

Effects of Fossil Fuels on Human Health- The Bigger Picture

Hazmat Commission Contra Costa County

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Climate Health Now

September 24, 2020



Health Effects of Fossil Fuels

Health Community Consensus:

Fossil Fuel production/consumption is hazardous to Human Health and will cause severe health consequences in future decades at present rates.

Fossil Fuels affect Human Health through Direct Effects and Indirect Effects:

- **Direct Effects** –
 - **Local Direct Effects** as outlined by Jeff Mann – direct chemical exposures and emissions affect human health near the source.
 - **Regional Direct Effects** from emissions have substantial human effects through effects on Air Quality.
- **Indirect Effects** – Emissions of greenhouse gases from the production, processing and burning of fossil fuels raises global temperatures [**Climate Change**] with a cascade of effects on the earth and Human Health growing over time.

Regional Health Effects of Fossil Fuels: Air Quality

- **Aerosols** less than PM10 (especially PM2.5) from fossil fuel production and burning effect deeper lung tissues causing premature death and worsened illness.
- **Ozone**— which forms from Nitrogen oxides (Nox) [fossil fuel pollution] and heat-- is strongly associated worsening of Asthma which disproportionately effects Children.

Air pollution and early deaths in the United States. Part I: Quantifying the impact of major sectors in 2005

Atmospheric Environment
Volume 79, November 2013, Pages 198-208

Regional Health Effects of Fossil Fuels: Air Quality

At least **200,000** premature American deaths – essentially equivalent to the number of Americans that have died from COVID so far-- die from air pollution each year, mostly from heart attacks, strokes and lung disease.

Air pollution and early deaths in the United States. Part I: Quantifying the impact of major sectors in 2005

Atmospheric Environment
Volume 79, November 2013, Pages 198-208

Regional Health Effects of Fossil Fuels: Air Quality

- Air Pollution from Fossil Fuels causes PM_{2.5} aerosols is disproportionately affecting people of color and lower economic status as they live closer to the generation of fossil fuel pollution.

Burden of Cause-Specific Mortality Associated With PM_{2.5} Air Pollution in the United States

Benjamin Bowe, MPH^{1,2}; Yan Xie, MPH^{1,2,3}; Yan Yan, MD, PhD^{1,4}; [et al](#)

[» Author Affiliations](#) | [Article Information](#)

JAMA Netw Open. 2019;2(11):e1915834. doi:10.1001/jamanetworkopen.2019.15834

pneumonia. The attributable burden of death associated with PM_{2.5} was disproportionately borne by black individuals and socioeconomically disadvantaged communities; 99% of the burden was associated with PM_{2.5} levels below standards set by the US Environmental Protection Agency.

Regional Health Effects of Fossil Fuels: Air Quality

- More vulnerable populations exposed to the effects of Air Pollution from Fossil Fuels have increased severity of COVID infection.



HARVARD UNIVERSITY

[HARVARD.EDU](https://www.harvard.edu)

COVID-19 PM_{2.5}

A national study on long-term exposure to air pollution and COVID-19 mortality in the United States

Conclusions: A small increase in long-term exposure to PM_{2.5} leads to a large increase in the COVID-19 death rate. Despite inherent limitations of the ecological study design, our results underscore the importance of continuing to enforce existing air pollution regulations to protect human health both during and after the COVID-19 crisis. The data and code are publicly available so our analyses can be updated routinely.

April 24, 2020

Regional Health Effects of Fossil Fuels: Air Quality

By Ozone	By Year Round Particle Pollution	By Short-Term Particle Pollution
#1: Los Angeles-Long Beach, CA	#1: Bakersfield, CA	#1: Fresno-Madera-Hanford, CA
#2: Visalia, CA	#2: Fresno-Madera-Hanford, CA	#2: Bakersfield, CA
#3: Bakersfield, CA	#3: Visalia, CA	#3: San Jose-San Francisco-Oakland, CA
#4: Fresno-Madera-Hanford, CA	#4: Los Angeles-Long Beach, CA	#4: Fairbanks, AK
#5: Sacramento-Roseville, CA	#5: San Jose-San Francisco-Oakland, CA	#5: Yakima, WA
#6: San Diego-Chula Vista-Carlsbad, CA	#6: Fairbanks, AK	#6: Los Angeles-Long Beach, CA
#7: Phoenix-Mesa, AZ	#7: Phoenix-Mesa, AZ	#7: Redding-Red Bluff, CA
#8: San Jose-San Francisco-Oakland, CA	#8: Pittsburgh-New Castle-Weirton, PA-OH-WV	#7: Salt Lake City-Provo-Orem, UT
#9: Las Vegas-Henderson, NV	#8: El Centro, CA	#7: Missoula, MT
#10: Denver-Aurora, CO	#10: Detroit-Warren-Ann Arbor,	#10: Phoenix-Mesa, AZ
		#11: Sacramento-Roseville, CA

Health Effects of Fossil Fuels

Scientific Community Consensus:

Human use of Fossil Fuels is the primary driver of
Climate Change

Health Effects of Fossil Fuels

•We have 10 years:

CO2 levels in 2019 were at 415ppm and rising about 3ppm per year at current fuel consumption rates. This has produced a rise of 1°C above preindustrial levels of the early 19th century as of 2015 above preindustrial levels. At current rates of consumption, with temperature rising 0.18°C per year, we will reach a 2°C increase within the next 10 years.

