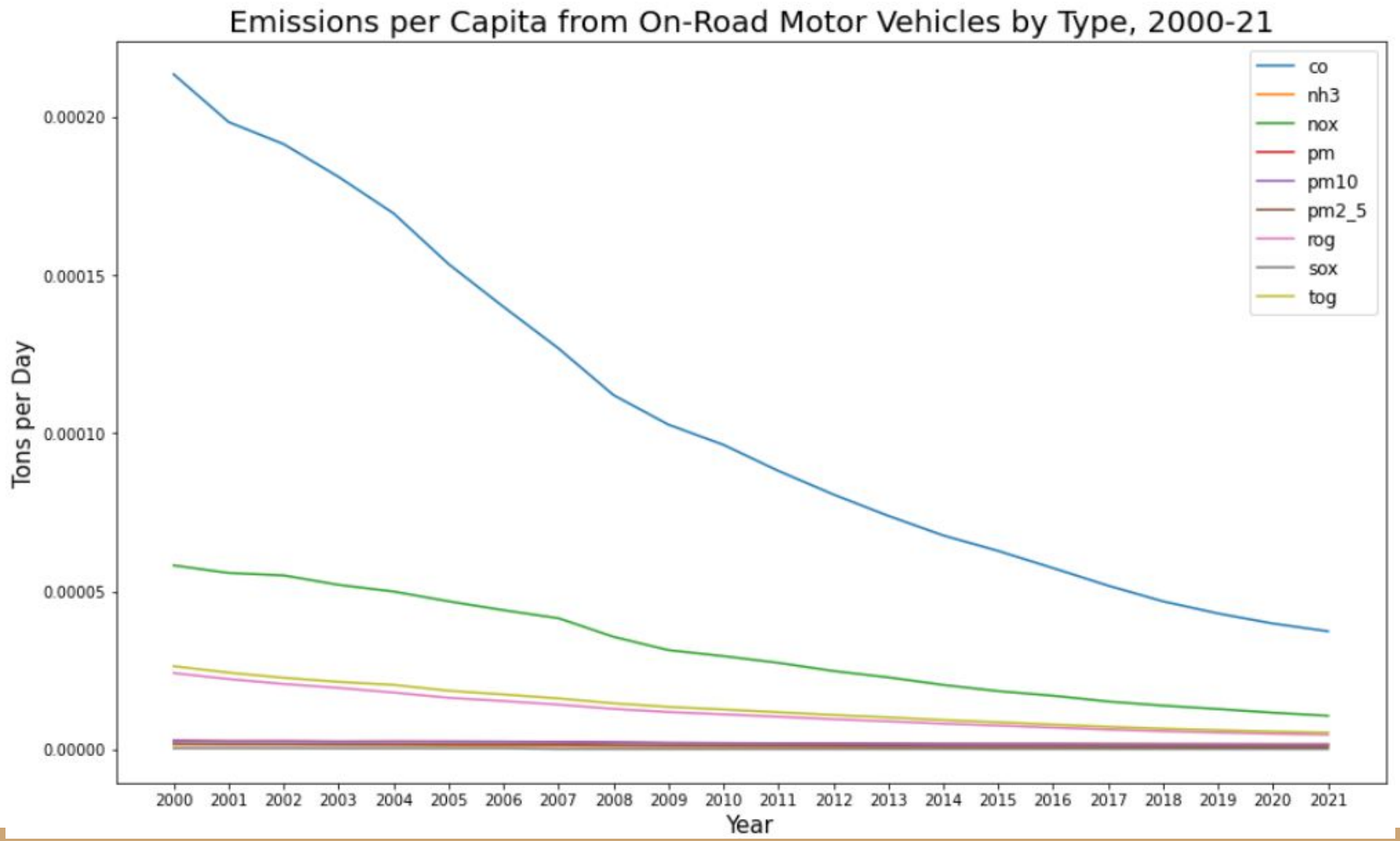
Emission Patterns


California Emissions by Type, 2000-21
Tons per Day
Year
co
nh3
nox
pm
pm10
pm2_5
rog
sox
tog
0
5000
10000
15000
20000
25000
30000
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

