Turning the Corner

By John Benson

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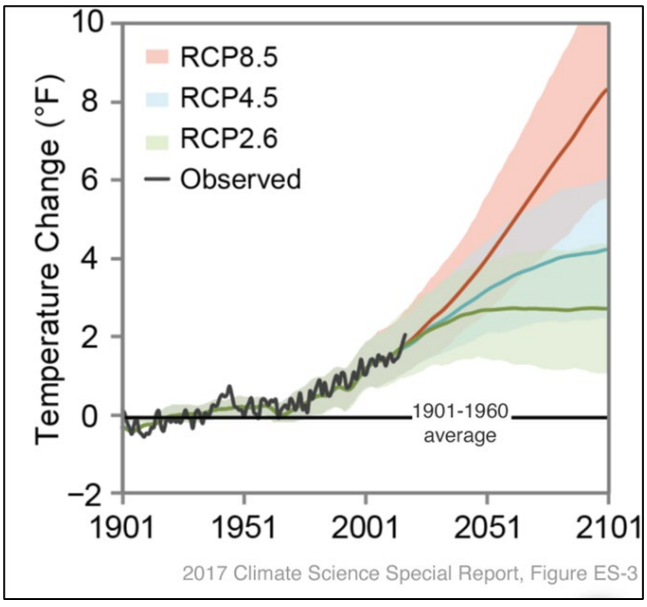
1. Introduction

I just finished a short book. I've already referenced this (at least) once in my earlier papers. The book is titled: "H Is for Hope: Climate Change from A to Z," (see Pg 3 for a full reference and a link to its Amazon page) and each "letter" has a short essay of one to three pages. It is crammed full of scientific facts. Its title is ironic because, after reading it, I felt pretty hopeless. This is because:

- It made a strong case that climate change (a.k.a. global warming) is very real.
- The effects of climate change will be ugly, indeed.
- The groups that are causing climate change have absolutely no reason to stop causing it, and every reason (read: profits) to keep it up until very close to the bitter end.
- Today, there are many powerful groups that represent those in the prior bullet.

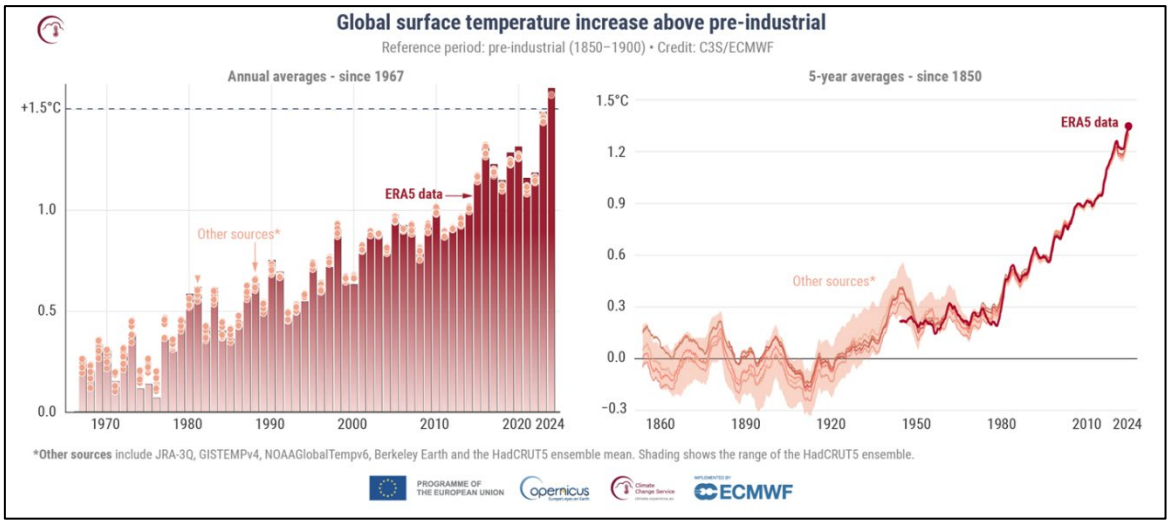
If you wonder who the groups are profiting from climate change, they are the ones saying climate change is not real, or something similar.

If you are wondering how long we have to turn this sinking ship around and head for the shallows, the chart below and the text excerpt might give you a clue. Unfortunately, these are not very current (2017), but I expect they haven't changed much because we haven't done much to mitigate climate change.