- **Current amounts of greenhouse gases will continue to drive increased temperatures and climate change effects even if humans stopped burning fossil fuels immediately and we left all fuel reserves in the ground. Future consequences will be much less severe if we rapidly wean off Fossil Fuels.**

<https://www.carbonbrief.org/state-of-the-climate-how-the-world-warmed-in-2019>

Thorsten Mauritsen et al. Committed warming inferred from observations, *Nature Climate Change* (2017). DOI: [10.1038/nclimate3357](https://doi.org/10.1038/nclimate3357)

• DECEMBER 11, 2014 What would happen to the climate if we stopped emitting greenhouse gases today? by Richard B. Rood, [The Conversation](#)

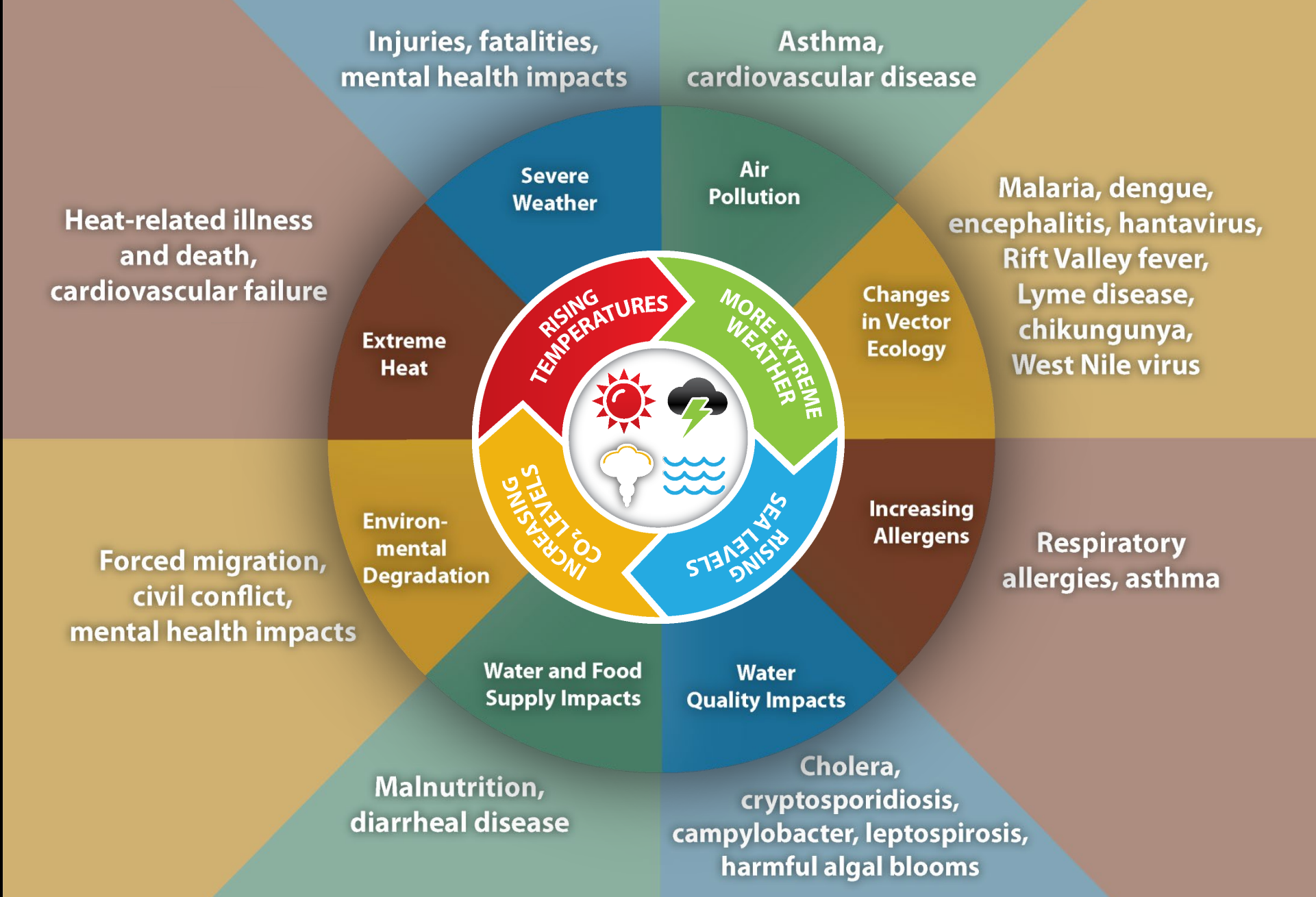
Health Effects of Fossil Fuels

- **United Nations Paris Accords:**

To avoid increasingly severe effects on Human Health, rapid reductions in fuel extraction and consumption would be required. The International Paris Accords, using IPCC* recommendations, in April 2016 set a goal of no more than a 2°C as the maximum acceptable rise in global temperatures. Higher levels will be catastrophic.