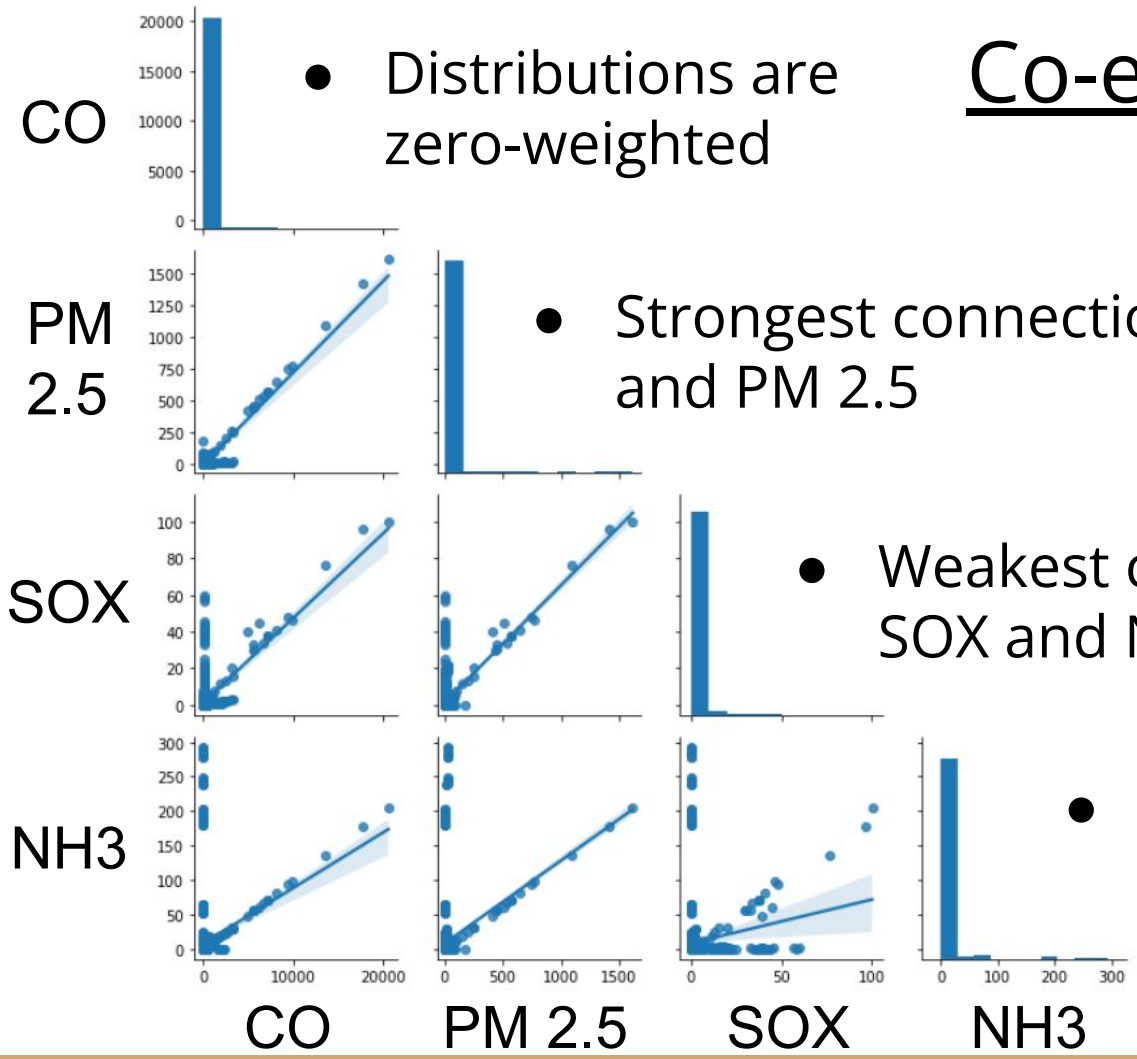

California per Capita Emissions by Type, 2000-21
Tons per Day
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
co
nh3
nox
pm
pm10
pm2_5
rog
sox
tog


Emissions per Capita from Electric Utility Fuel Burning by Type, 2000-21
1e−6
Tons per Day
Year
co
nh3
nox
pm
pm10
pm2_5
rog
sox
tog
0.0
0.5
1.0
1.5
2.0
2.5
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021


Emissions per Capita from Cogeneration Fuel Burning by Type, 2000-21
1e−6
Tons per Day
Year
co
nh3
nox
pm
pm10
pm2_5
rog
sox
tog
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

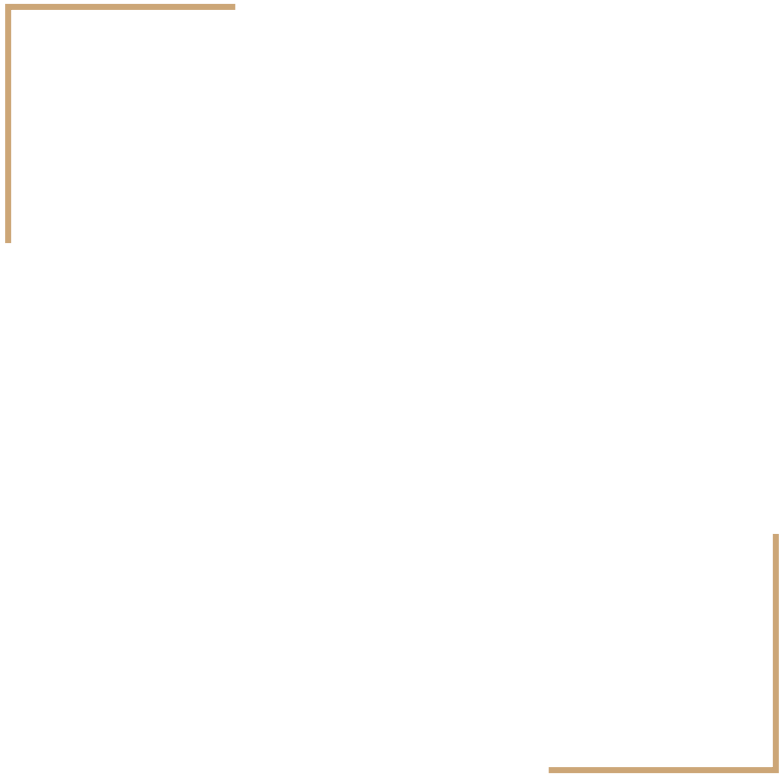

Emissions per Capita from On-Road Motor Vehicles by Type, 2000-21
Tons per Day
0.00020
0.00015
0.00010
0.00005
0.00000
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
co
nh3
nox
pm
pm10
pm2_5
rog
sox
tog

