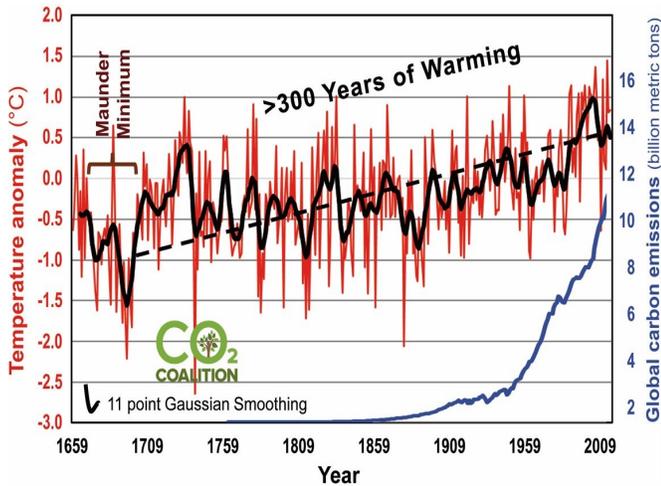


# Climate Science and Policy for Nonscientists

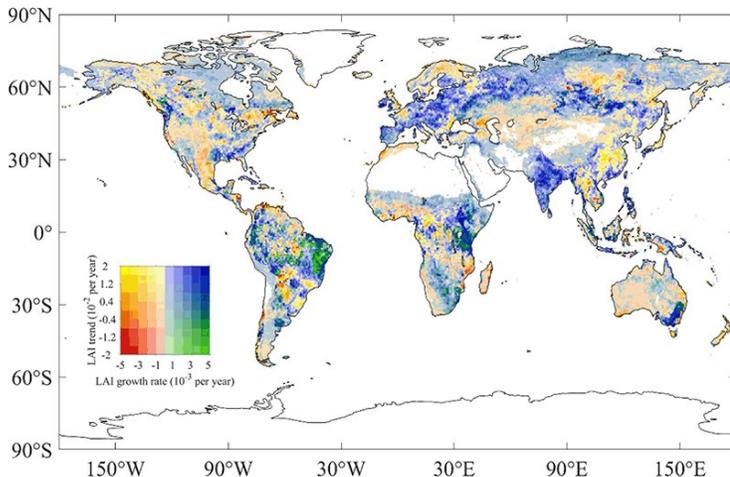
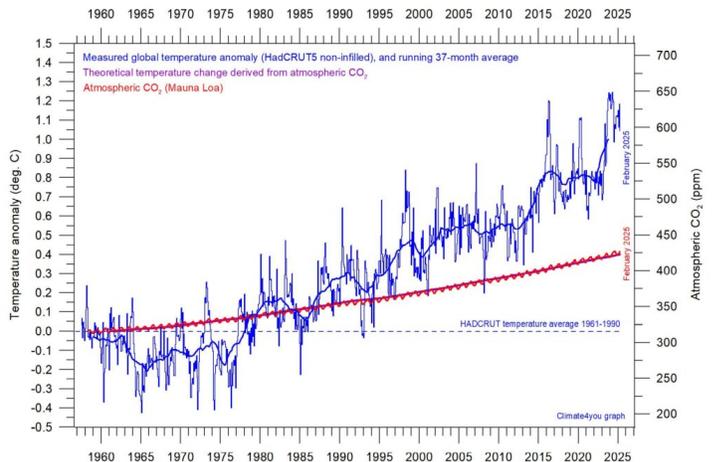
One Picture is Worth a Thousand Words.



## WHERE'S THE CRISIS?

There's supposed to be a climate crisis. Where is the evidence? Study after study published recently presents evidence rebutting the idea of any crisis. World temperatures have been slowly, steadily increasing since the 18<sup>th</sup> century as the Little Ice Age has come to an end. The rise started long before CO2 emissions could possibly have been the cause. Natural variability is a likely explanation.

World temperatures spiked during 2023 and early 2024, which led to much commentary in the media. But for the last year temperatures have been declining. Neither the spike, nor its decline, can have been caused by CO2, because during this period the CO2 level has just been continuing its slow, steady rise that began in the 1950s. Temperatures have been slowly rising for the last 50 years with significant ups and downs that can not be explained by CO2, and the rate of temperature rise remains roughly linear and is now slightly greater than the rate of CO2 rise.



