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GLOBAL WARMING: HAS COMPLACENCY (FINALLY)YIELDED TO PANIC?

An NPG Forum Paper
by Edwin S. Rubenstein

The summer of 2018 was a moment when the ecological future became our present reality. A heatwave baked the entire Northern Hemisphere, killing dozens from Quebec to Japan. In Europe, nuclear power plants shut down because river water that cools their reactors was too warm. The most destructive wildfires in California's history turned more than a million acres to ash, while a study in the journal PLOS Medicine projected a five-fold rise in heat-related deaths in the U.S. by 2080.[1]

In October the United Nations released what came to be known as the **"Doomsday report,"** described by one U.N. official as **"a deafening, piercing smoke alarm going off in the kitchen,"** – detailing climate effects of 1.5 to two degrees Celsius on global warming. **"If we don't take action,"** a BBC environmental consultant warned, **"the collapse of our civilizations and the extinction of much of the natural world is on the horizon."**[2]

Climate scientists have felt this way for decades, but they rarely talk about it. Why are they so cool with global warming? Other emergencies have elicited immediate outcries from professionals in those fields:

- Public health experts had no problem screaming about the cancer risk posed by cigarettes after the Surgeon General's 1964 report confirmed the relationship. The result: cancer rates fell as Americans kicked the habit in record numbers.
- Rachel Carson's 1962 book *Silent Spring* alerted the public to the harm done to wildlife by the pesticide DDT, and the role of the chemical industry in spreading false assurances of safety. The result: in 1972 EPA banned DDT.
- The partial meltdown at the Three Mile Island nuclear power plant in 1979 was the most serious accident in the U.S. nuclear power industry. Although little radiation escaped, public confidence was shaken to near-panic levels. The result: the construction of new nuclear power plants in the U.S. was halted for 30 years.

Nearly everything we know about global warming today was known in 1979.[3] By that year data confirmed what had long been suspected: Human beings have altered the Earth's atmosphere through the indiscriminate burning of fossil fuels. As the 1980s began the scientific consensus grew – but for nearly a decade climate scientists were reluctant to sound the alarm.

Finally, nearly a decade later, one did.

On June 23,1988 James E. Hansen, director of the NASA Goddard Institute for Space Studies, became the first professional to present evidence implicating human activity in global warming. In Senate testimony he said: **"The signal has emerged…"** that the warming trend is not a natural variation but can be attributed to carbon dioxide emissions **"with 99 percent confidence."** Interviewed after the hearing, Dr. Hansen added, **"It is time to stop waffling so much and say that the evidence is pretty strong that the greenhouse effect is here."**[4]

Hansen's testimony went viral – or whatever the comparable term was in those pre-internet days – prompting headlines in dozens of newspapers, including *The New York Times*, which splashed a headline over the top of its front page announcing **"Global Warming Has Begun, Expert Tells Senate."**

Four days later, at the World Conference on the Changing Atmosphere – an event one reporter described as "Woodstock for climate change" – 300 scientists joined Hansen to sign a resolution stating that atmospheric changes from human activity **"represent a major threat to international security**