Co-emission Patterns

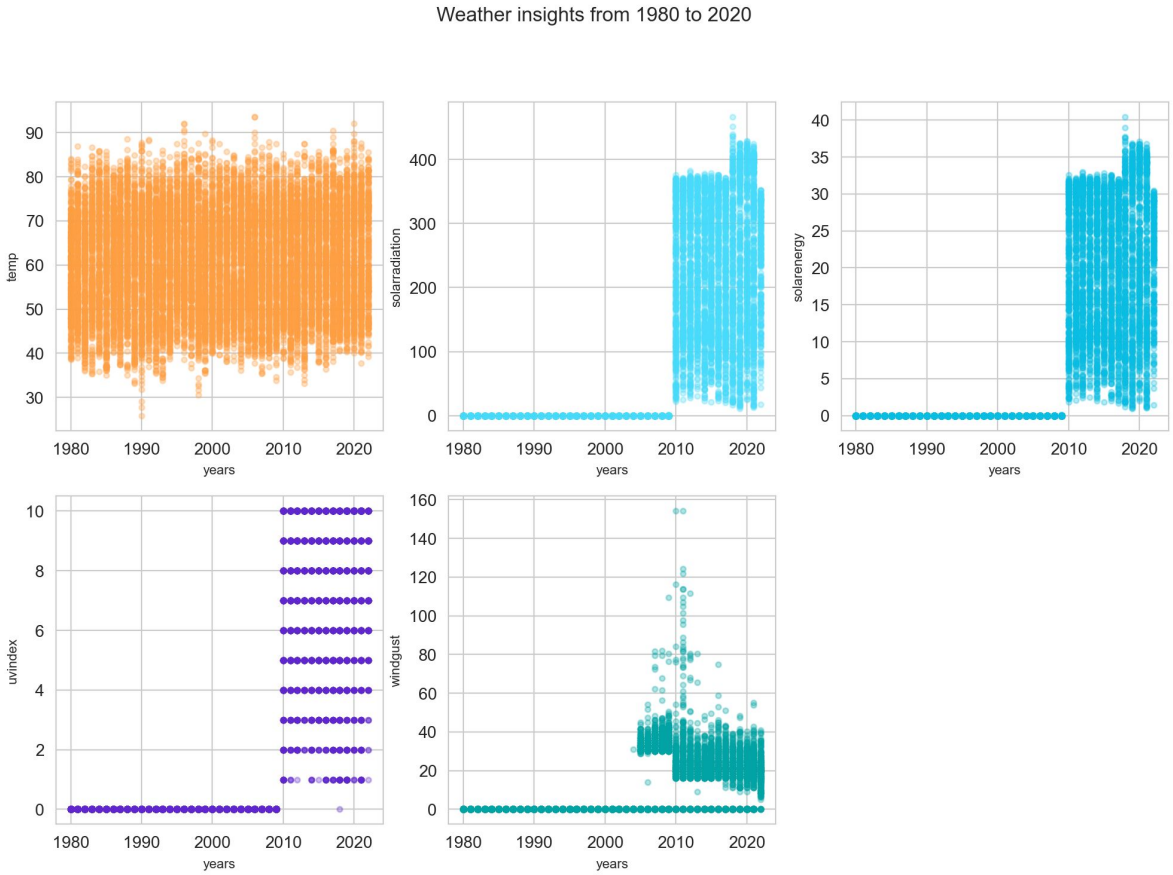


- Distributions are zero-weighted
- Strongest connection: CO and PM 2.5
- Weakest connection: SOX and NH3
- Other connections similarly weak