Rising temperatures and CO2 levels have beneficial effects. For example, many studies have concluded that these changes are causing the world to green and food production to increase. Warming increases plant growth, and CO2 is plant food. A recent study has concluded that the rate of greening (areas of blue and green) has been increasing over the last 25 years. One estimate is that doubling of carbon dioxide from today's approximately 420 ppm to 840 ppm will increase the amount of food available to people worldwide by roughly 40%.

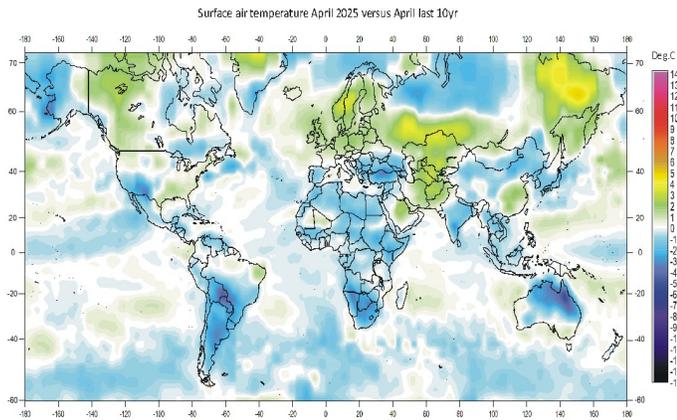
The entire southern rim of the Sahara Desert is greening. Desert area shrank by 8% from 1988 to 2018. But not all places are greening.. For example, one study concluded that greening is occurring and accelerating over 55% of land area, and that desertification is increasing over 7%, which leaves around one-third of the world that is not changing.

Using satellite images, Venter et al. 2018 found an eight percent increase in woody vegetation in sub-Saharan Africa over the last three decades, underscoring the global “greening trend”.



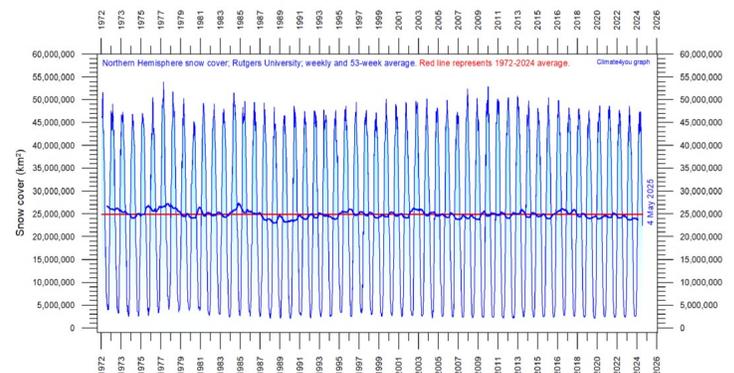
Recent study by Venter et al finds that the Sahara has shrunk by 8% over the past three decades. NASA image, public domain.

April 2025 global surface air temperature overview versus average April last 10 years

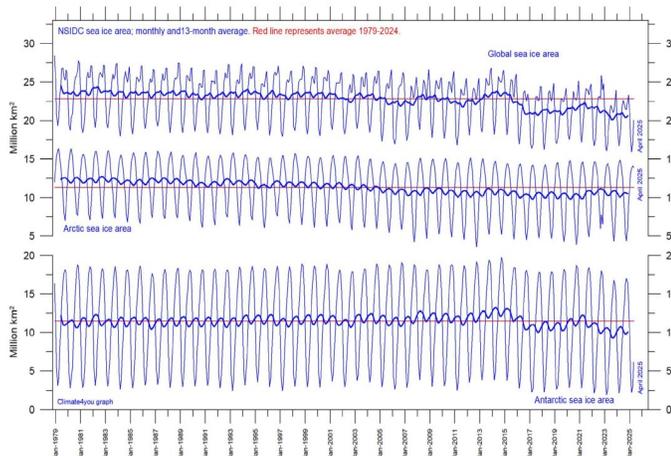


The media focuses on changes to the world’s average temperature, but in terms of land area more of the world is actually cooling (areas in blue) than is warming (areas in green and yellow). Much of the warming is occurring in places like Canada, Scandinavia, and Russia, where it is beneficial.