*The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.

Impact of Climate Change on Human Health



More Sources:

https://www.cdc.gov/climateandhealth/docs/Health_Impacts_Climate_Change-508_final.pdf

<https://www.cdc.gov/climateandhealth/effects/default.htm>

https://www.cdc.gov/climateandhealth/pubs/hhcc_final_508.pdf

<https://www.apha.org/topics-and-issues/climate-change/health-impacts>

<https://oehha.ca.gov/epic/impacts-biological-systems/heat-related-mortality-and-morbidity>

<http://impactlab.org/research/valuing-the-global-mortality-consequences-of-climate-change-accounting-for-adaptation-costs-and-benefits/>

<https://www.pnas.org/content/116/15/7192> **PNAS Effects of fossil fuel and total anthropogenic emission removal on public health and climate**, J. Lelieveld, K. Klingmüller

Fossil Fuels Indirect Health Effects

Fossil Fuels →

Greenhouse Gases →

Increased Temperatures →

-More Heat Related Deaths/Morbidity

-More Extreme Weather Events

More Heat Related Deaths/Morbidity

Fossil Fuels → Greenhouse Gases → Increased Temperatures →

More Heat related Deaths/Morbidity



HOUSE COMMITTEE ON
OVERSIGHT AND REFORM
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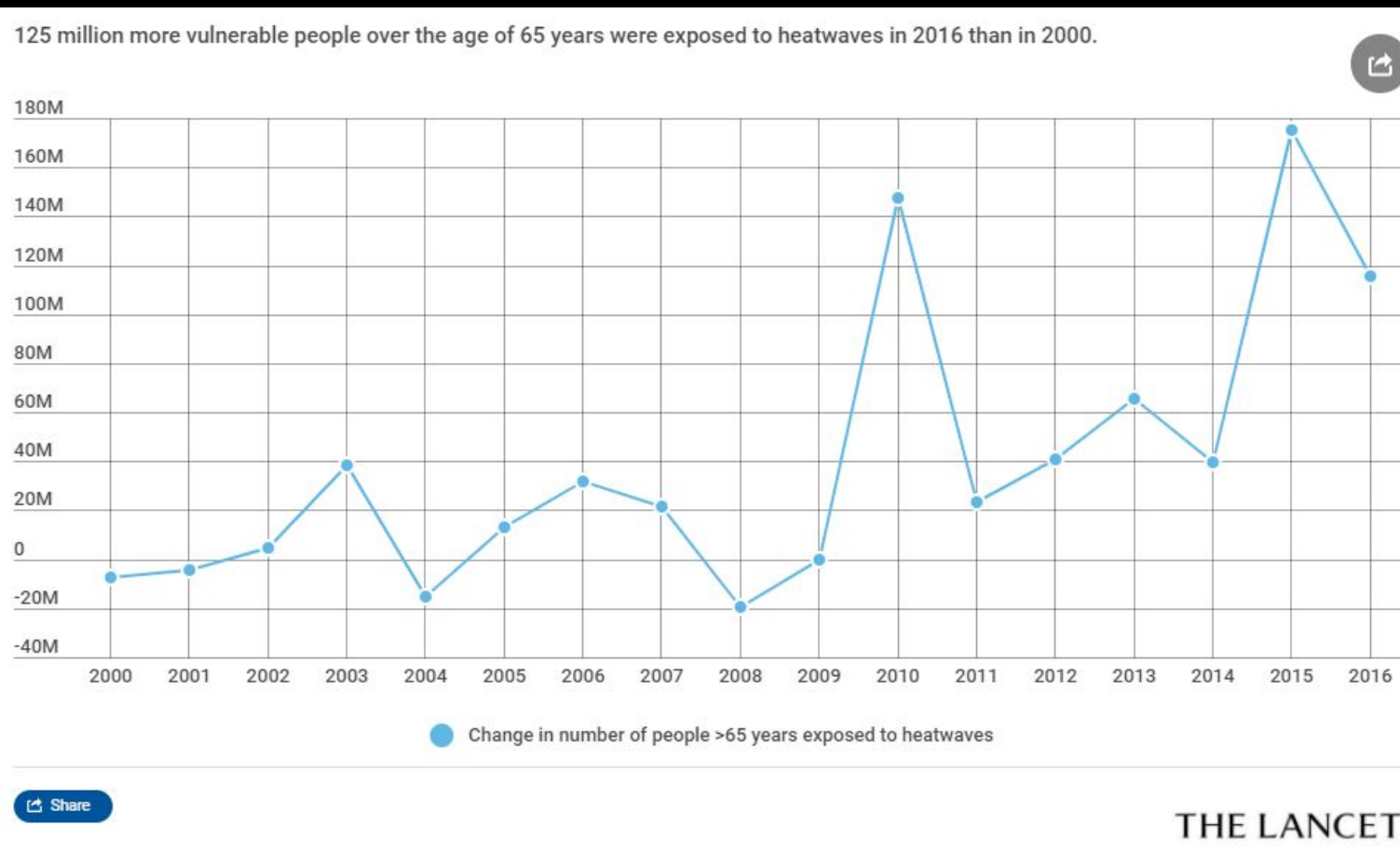
Oversight Committee and Top Experts Examine New Data on the Health and Economic Impacts of Climate Change