WildFires and Drought Insights

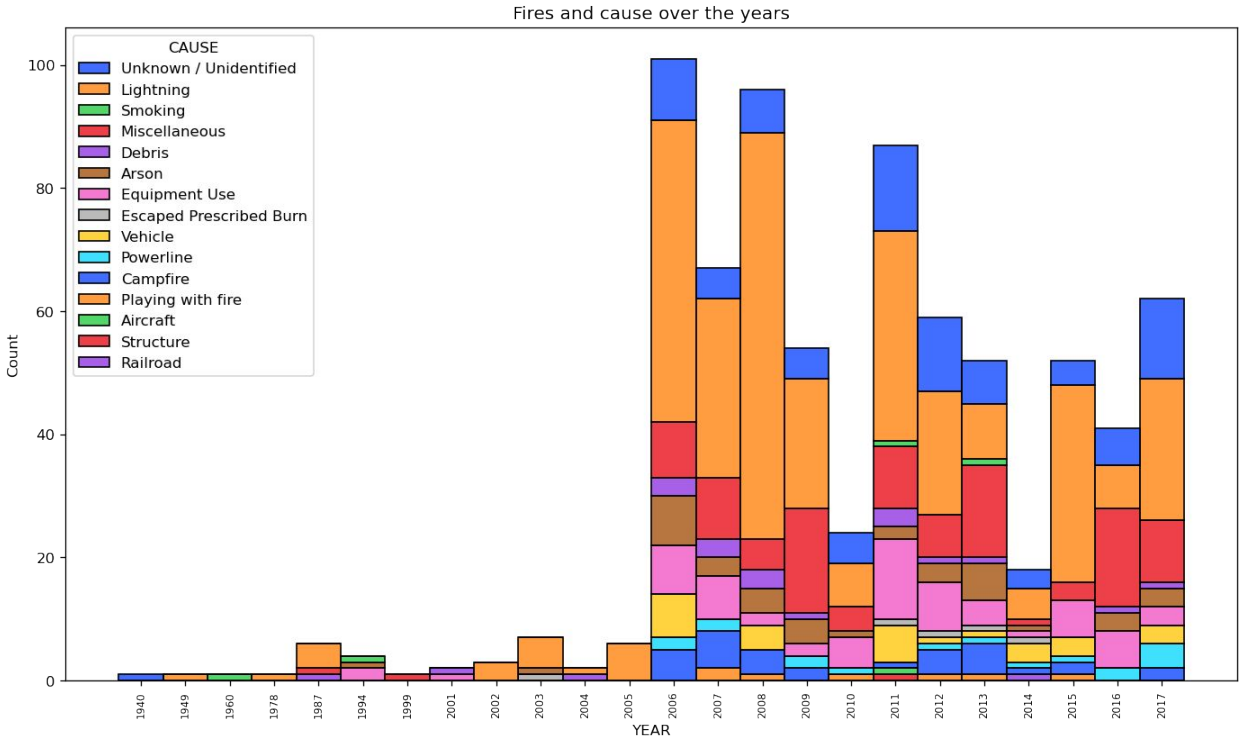


- We cannot see a clear pattern of temperature changes across the years
- More solar radiation
- More solar energy
- More windgust
- More ultraviolet radiation



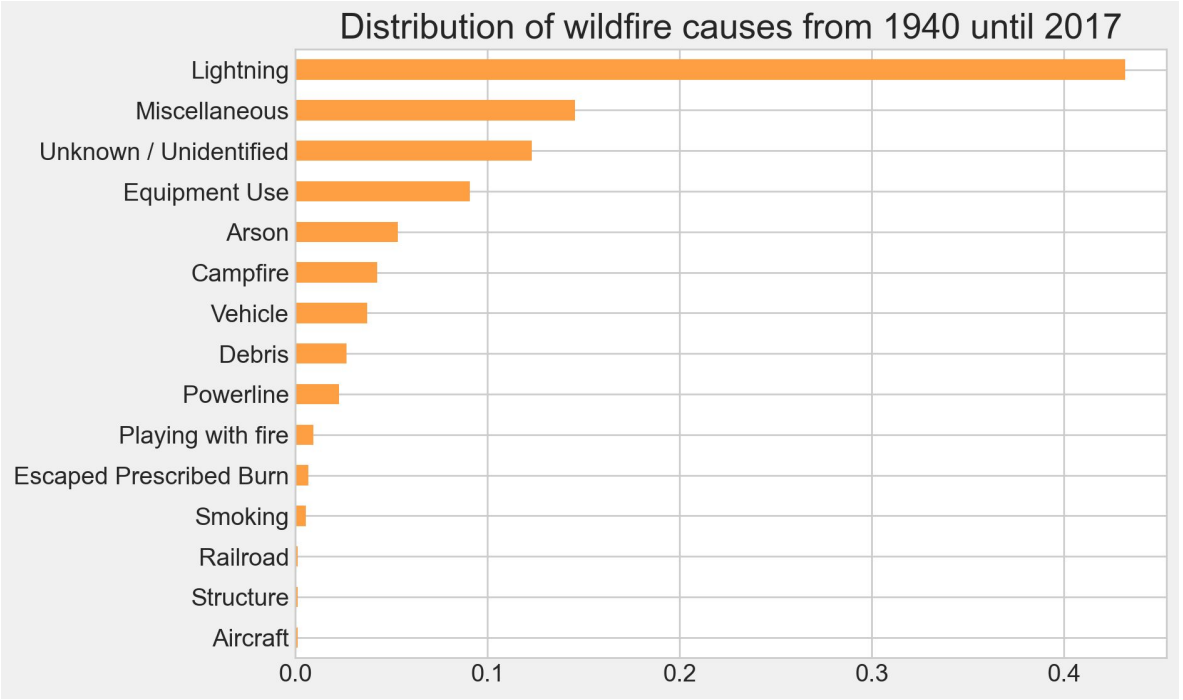
What's Causing Wildfires?