RCPs are representative concentration pathways, throughout the twenty-first century based on different possible energy policies and economic growth patterns.

The US Government had a climate peak temperature increase goal of 1.5°C, shorthand for global average surface warming of 1.5 degrees Celsius above pre-industrial temperatures. That's the level of warming that the countries who signed the Paris Agreement have agreed to try to stay below. Unfortunately, our current chief executive (I forget his name) withdrew us from these accords. Also, if you look at the charts, above and below, we may have already exceeded the 1.5°C mark, depending on the specific metric.[1]



Your author is lucky to live in a relatively cool area (the SF Bay Area). It is fairly cool, even in the warmest time of the year. This is because (1) we are adjacent to the Pacific Ocean, (2) the cool California Current comes down off-shore from British Columbia and Alaska, and (3) the prevailing winds are from the west (and the cool Pacific Ocean).

Areas further inland will feel the full-brunt of the increase in heat during the hottest time of the hear. Even though it's a "dry heat," the warmest areas are already approaching the limit of human endurance. For instance:

- Las Vegas, NV: Average high temperatures in July are around 103.8°F.
- Phoenix, AZ: Average high temperatures in July are around 104.5°F.

If you add a few degrees to these, it becomes completely impossible to work in a profession where mid-day outdoor-work is required, and I expect that many such workers already take extended mid-day breaks. The only slightly good news here is that, with the low humidity, the nightly temperature drops into the high 70s.

The story may be even worse in areas like the Gulf Coastal States where the heat is accompanied by high humidity, not only are the daytime temperatures brutal, the nightly temperatures don't drop that much.

[1] Charts on this page from Copernicus (European Union's Earth Observation Program), "2024 is the first year to exceed 1.5°C above pre-industrial level," European Centre for Medium-Range Weather Forecasts (ECMWF), Accreditation: This year the following organizations involved in global climate monitoring – ECMWF, NASA, NOAA, the UK Met Office, Berkeley Earth and the World Meteorological Organization (WMO), https://climate.copernicus.eu/copernicus-2024-first-year-exceed-15degc-above-pre-industrial-level

For instance, where I lived in Houston, TX before joining the Army in the late 1960s.

In 2025, the typical peak summer temperatures in Houston, TX are expected to be around 95°F (35°C), with daily high temperatures ranging from 89°F to 93°F. The corresponding humidity levels are likely to be around 77%, with the highest humidity occurring in September.[2]

The only good news is that the temperature also drops into the high 70s at night, but the humidity is also still very high then. Air conditioning is pretty-much required currently in all of the above locations, and will be even more of a prerequisite in future years with increasing temperatures due to global warming.

2. Long-Term Fix for Global Warming

I started this paper with a reference to a book that I just finished – I will insert a complete reference to that book here.[3] As I said in the Intro, I'm uncomfortable with the negative feeling it gave me. Yes, climate change is bad for civilization, and current political leaders (in the US) are not taking it seriously, but there is still reason for hope.

Based on the public opinion of the current administration there is reason to hope that the 2026 mid-term (congressional) election will be a "Saturday Night Massacre" for this administration, with Democrats taking control of at least one or (hopefully) both houses of Congress. At that point Congress will hopefully lock-down the administration's attempt to ignore climate change.

Also causing optimism, we have several major tools in our bag currently. See my earlier posts summarized and linked and other information below.

Renewable power:

Renewable Energy Expansion Exceeding all Estimates (2023): I have noted the rapid acceleration in the development of renewable energy at every level: state, U.S. and North American, but since I rarely focus on the international market, I wasn't aware of the global trends that this article covers.

Global decarbonization will require a massive build-out of wind and solar farms. But can developers find enough land, secure the supply chain, and recruit workers while maintaining profitability?