Aug 5, 2020 | Press Release

Dr. Salas explained that she was testifying to bring the stories of her patients to Congress: **“Patients like the young, strong, and otherwise healthy construction worker who had two jobs to support his growing family in record-breaking heat. By the time he arrived at my emergency department, his organs were already failing as we rapidly tried to cool him. His story showcases that no one is invincible. Or patients like the elderly man whose wife called 9-1-1 because he was acting confused. The medic said that the temperature in their apartment felt like the Sahara Desert because they had no air conditioning and only one open window. This man’s core temperature was 106 degrees Fahrenheit. When I tell this story, I often wonder about his wife, who remained in the apartment that day while her husband was taken to the hospital.”**

- [Dr. Renee N. Salas](#), Harvard Medical School, US Congressional Oversight Committee Hearings, 8/2020

More Heat Related Deaths/Morbidity



More Heat Related Deaths/Morbidity

Fossil Fuels → Greenhouse Gases → Increased Temperatures →

More Heat related Deaths/Morbidity

- 12-14 ER visits/10,000/yr on average

- 2 Deaths /10,000/yr on average

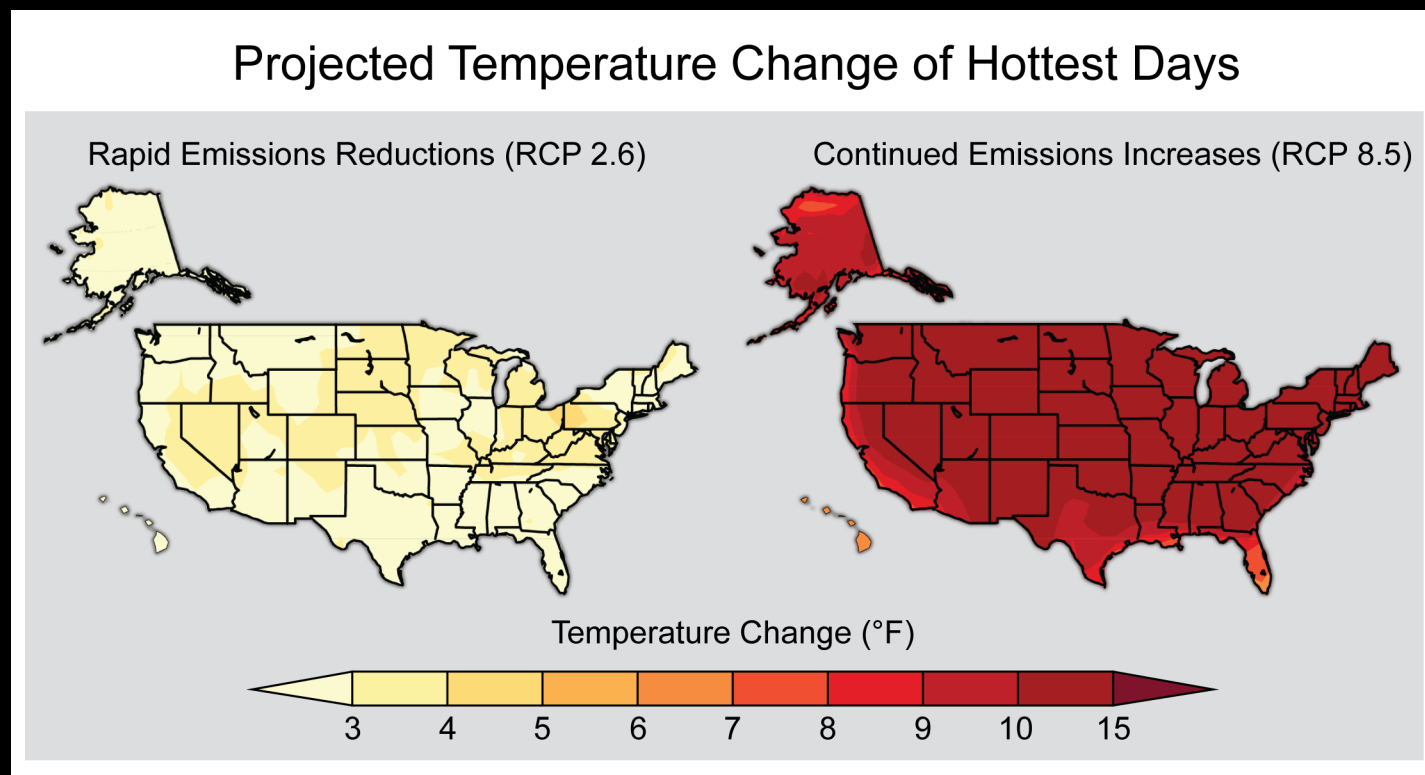
- mostly the elderly and those with chronic disease, but also young workers eg agricultural labor

- spikes occur with heat waves which will be more intense and frequent without reducing emissions