The slow, steady rise of world average temperature has not had significant effects on most of the climate variables most commonly mentioned in the media. For example, most of the world’s snow occurs in the Northern Hemisphere, and current data shows such snowfall is virtually unchanged since 1972.



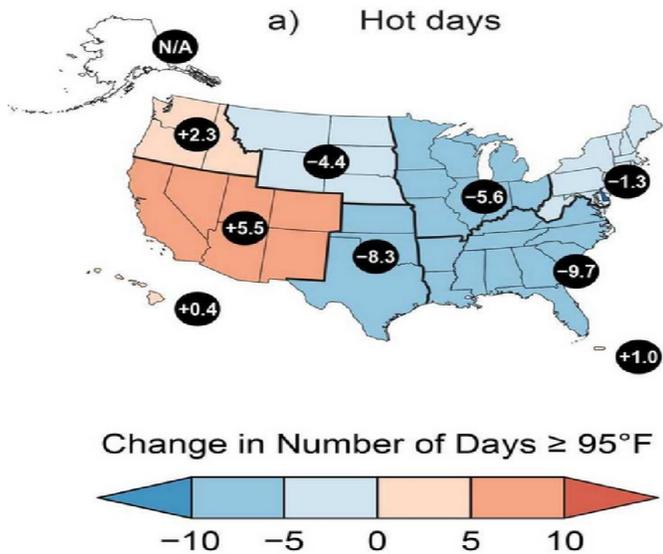
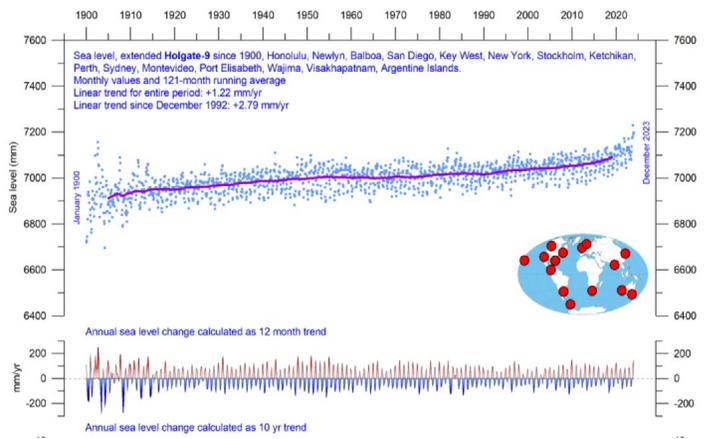
Northern hemisphere weekly snow cover since January 1972 according to Rutgers University Global Snow Laboratory. The thin blue line is the weekly data, and the thick blue line is the running 53-week average (approximately 1 year). The horizontal red line is the 1972-2024 average.



Global sea ice (top line) was practically unchanged from 1979 to 2015. Then it declined from 2015 to 2017, but it has been essentially unchanged from 2017 to 2025. The middle line is Arctic sea ice and the bottom line is Antarctic sea ice.

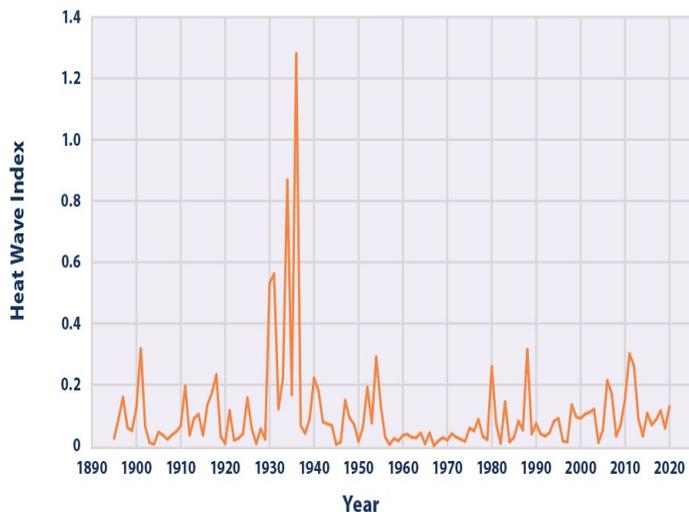
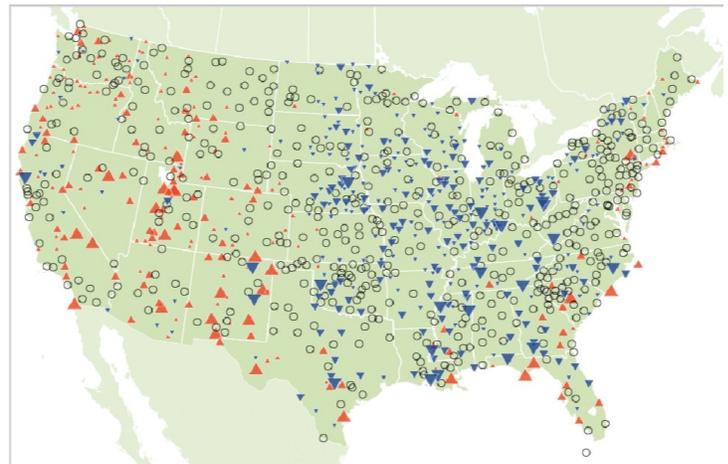
Since 1900 sea levels have risen at a slow, steady rate of between 5 and 11 inches per century, as measured by tide gauges in various port cities around the world. The rise started long before rising CO2 levels could have caused it. This rate of sea level rise has not, in general, been a problem over the last century, and there is no reason to expect significant problems if this rate of rise continues for the next century.