- We can notice that wildfires were relatively low from 1940 until 2005, then wildfires are immensely spiking up from 2008 until 2017 with lightning being the strongest or cause of fires



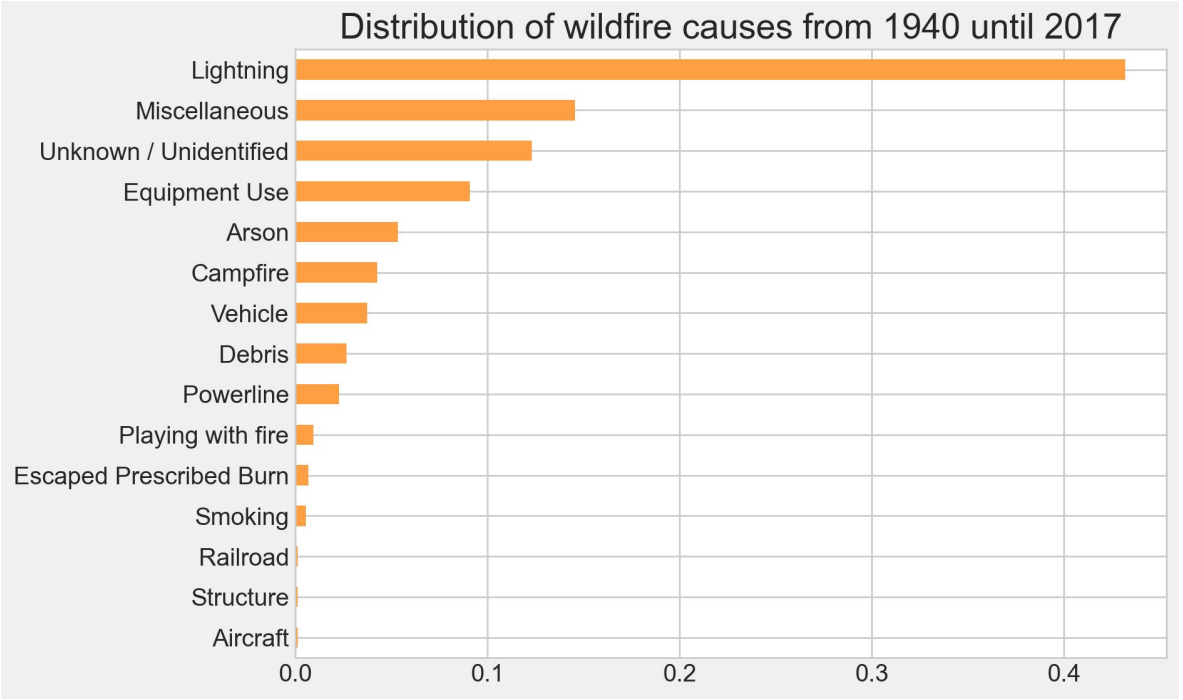
What’s Causing Wildfires?

- Lightning 0.43%
- Miscellaneous 0.14%
- Unknown / Unidentified 0.12%
- Equipment Use 0.09%
- Arson 0.05%
- Campfire 0.04%
- Vehicle 0.03%
- Debris 0.02%
- Powerline 0.02%



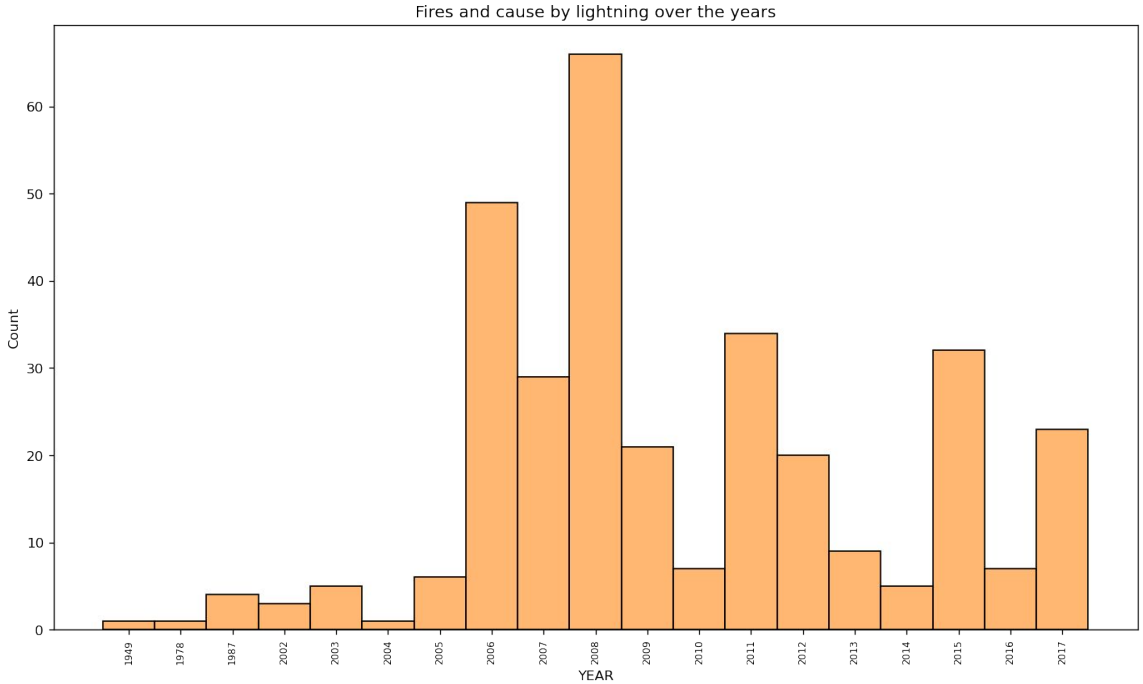
What’s Causing Wildfires?