Indicators of Climate Change in CA--OEHHA CA office of Environmental Health and Hazard Assessment

CDC <https://www.cdc.gov/mmwr/volumes/69/wr/mm6924a1.htm>

More Heat Related Deaths/Morbidity



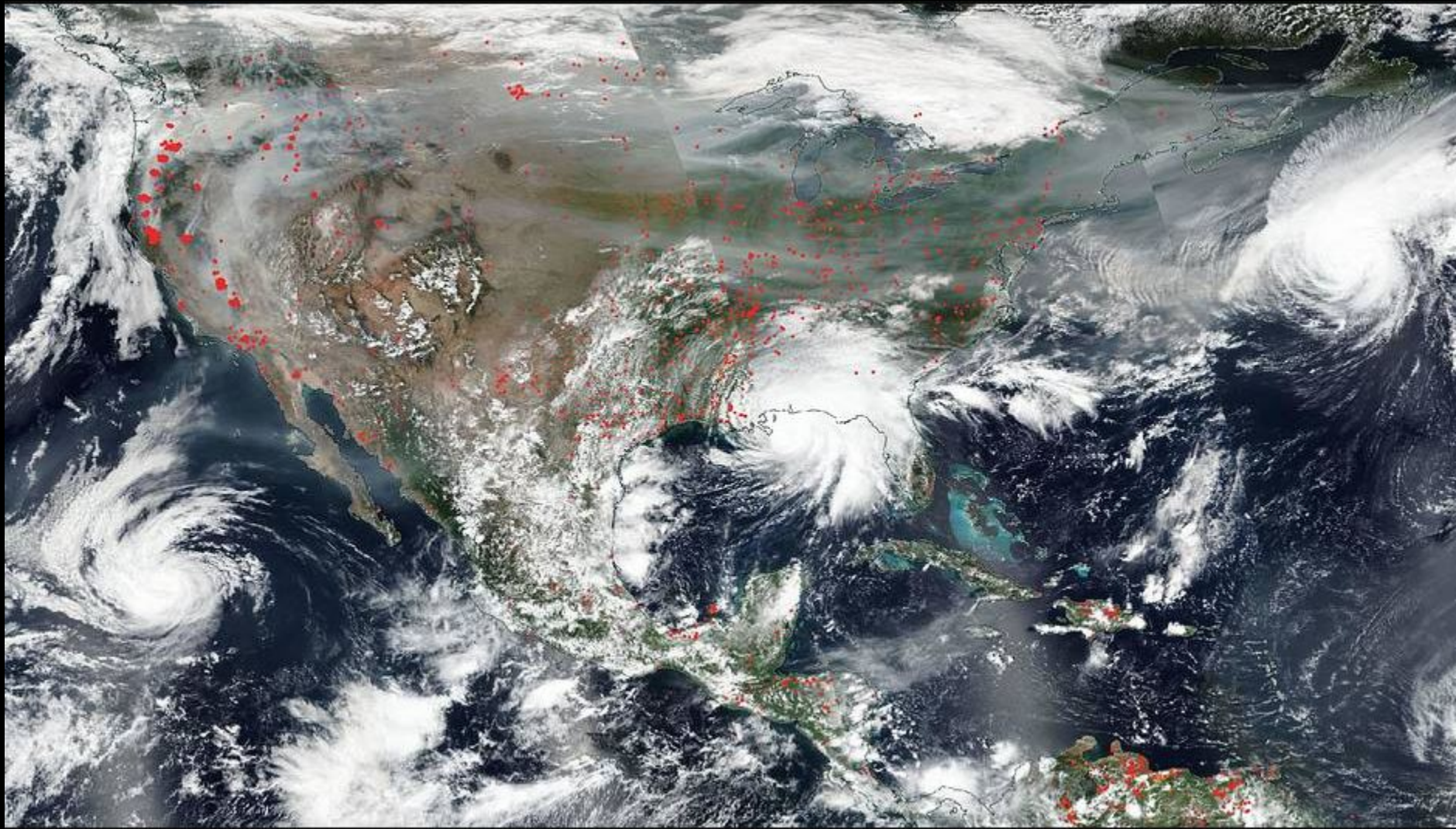
**Fossil Fuels → Greenhouse Gases → Increased Temperatures
→ More Extreme/unprecedented Weather Events →**

- More Frequent and Severe Hurricanes
- Loss or excess Monsoon/ Rains → Crop Failures
- Electrical Storms//Increased Drought Conditions