Global sea level from tide-gauges, extended Holgate-9, updated to December 2023



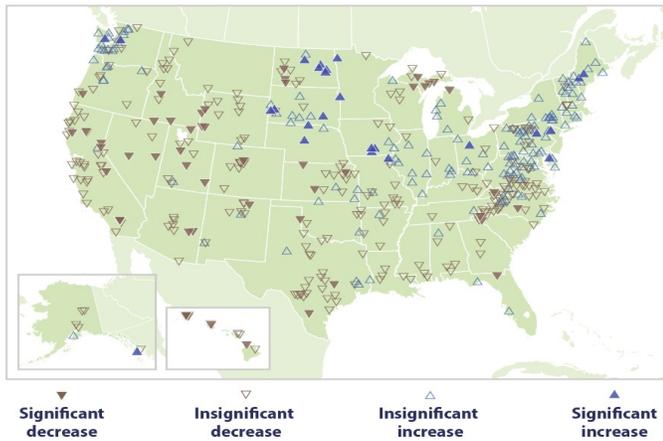
Much more of the US is experiencing a reduction in hot days than is experiencing an increase.

And most of the US is experiencing no change or a reduction in the number of days hotter than the 95th percentile. Virtually all of the areas in the US that are experiencing an increase in hot days are in the Western third of the US.



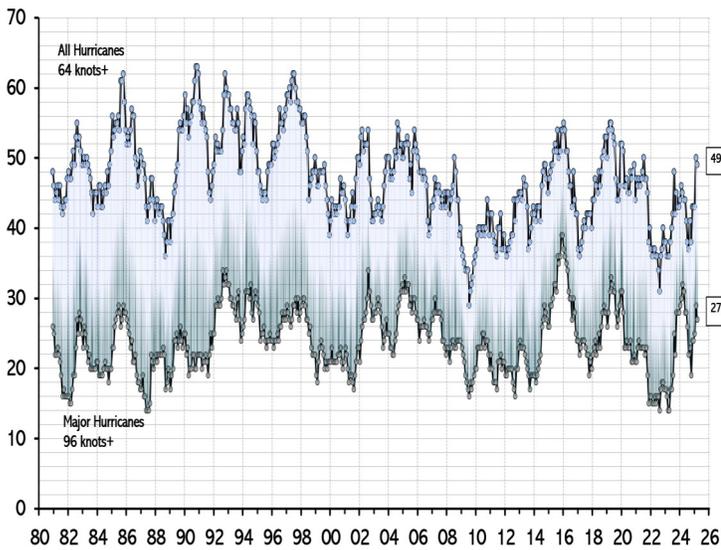
The EPA's heatwave index shows a massive spike in the 1930s (the years of the Dust Bowl in the Great Plains). Since then, the index is roughly comparable to the index prior to the 1930s.

Figure 2. Change in the Frequency of River Flooding in the United States, 1965–2015



Wildfire area burned is decreasing worldwide, although it is increasing in some areas, such as California, due primarily to forest mismanagement.