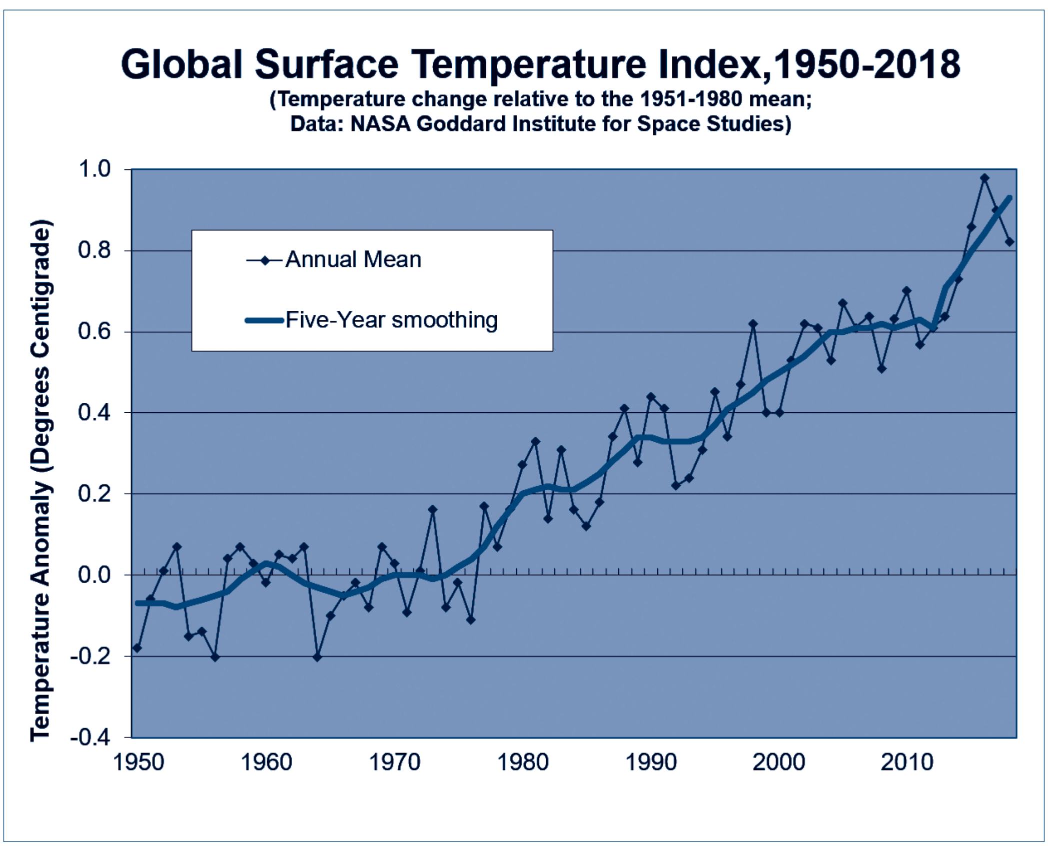
and are already having harmful consequences over many parts of the globe," and declared that by 2005 the world should push its emissions some 20% below the 1988 level. [5]

Thirty years ago we could have saved the planet – and it briefly looked like we would. Optimism ran high when, eighteen months after Hansen's speech, a global summit to discuss the framework of an emissions treaty was held in the Netherlands. After coming within a few signatures of endorsing a binding global agreement, the world's major powers dithered.[6]

The U.S. delegate, **"…at the urging of** [President George H. W. Bush's Chief of Staff] **John Sununu, and with the acquiescence of Britain, Japan, and the Soviet Union, had forced the conference to abandon the commitment to freeze emissions."**[7] Sununu, and the White House science advisor he personally installed, decided that the climate models promoted by James Hansen were **"technical poppycock"** that didn't begin to justify pronouncements that the greenhouse effect is here, let alone justify changes in national economic policy.[8]

And with that a decade of slow, exhausting progress turned to thin air.

The result:



Eighteen of the 19 warmest years have occurred since 2001, the sole exception being 1998. The year 2016 ranks as the warmest on record.[9] The solid line uses a statistical technique known as Five-Year smoothing to isolate the long-term trend from year-to-year anomalies. It hit at an all-time high in 2018.

The environmental calamities of 2018 grabbed our attention. By January 2019 more than seven out of ten Americans said that global warming was "personally important" to them, according to a January 2019 poll from Yale and George Mason University, an increase of nine points from March 2018. More Americans than ever – 29 percent – also say they are "very worried" about climate change. These changes are unprecedented**. "We've not seen anything like that in the ten years we've been conducting the study,"** says the senior research scientist at Yale who helped oversee the poll.[10]

But how much are Americans actually willing to do to help save the planet? Many economists support a carbon tax that would make polluters pay for emitting greenhouse gases into the atmosphere. Less than half of Americans support such a tax, and even those who do are not willing to spend much. Seventy percent say they would vote against a $10 monthly fee tacked onto their utility bills; Forty percent would oppose even a $1 per month increase, according to a new *AP* survey.[11]

Would Americans support population decline as a part of the government's climate change agenda? Alas, the question did not make the cut. As far as we know, there is no recent polling data on our issue.