→ Wildfires

→ Increased PM2.5

**→ More Respiratory/Cardiovascular
Morbidity and Mortality**





Interactive Map of Air Quality

Current

Forecast

Loops

Archive

Info

Find address or place



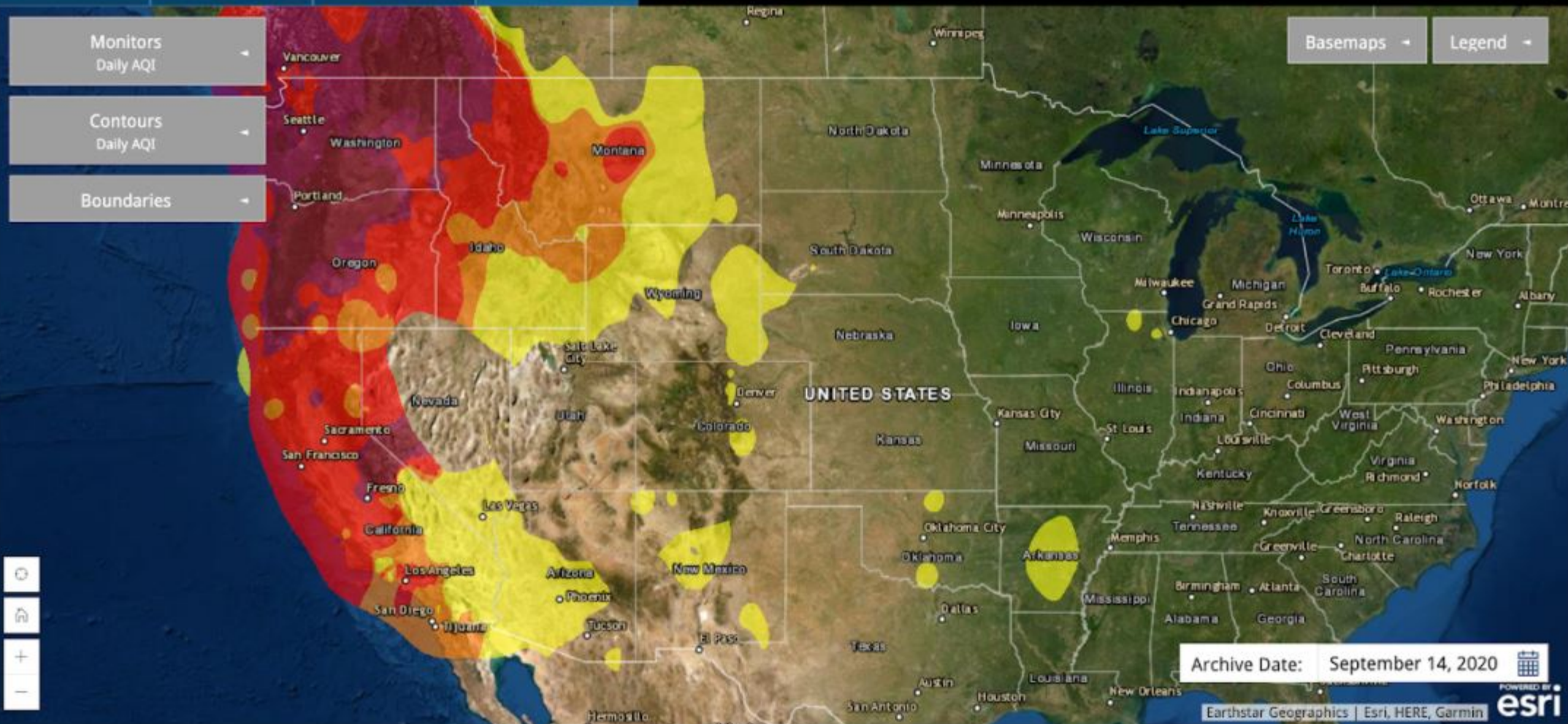
Monitors
Daily AQI

Contours
Daily AQI

Boundaries

Basemaps

Legend



Archive Date: September 14, 2020

Earthstar Geographics | Esri, HERE, Garmin



Wildfires

- Additive with PM2.5 regional emissions, wildfire smoke has similar health risks, but is becoming a larger contributor to overall morbidity and mortality.
- Wildfire Smoke affects the young, elderly and those with lung disease most.

US wildfire smoke deaths could double by 2100

Date: September 10, 2018

Source: American Geophysical Union

quality over the coming decades. The number of human deaths from chronic inhalation of wildfire smoke could increase to more than 40,000 per year by the end of the 21st century, up from around 15,000 per year today.

Climate and Health Emergency

- **Analogy of COVID and Climate Change Significant:**
 - Both are not directly obvious to many humans as the connections are complex and slow moving.
 - Both have catastrophic consequences if we don't act quickly and decisively to avoid worsening
- **Future costs in human life, health and economic damage** are estimated at current fossil fuel rates to be staggering.
Like the COVID Spending Packages, mitigation for Climate Change will be in the trillions per year in future decades-
Unsustainable

Health Community Consensus:

Fossil Fuel production/consumption is hazardous to Human Health



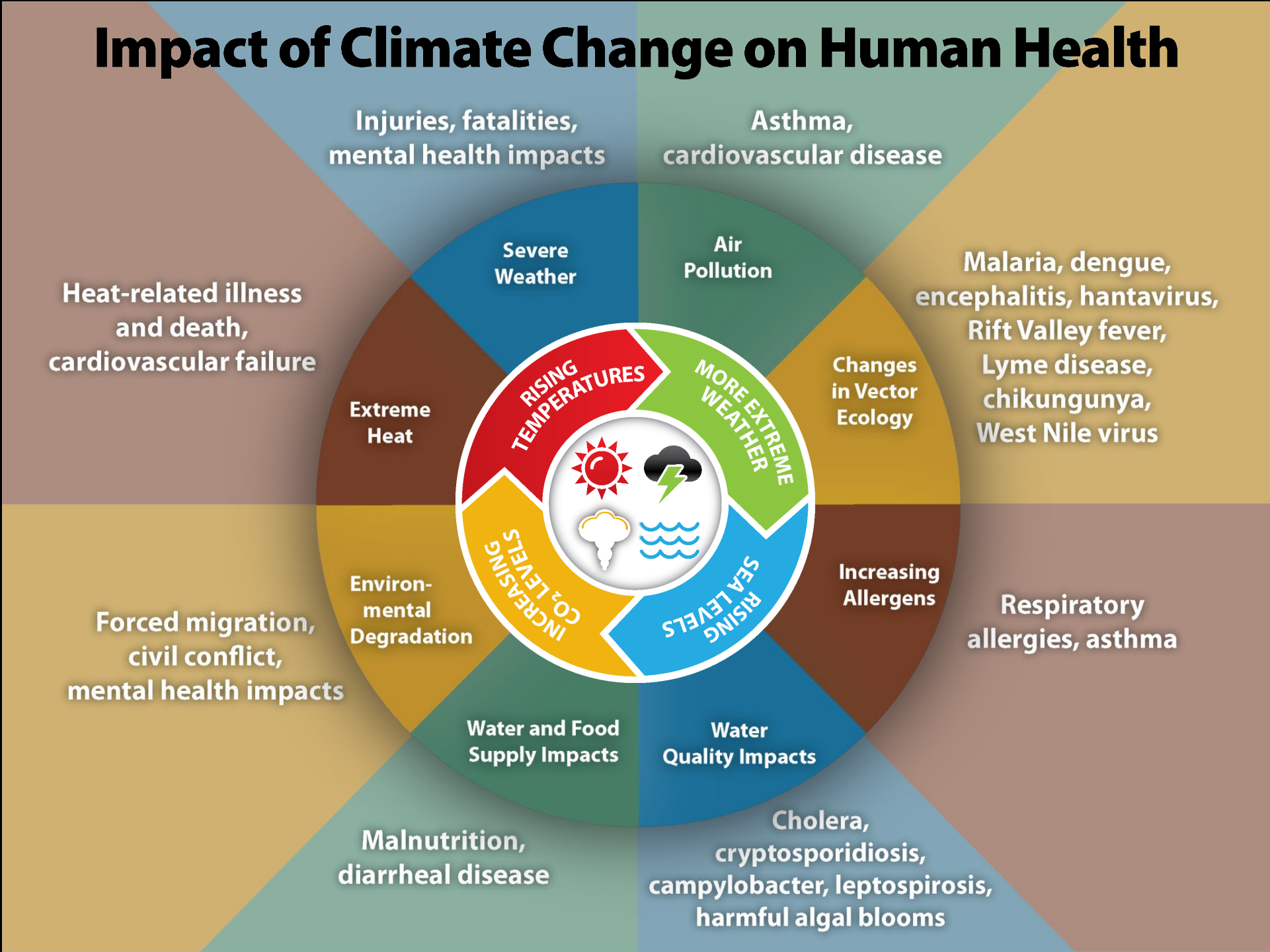
Health Community Consensus:

U.S. CALL TO ACTION ON CLIMATE, HEALTH, AND EQUITY: A POLICY ACTION AGENDA

Climate change is one of the greatest threats to health America has ever faced—it is a true public health emergency. The health, safety and wellbeing of millions of people in the U.S. have already been harmed by human-caused climate change, and health risks in the future are dire without urgent action to fight climate change.

120 US Medical Organizations including the AMA and the California Medical Association have signed this Call to Action in 2019 advocating transitioning away from Fossil Fuels

Impact of Climate Change on Human Health



Conclusions:

-Fossil Fuels are Hazardous to Human Health and the Planet

Conclusions:

The proposed well in Brentwood would have significant health consequences:

- Direct health effects on adjacent residents,
- Direct effect on AQI with health consequences for CCC, and
- contribute to the health consequences of Climate Change.

Conclusions:

-Even if Climate Change didn't exist, the benefits of eliminating fossil fuels on Air quality and human health would be dramatic- 200,000 premature deaths would be averted per year in the US

Conclusions:

-We applaud the Resolutions of the CCC BOS on 9/22/20 to reduce emissions by 2030, go all electric by 2045 and pursue a just transition. We as individuals and through policy need to start taking steps now to achieve that.

Our Recommendations

Due to the significant health risks to the Brentwood and Surrounding community, we request the Hazmat Commission to recommend to the CCC BOS to reject the proposed well in Brentwood.

Our Recommendations

- We recommend a moratorium on new oil and gas well drilling in CCC due to the increased health risks.