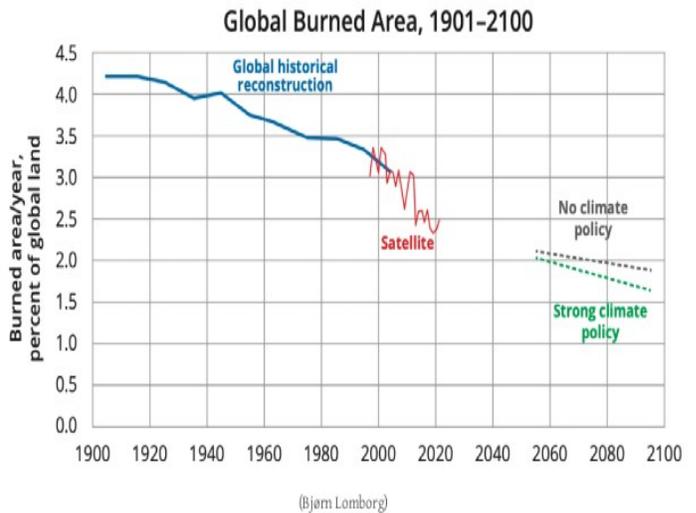
Global Major Hurricane Frequency – 12 month running sums – @RyanMaue  
Updated March 10, 2025      Last 30-years, annual: 45 H | 24 M



## THE CO2 CONTROL KNOB

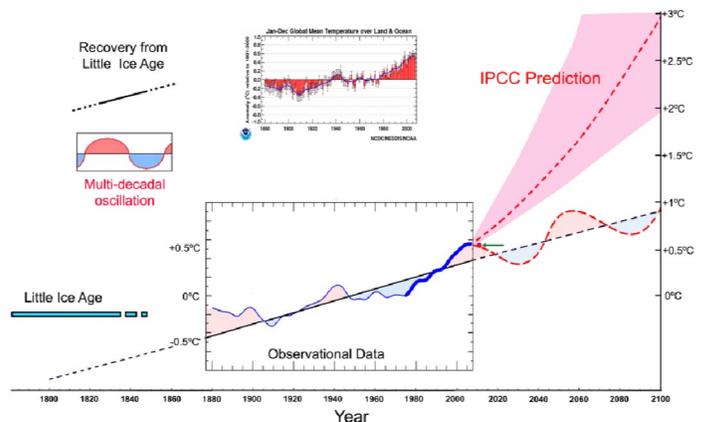
The idea of a climate crisis is based on the theory that CO<sub>2</sub> is the control knob that drives accelerating temperature rise. Immediate acceleration is necessary for temperatures to reach dangerous levels by the year 2100 or sooner, as shown in the graph. A continuation of linear temperature rise, such as the data actually shows over the last century, results only in mild warming, which is beneficial to plant and food growth. It does not result in dangerous warming.

Flooding in the US, while increasing in some areas, particularly along the Appalachian Mountains, is decreasing overall.

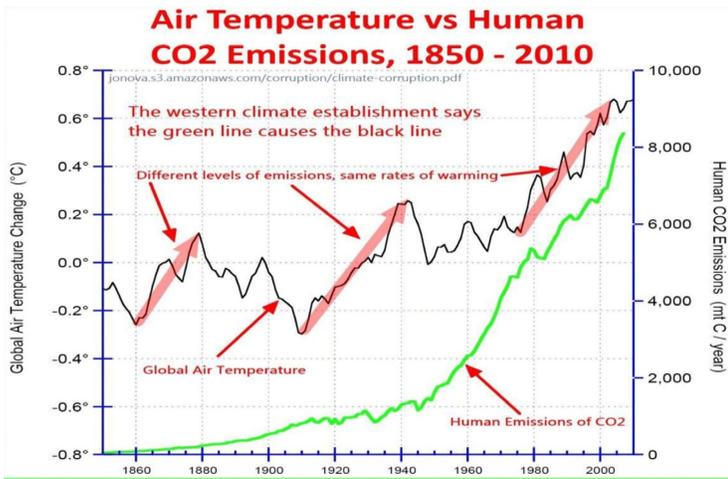


And since 1981 the frequency of major hurricanes and of total hurricanes has been virtually unchanged, or perhaps trending slightly down. Hurricanes, unfortunately, have always been with us and will continue to be with us. In 1775 a hurricane with a 20-30 foot storm surge hit Virginia and then went up the coast to Newfoundland, where it virtually destroyed the British fishing fleet. Over 4,000 people were killed.