Americans fight this mega problem in minor ways. We recycle. We put solar panels atop our houses. Eat vegan instead of paleo. Junk the clunker in favor of a hybrid. Request paper instead of plastic at the checkout counter. Etc., etc.

While these personal changes make us feel good, they are not enough to move the CO_2 needle significantly. For that, we need scale. Buying a hybrid is a drop in the bucket compared to raising fuel efficiency standards sharply. And if I eat fewer hamburgers this year, so what? But if cattle farmers were required to feed their cows seaweed, which one study shows would reduce methane emissions by nearly 60%, that would make an enormous difference.[12]

Only government can do those things.

There is one lifestyle choice that reduces emissions on a scale attainable by government action: having one less child:

Emissions Reductions From Various Individual Actions in Developed Countries (tons of CO_2 equivalents per year)	
Have one fewer child	58.6
Live car free	2.4
Avoid one roundtrip transatlantic flight	1.6
Buy green energy	1.5
Switch to an electric car	1.2
Eat a plant-based diet	0.8
Replace typical car with hybrid	0.5
Wash clothes in cold water	0.3
Hang clothes to dry	0.2
Recycle	0.2
Upgrade lightbulbs	0.1

Data: Seth Wynes, *The Climate Mitigation Gap,* July 2017. https://iopscience.iop.org/article/10.1088/1748-9326/aa7541

Wynes relied on a study that allocated half the child's emissions to each parent, one-quarter to the child's offspring (the grandchildren), and so-forth. The summed emissions of all descendants, weighted by their relatedness to the parent, far exceeds the lifetime emissions produced by the original parent. In the U.S., for example, each child adds about 9,441 metric tons of CO_2 to an average mother, which is 5.7-times her lifetime emissions.[13]

As far as reducing atmospheric CO_2 is concerned, having one less child is a gift that keeps on giving.

The 2015 Paris Agreement set a goal of zero net emissions – offsetting new emissions from human activity by increasing the CO_2 removed by natural sinks – in the second half of this century. If achieved, global warming would be constrained to less than 2 degrees C above pre-industrial levels. An ambitious goal, and yet the best personal way of achieving the target – having one fewer child – was not even considered.

While John Sununu is no longer around to sabotage international climate agreements, Donald Trump is. In 2017 the President pulled the U.S. out of the Paris Agreement, explaining that **"The Paris accord will undermine (the U.S.) economy,"** and **"puts (the U.S.) at a permanent disadvantage."**[14]

In 2018 Representative Alexandria Ocasio-Cortez co-authored the Green New Deal, a laundry list that ignores the climate cleansing potential of having fewer children. Ms. Cortez remains a staunch supporter of higher immigration to the U.S., a policy we have shown increases global CO_2 emissions.[15]