- Lightning 0.43%
- Miscellaneous 0.14%
- Unknown / Unidentified 0.12%
- Equipment Use 0.09%
- Arson 0.05%
- Campfire 0.04%
- Vehicle 0.03%
- Debris 0.02%
- Powerline 0.02%



What’s Causing Wildfires?

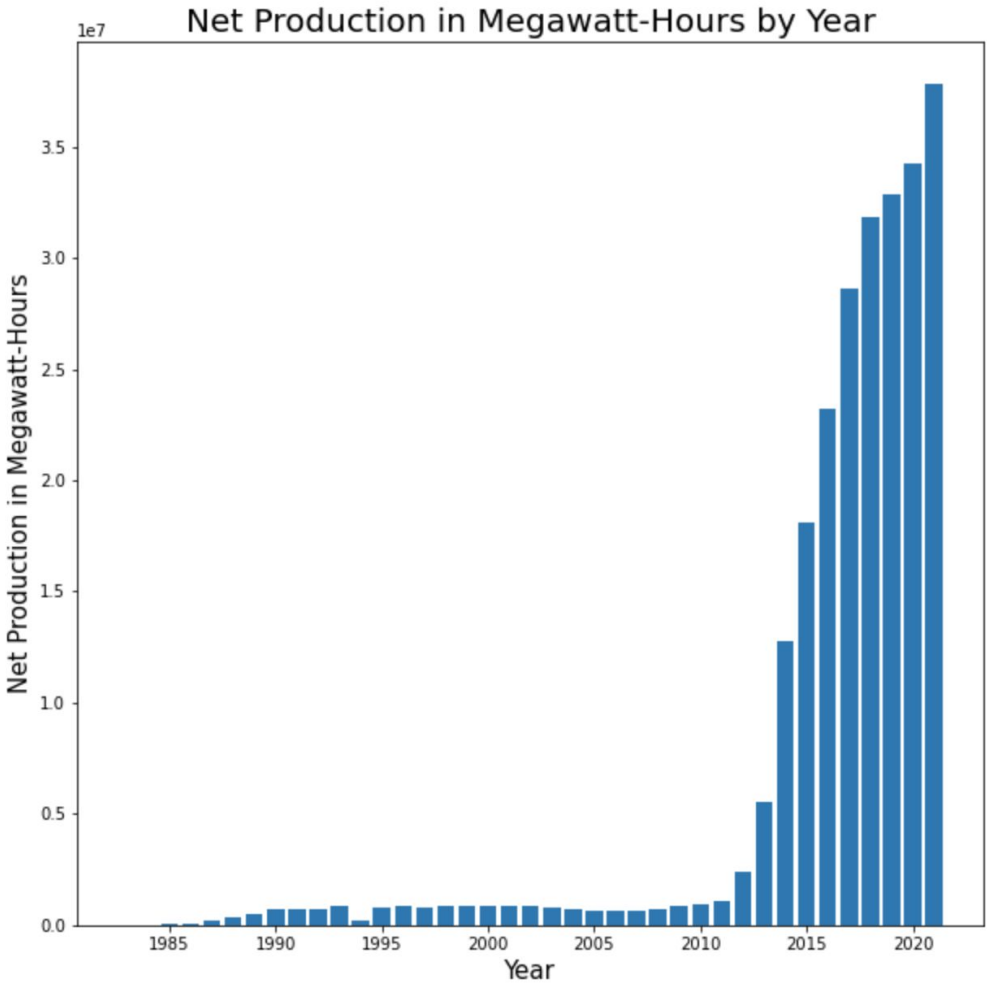
With lightning being the strongest cause of wildfires in Califoria, we can notice here that we are getting more lightening starting from 2006 onward