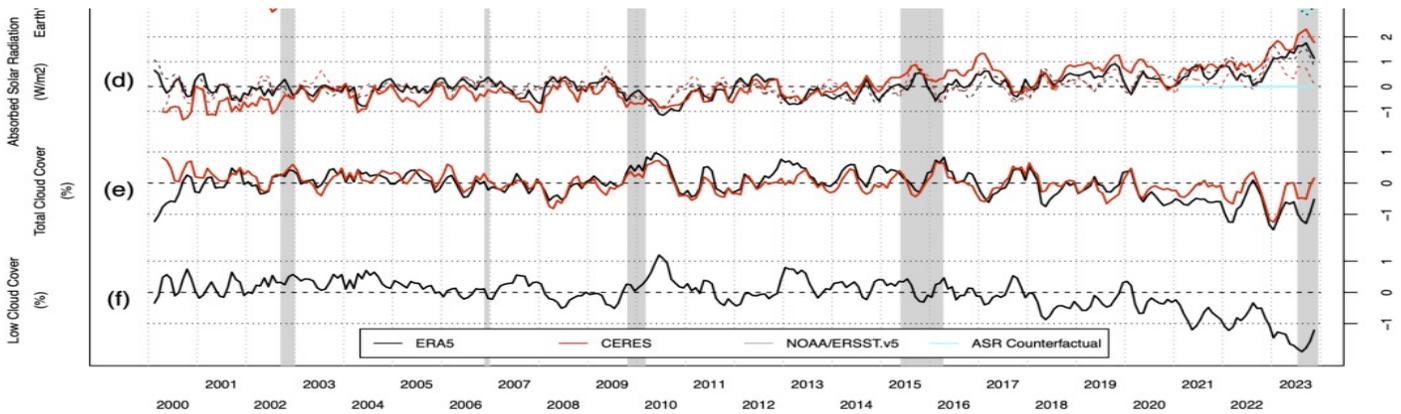
So, where is the crisis?



Earth is still recovering from the Little Ice Age, which was the coldest period of the past 10,000 years, that ended about 150 years ago.

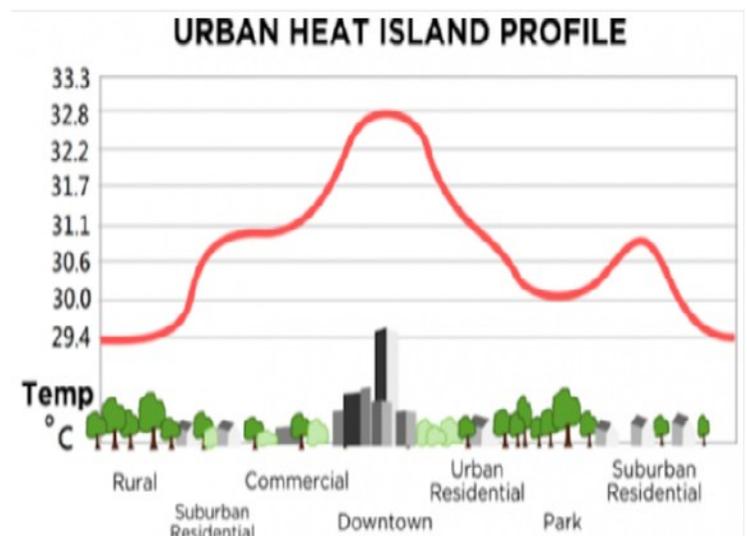


CO2 levels can not explain the warming from 1910 to 1940, nor the cooling from 1940 to 1975. While CO2 levels do correlate with temperature rise since 1975, the temperature rise has been linear with no sign of dangerous acceleration. This data refutes the accuracy of the computer models that use the CO2 Control Knob Theory. Every year that passes without an acceleration in temperature rise is further evidence that the CO2 Control Knob theory is wrong, and that CO2 is not as strong a greenhouse gas as claimed.