POPULATION GROWTH AND CLIMATE CHANGE

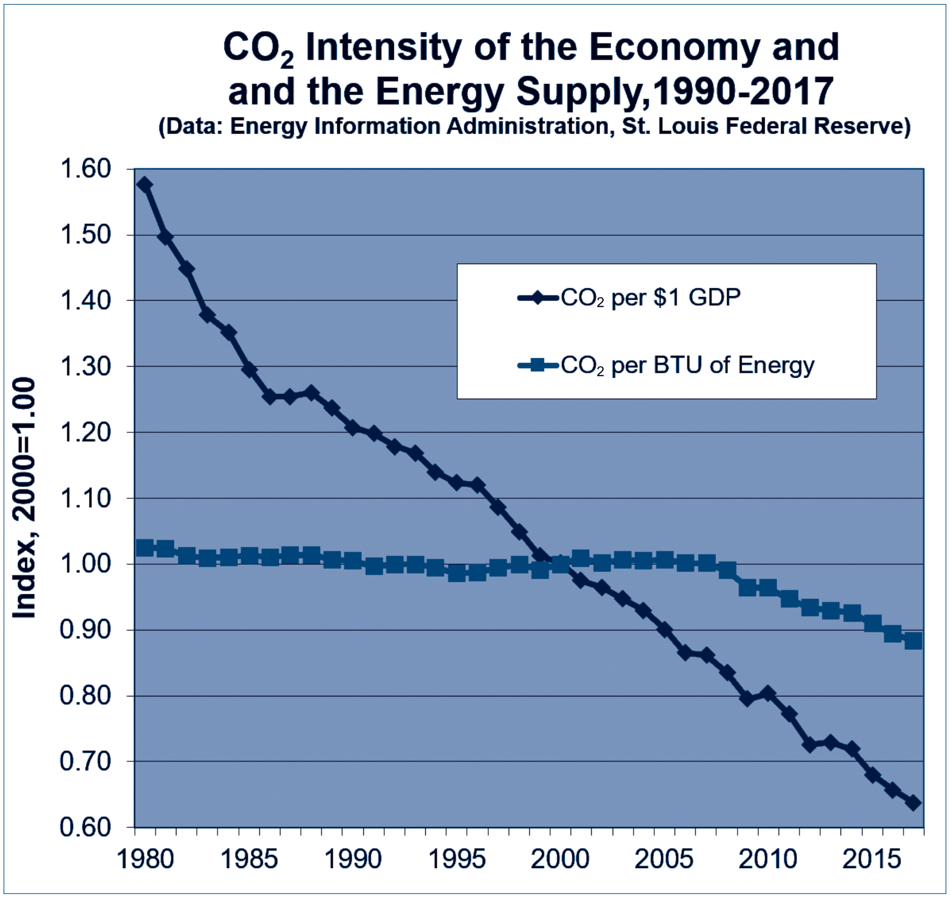
Some environmentalists still argue that Americans need focus only on increasing energy efficiency and reducing consumption in order to forestall environmental destruction. They are right to push for less consumption and increased energy efficiency, but wrong to assume such efforts can replace population control. A growing population can overwhelm improvements in energy efficiency and CO_2 abatement. Indeed, we have seen this over the past few decades as reductions in energy use per capita and per dollar of GDP have failed to offset the increased numbers of "capitas" and dollars of GDP. Energy use and CO_2 emissions have risen steadily.

Ecologists use a formula to measure the impact of human activity on the environment: **I=P x A x T**. In this formulation I, total environmental impact, is a function of three factors: P=total population, mediated by A, Affluence, as measured by GDP per capita, and T, the technology used to produce the goods and services in GDP.

In the particular case of CO_2 emissions, this version of the IPAT equation has been suggested:[16]

CO_2 emissions=population x (GDP/population) x (CO_2 per \$1 of GDP) x (CO_2 per unit of energy.)

The equation tells us that while population is important, it is by no means the only factor driving emissions. Economic growth, as measured by GDP per capita, also matters. The more affluent we become, the more "stuff" we buy. And that stuff is produced mainly by processes that involve the burning of fossil fuels. Other things equal, a rapidly growing economy will generate more CO_2 and other greenhouse gases than a slowing or shrinking economy.



Eco-optimists see salvation in the last 2 terms of the equation – the ones that comprise the T, or technology, component. Both have declined since 1980, signaling that we have become less profligate in generating CO_2 emissions to drive our economy and our energy supply:

From 1980 to 2017 CO_2 emissions fell relative to GDP (per $1 of GDP) by a whopping 60%. The key word here is **"relative."** Had GDP remained at its 1990 level, CO_2 emissions would have dropped by that same 60%. That didn't happen: GDP rose 167% from 1990 to 2017, undoing any benefit from the *relative* reduction in CO_2 dependency. Total U.S. CO_2 emissions rose 8% from 1990 to 2017.

By comparison, the fall in CO_2 per unit of energy was fairly modest, down about 14% since 1980. The main factors include substitution of natural gas for coal in electricity generation, the increased use of renewable energy, and improved emissions control systems in U.S. automobiles. As with GDP, the benefits of lower *relative* CO_2energy intensity were wiped out by increased energy usage. BTUs of energy rose 25.3% from 1980 to 2017.