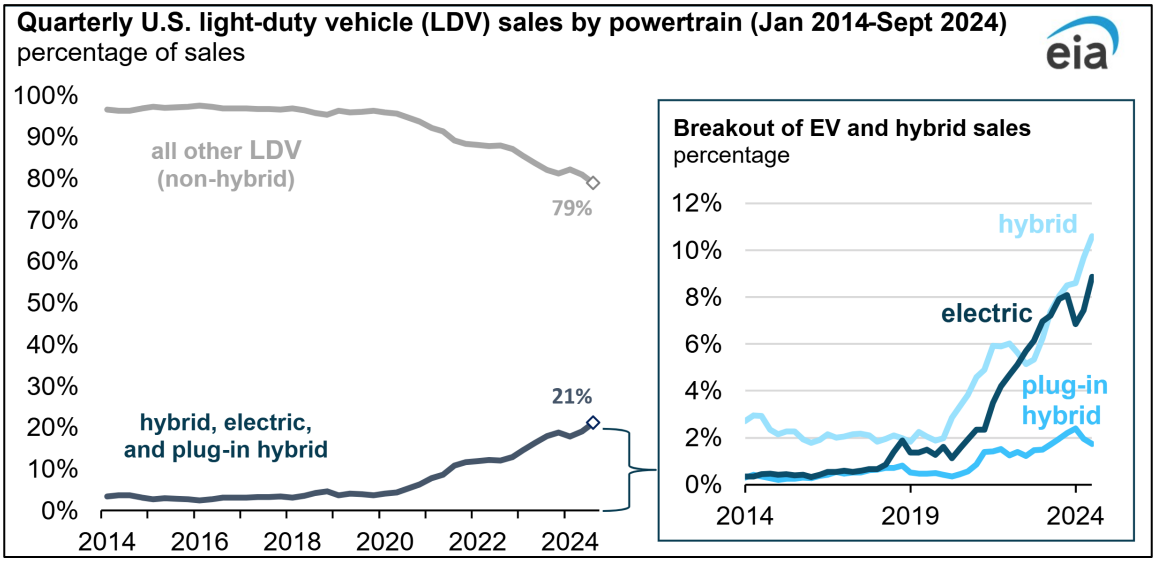
This paper presents evidence that the developers can meet these challenges.

https://energycentral.com/c/cp/renewable-energy-expansion-exceeding-all-estimates

[2] Weather Spark, https://weatherspark.com/s/9247/1/Average-Summer-Weather-in-Houston-Texas-United-States
[3] Elizabeth Kolbert, Book: H Is for Hope: Climate Change from A to Z, Ten Speed Press, ©2023 Elizabeth Kolbert, https://www.amazon.com/H-Hope-Climate-Change-Z-ebook/dp/B0CFJBR9QS

Strong EV Growth:

I have not covered this subject recently with my posts, so a grabbed a couple of charts from eia (U.S. Energy Information Administration). These are below.



Direct Air Capture of Carbon Dioxide (December 2024):

Since the 2000s global emissions have continued to rise and Earth has gotten hotter. Scientists increasingly recognize that limiting warming to the Paris Climate Agreement goal of 1.5 degrees Celsius or even 2°C above preindustrial temperatures will require more than drastically cutting emissions—it will involve pulling hundreds of billions of tons of carbon dioxide out of the atmosphere this century. The most obvious way is planting trees. But even a trillion trees would not be nearly enough, and trees can burn or die of disease, emitting the carbon they've stored. In the 2000s the world wasn't ready for direct air-capture (DAC), but now we are too late to do without it.

https://energycentral.com/c/ec/direct-air-capture-carbon-dioxide

Atmospheric carbon sequestration via burial of woody biomass (November 2024):
*A recent discovery may give us a short-cut to isolate biomass (*containing carbon from CO_2 it absorbed from the biosphere*) for a very long time without extensive processing.*

Limiting climate change requires achieving net-zero carbon dioxide emissions. Although substantial reduction in fossil fuel emissions is essential, it is insufficient for achieving the international goal of restricting global warming to 1.5° or 2°C above preindustrial levels. Achieving net-zero necessitates approaches that remove carbon dioxide from the atmosphere, known as carbon dioxide removal (CDR).

Engineering CDR methods, such as direct air capture, are expensive and energy-intensive. Nature-based CDR, such as reforestation and afforestation, are cheaper but face land-use competition, scalability, and carbon leakage risks.

Forests are central to climate change discussions because of their critical role as a dominant land carbon sink in natural carbon cycles. They sequester carbon from the atmosphere through photosynthesis. This carbon is stored in wood with ~50% carbon content that varies by species. The carbon is released back to the atmosphere through burning (forest fires or prescribed burning for fire risk management) or decomposition of woody biomass.

This paper describes a pathway to making deadwood carbon storage a reality. The authors present a CDR approach involving the burial of sustainably sourced wood in an underground engineered structure called a "wood vault" to prevent wood decomposition.

https://www.energycentral.com/energy-biz/post/long-term-sequestration-woody-biomass-yPb5ZNlzSOEeUtz