Modern satellite data increasingly calls into question the CO2 Control Knob Theory. In particular, such data shows that world cloud cover is decreasing. The graph covers from 2000 to 2023. The middle line is Total Cloud Cover. The lowest line is Low Cloud Cover. Declining cloud cover means that less of the solar radiation reaching the earth is reflected back into space, and this means that more solar radiation reaches the earth and warms the earth (the top line). The more world temperature rise is caused by reductions in cloud cover, the less can be caused by rising CO2 levels. This, in turn, means, that CO2 Control Knob Theory is based on false assumptions about the strength of CO2 as a greenhouse gas. The exact strength of CO2 as a greenhouse gas has never been directly measured and is much disputed.

Scientists agree that the temperatures in cities are higher than the temperatures in the surrounding countryside. This is called the urban heat island effect and can be as much as 2-3 degrees C, whereas the world has been warming at the rate a little over 1 C per century. Scientists disagree as to the significance of the heat island effect. The IPCC maintains it is minimal, but this is disputed. A recent study concluded that as much as 65% of the global warming, measured in recent years, might have been caused by the increases in world urban populations.





Google's Nuclear Move with Element1 Signals Broader Energy Shift for AI-Driven Data Centers

## NUCLEAR POWER PROGRESS

Google has signed an agreement with Element1 Power to develop three Small Modular Reactor projects. This is the latest example of tech giants moving to nuclear to supply reliable energy for their data centers. Denmark has been the “absolute champion” in Europe at building wind turbines and solar panels, but now, partially in response to the massive blackout in Spain and Portugal, it is in the process of repealing its law that phased out nuclear power and banned new nuclear construction. A recent report by the operator of the New England grid found that nuclear power can reduce emissions more cheaply than wind and solar.

Three issues have been slowing nuclear development: cost, safety, and spent fuel disposal. As discussed in the CliSciPol policy topic: Nuclear Power, modern nuclear fail-safe designs work, and fuel disposal is now readily manageable. The major problem remains the high cost, which has been driven by two factors: (1) the length of time it takes to get a project approved and built, and (2) the excessive and variable safety demands imposed by the Nuclear Regulatory Commission.



For example, in the US it takes 16 years to complete a nuclear power plant. In South Korea it takes 5 years. The difference is mostly caused by the lengthy US regulatory process. The NRC has not updated its safety requirements to take into account that modern reactor designs have substantially reduced risk, and that medical research has shown the risk from radiation exposure is much smaller than was previously assumed. On May 23, 2025, President Trump signed four executive orders to modernize and streamline nuclear regulation and to reinvigorate the US’s nuclear industrial base. In particular, the NRC is required to decide on applications for new nuclear plants within 18 months.

## WIND AND SOLAR PROBLEMS

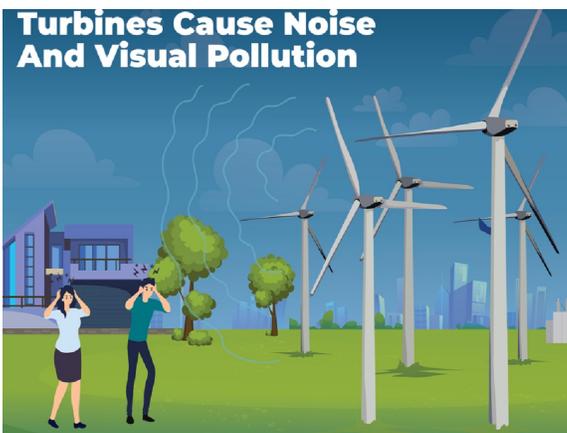
Solar panels create DC electricity. The grid operates on AC. So all power created by solar panels must be routed through a device called an inverter. For a solar farm this is a large and expensive piece of equipment. The significant costs of connecting a solar farm to a grid are commonly omitted from publications touting the low cost of solar electricity. Wind turbines create AC current, but the frequency varies with wind speed. So the electricity must first be inverted to DC, and then re-inverted to AC at the required frequency, which must precisely match the frequency of the grid.



Most inverters installed in the US are made in China and imported. In recent months US engineers have found small communication devices hidden in such inverters that can be used to switch off the inverters or change the settings, which could cause serious damage to any connected grid. The electricity stored in batteries is also DC, so large batteries, used to store electricity as grid back up, also have to use Chinese manufactured inverters in order to provide electricity to a grid.