The same trends play out globally. CO_2 emissions per $1 of world GDP fell 41% between 1980 and 2014, according to World Bank data, while CO_2 emissions rose by 87% over that time. Once again economic growth overwhelmed increases in efficiency.

THE DECOUPLING FANTASY

This goal of severing the link between economic growth and CO_2 emissions is called "decoupling." Eco-optimists claim that a combination of factors – including the transformation of the U.S. economy from manufacturing to services, increased efficiency in the use of fossil fuels, and clean energy alternatives, can make this happen. The internet is another energy saver. One truck transporting goods from a central warehouse to 100 homes uses far less gasoline than 100 private vehicles making round trips to brick and mortar stores.

Since 1980 most national economies have become more efficient in the use of fossil fuels. Improved technology has enabled CO_2 emissions to fall relative to GDP. It was a time of r*elative* decoupling.

Mesmerized by this trend, eco-optimists assume we can reach a point of *absolute* decoupling, when global GDP will grow while global CO_2 emissions fall. In this scenario technology saves the day, and the climate change problem is solved.

Evidence, please? There is none. A 2016 review of the decoupling literature by a panel of environmental scientists finds:

"…While relative decoupling has been observed in multiple countries, absolute decoupling remains elusive [32–34]. According to one study [35] no country has achieved absolute decoupling **during the past 50 years. Another study [36] reports that population growth and increases in affluence are overwhelming efficiency improvements at the global scale. They find no evidence for absolute reductions in environmental impacts, and little evidence to date even for significant relative decoupling."**[17]

Even as a theoretical possibility, absolute decoupling does not fly:

"Our model demonstrates that growth in GDP ultimately cannot plausibly be decoupled from growth in material and energy use, demonstrating categorically that GDP growth cannot be sustained indefinitely. It is therefore misleading to develop growth-oriented policy around the expectation that decoupling is possible."[18]

We live in a finite world. There is only so much oil and coal in the ground. When those fossil fuels are used in manufacturing they are transformed to CO_2. The process is irreversible: no technology can convert CO_2 back to fuel. The laws of thermodynamics do not permit it.

Herman Daly, the world's foremost proponent of a steady-state economy, explains:

"Entropy is the basic physical coordinate of scarcity. Were it not for entropy, we could burn the same gallon of gasoline over and over, and our capital stock would never wear out. Technology is unable to rise above the basic laws of physics, so there is no question of ever 'inventing' a way to recycle energy."[19]

The implication: no economy dependent on fossil fuels is sustainable in the long run.

The more immediate question is whether Earth's climate can cope with current levels of CO_2. Cornucopians believe that technology and human ingenuity can solve any problem associated with population and economic growth. They note that population and GDP have historically moved in tandem, and can continue to do so indefinitely. Daly calls this belief **"growthomania,"** which he finds pervasive in modern society.

While growth ideology is addictive, Daly counters that **"…there *is* such a thing as absolute scarcity, and there is such a thing as purely relative and trivial wants." "Once it is recognized that scarcity is imposed by nature in an absolute form by the laws of thermodynamics and the finitude of earth; and that some human wants are only relative and not worthy of satisfying; then we are all well on the way to the paradigm of a steady-state economy."**[20]

Herman Daly is the skunk at the cornucopian garden party.

While he waxes theoretical, he does not shy away from practical proposals. The best way to promote decoupling, in his view, is to impose quantitative restrictions on resource use by establishing a cap and trade system of quotas. Daly himself acknowledges limitations on how much efficiency can be squeezed from his proposal. He dismisses the idea of absolute decoupling.