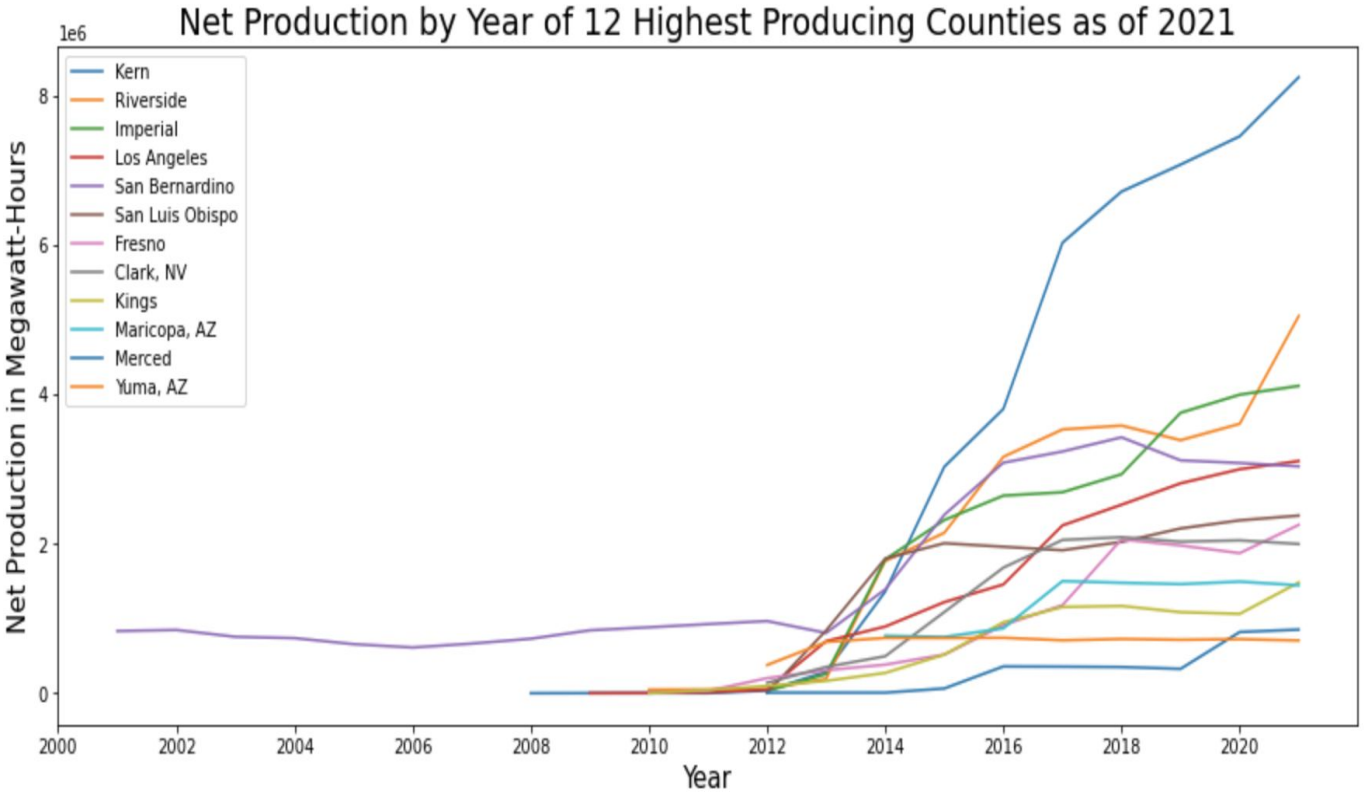
Solar Energy Production

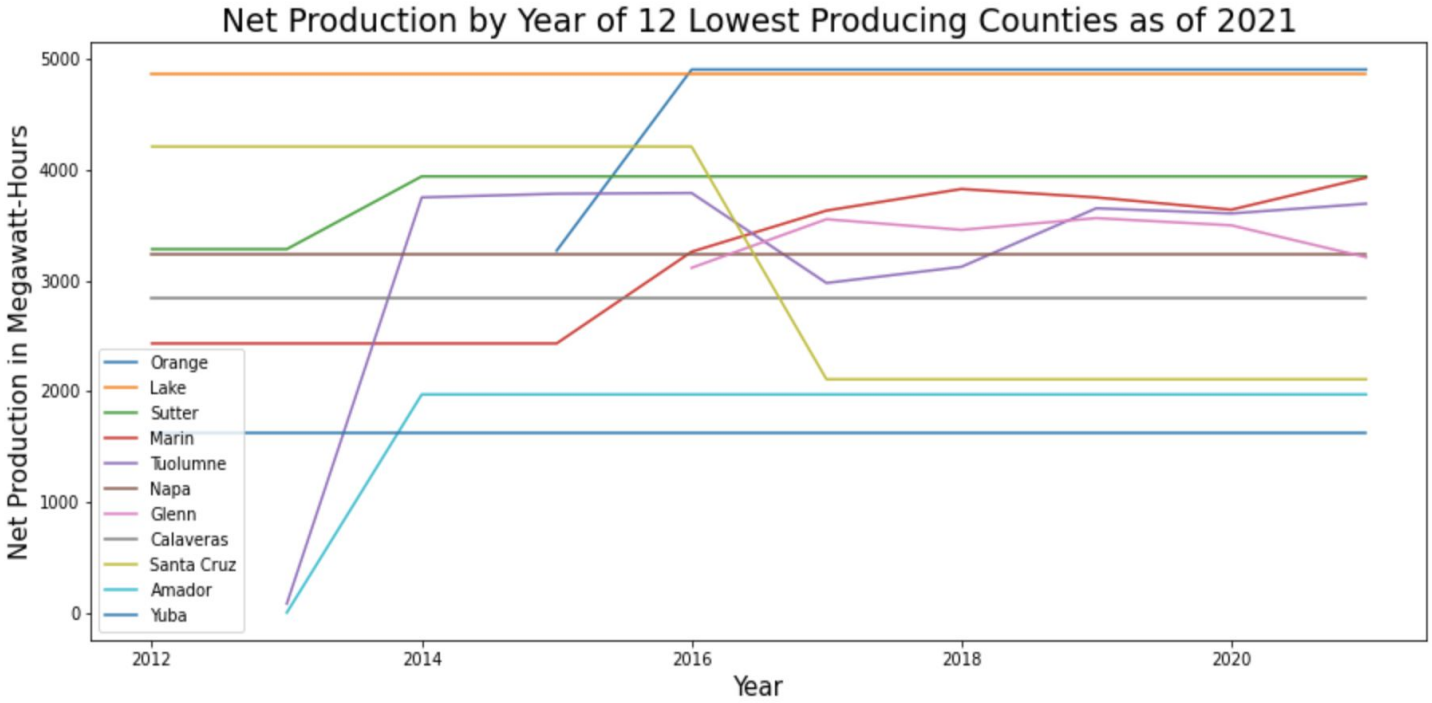
Net CA Solar Production per Year

- Solar production dramatically increased starting in 2011
- Large shifts in public policy and operation costs have lowered the barrier for solar production



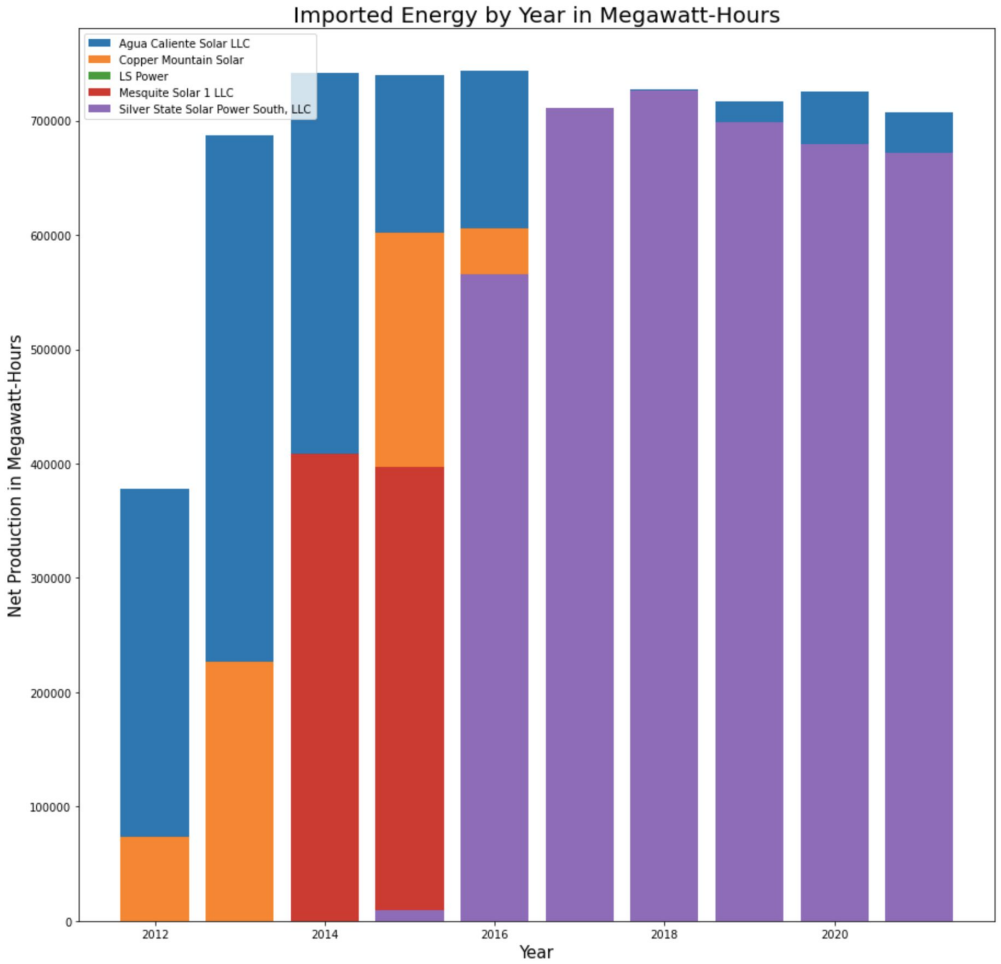
Net Solar Production By County




Net Production by Year of 12 Lowest Producing Counties as of 2021
Net Production in Megawatt-Hours
Year
5000
4000
3000
2000
1000
0
2012
2014
2016
2018
2020
Orange
Lake
Sutter
Marin
Tuolumne
Napa
Glenn
Calaveras
Santa Cruz
Amador
Yuba

Imported Energy

- California imports energy from the neighboring states of Arizona and Nevada
- Imports are largely supplemental to native solar production



Solar Production by Producer

- The largest producers of solar power are typically large for-profit corporations with large stakes in other energy sectors.
- Independent producers and startup energy companies are beginning to compete with corporate energy producers.