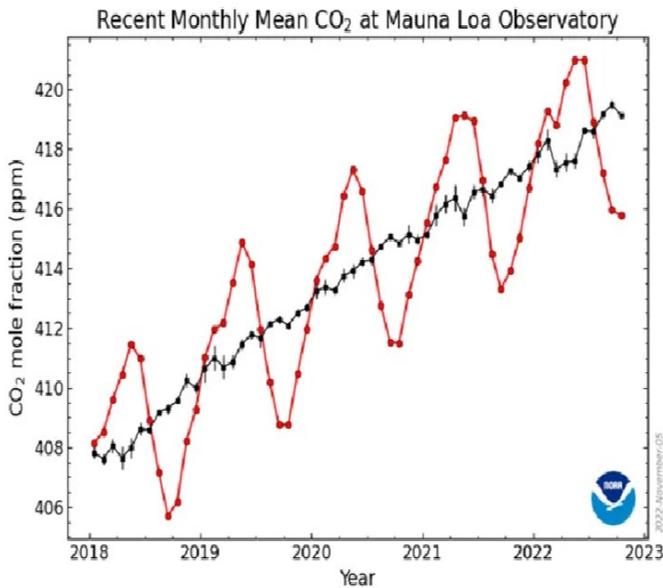
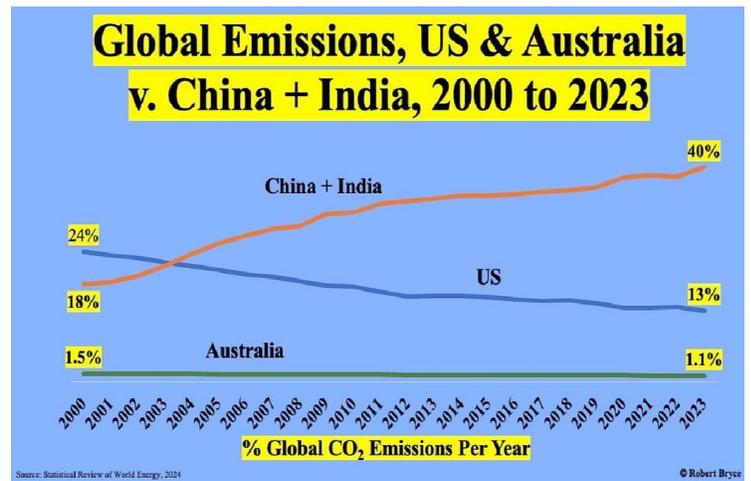


And lithium-ion batteries remain a fire hazard. On June 3, 2025, a ship en route from China to Mexico caught fire. All crew members had to be evacuated. The cargo was 3,000 vehicles including 800 EVs and hybrids. Regardless of the cause of the fire (still under investigation), the presence of the numerous lithium-ion batteries on the ship makes the fire much more dangerous and difficult to extinguish.



There has been much disagreement about the adverse health effects of wind turbine noise, which exists in both the audible and inaudible range. In general, the wind industry and environmentalists deny any significant adverse effects. But numerous studies going back over 15 years have documented adverse effects. There have been a number of judicial findings against wind companies. The High Court in Ireland after a 6-week trial in early 2025 has ordered a wind company to shut down three turbines in the Gibbet Hill wind project in County Wexford and awarded over \$400,000 in damages. One of the turbines was located over half a mile from the plaintiffs' house.

It is dubious that installing more wind and solar in the US will have a significant impact on world CO2 emissions, because so much of the increase in world emissions over the last 25 years is coming from China and India. China and India now are responsible for more than 40% of total world emissions, whereas the US contribution has fallen from 24% to only 13%. Environmentalists should spend more time protesting Chinese and Indian emissions.



Annual cycle of carbon dioxide concentrations in the atmosphere. Source: NOAA.

And reducing world CO2 emissions may not result in slowing the rate of CO2 increase in the atmosphere. During the COVID epidemic in 2020-2021 human CO2 emissions declined by 7%, but this did not slow the CO2 rise at all. The actual data since 2019 shows no effect at all of COVID on the global CO2 level. The saw tooth monthly data (the red line) results from there being about twice as much land area in the Northern Hemisphere (and hence about twice as much plant life) as in the Southern Hemisphere. During summer in the Northern Hemisphere plants eat so much CO2 that the global atmospheric CO2 level declines and then bounces back during the Northern Hemisphere winter.