- We further recommend a minimum 2500 foot setback for any future oil and gas well drilling because of health risk

Our Recommendations

- We recommend a goal of phasing out oil and gas production and consumption completely as quickly as possible in CCC with assertive actions before 2030.
- To achieve that, we recommend the CCC BOS take any measures it can to further the goals of moving away from fossil fuel production and consumption in CCC with a Just Transition:
 - All electrification and alternative energy
 - Living wage jobs in the transition and the future
 - Protecting vulnerable populations



Thank You

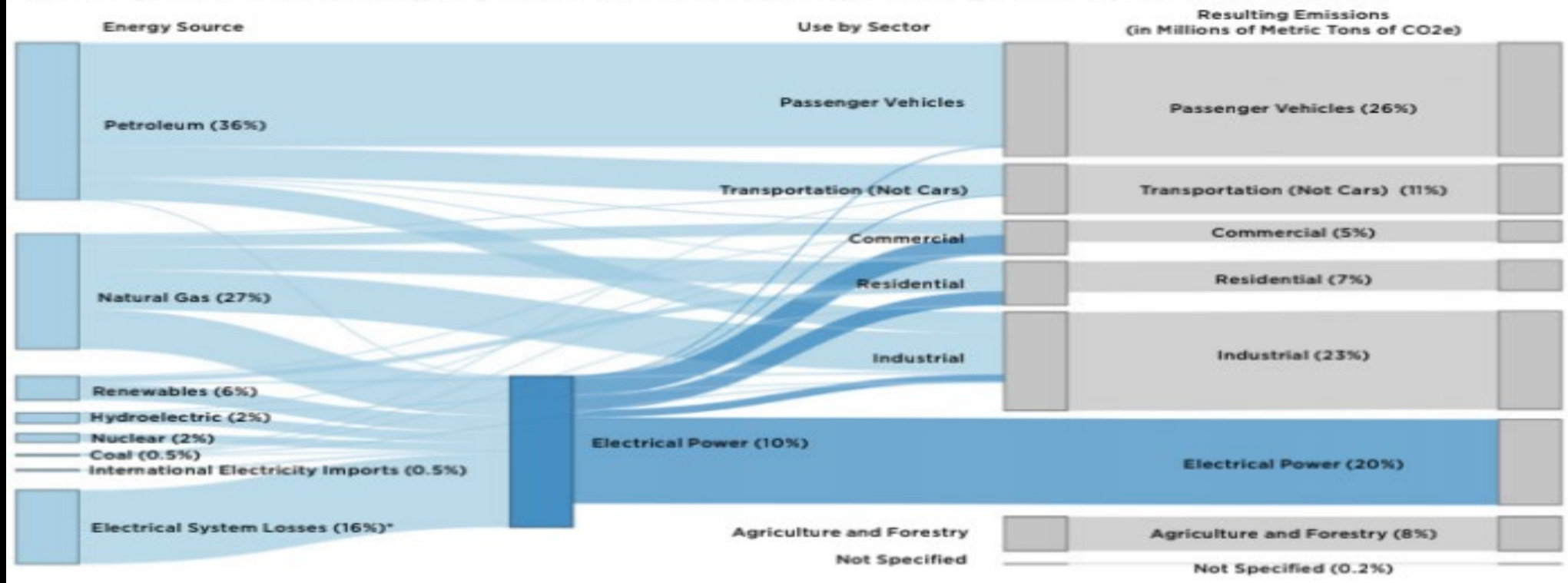
California Fossil Fuels Consumption and Emissions

California Consumes More Petroleum Than Any Other Energy Source

This figure shows the consumption of fuels by sector and the resulting emissions. At the far left, the energy consumed in California is shown by percentage of the state's 9.346 trillion Btu total. This energy is consumed by intermediate or end-use sectors shown in the middle. At the far right, the greenhouse gas emissions from those sectors are shown by percentage of the state's total 459.3 million metric tons of CO₂ equivalent. Electric power is unique in that it both consumes raw energy and provides energy to other sectors.

Sources: Energy Btus are from EIA's 2013 State Energy Consumption Estimates: http://www.eia.gov/state/seds/sep_use/notes/use_print.pdf; greenhouse gas emissions are from CARB's California Greenhouse Gas Inventory for 2000-2013—by Sector and Activity: http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_sector_all_2000-13_20150831.pdf

* Note: Electric system losses include the loss of energy through heat when fuels are burned to make electricity, as well as energy loss as electricity moves across transmission wires.



- 2013 EIA –By state energy consumption, from SPUR report 9/2016
- California Air Resources Board 2013 Inventory by Sector

Health Effects of Fossil Fuels

- **Climate Change** is the consequence of the rise in the average global temperature above preindustrial levels in the 1800s.
- Fossil fuel extraction/consumption produces greenhouse gases. CO₂ is the most common greenhouse gas product although Methane is 30x more potent than CO₂.
- CO₂ levels in 2019 were at 415ppm and rising about 3ppm per year at current fuel consumption rates. This has produced a rise of 1°C as of 2015 above preindustrial levels. At current rates of consumption, with temperature rising 0.18°C per year, we will reach a 2°C increase within the next 10 years.
- To avoid increasingly severe effects on Human Health, rapid reductions in fuel extraction and consumption would be required. The International Paris Accords, using IPCC* recommendations, in April 2016 set a goal of no more than a 2°C as the maximum acceptable rise in global temperatures. Higher levels will be catastrophic.

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