Population reduction is conspicuously absent among Daly's proposals. We see no explicit reference to it. At best he would **"…stabilize the population by issuing transferable reproduction licenses to all fertile women at a level corresponding with the general replacement fertility in society."**[21] In this way he makes the same mistake as the eco-optimists, while ignoring Donald Mann's sage advice:

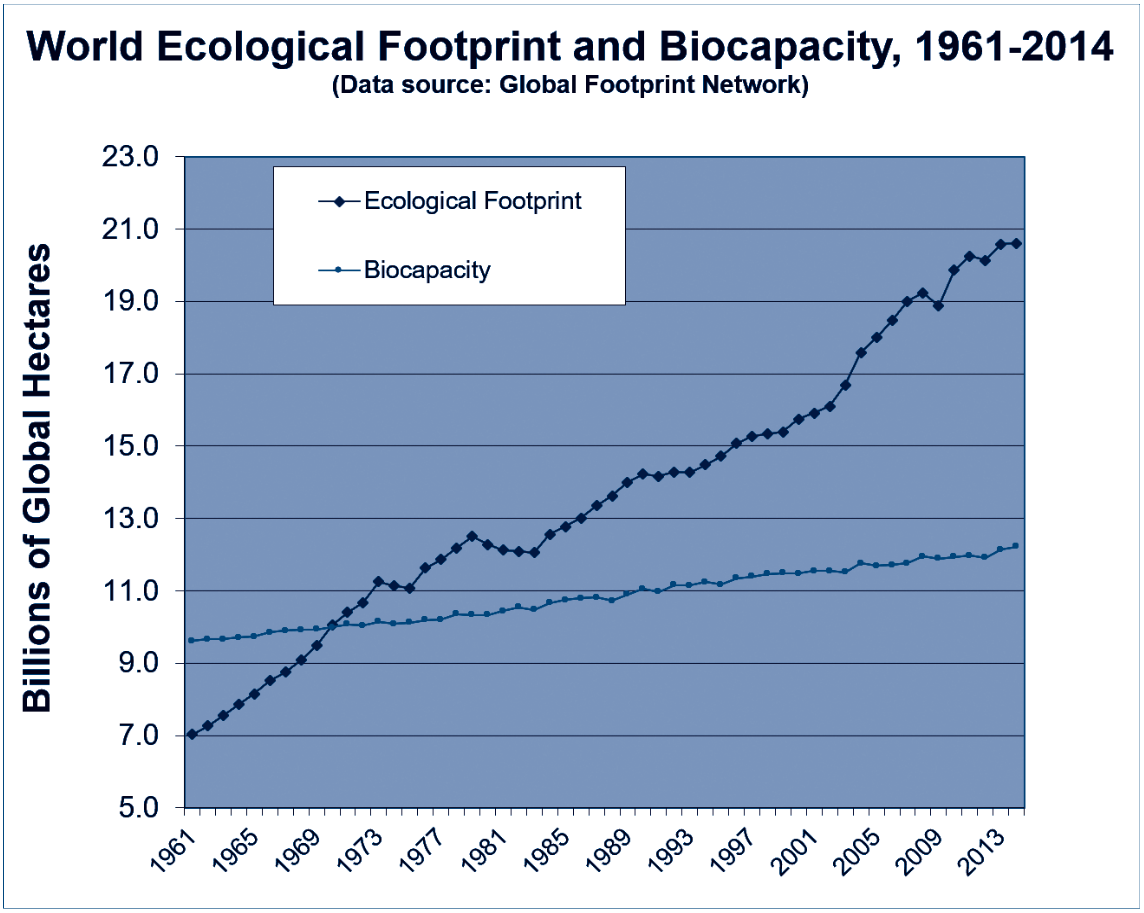
> "Our present goal seems to be to provide an ever rising standard of living for ever increasing numbers, but that must be seen for what it is: an impossible dream. The great lesson of the industrial revolution is that vast numbers of people are simply incompatible with an industrial society.
>
> "Further population growth on the gigantic scale now projected is not inevitable. With the will, we could start now on the path toward a sustainable global economy by first reducing, then stabilizing world population in the range of 1.5 to 2 billion. The negative rate of population growth we need in order to do so depends on our achieving levels of fertility substantially below replacement level in all the countries in the world. Almost all the developed countries have already reached that level." [22]

THE ECOLOGICAL FOOTPRINT

Another way of quantifying the biosphere's ability to cope with CO_2 emissions is the Ecological Footprint.

Ecological Footprint measures the demands humans place on nature in a given year. Demand is expressed as the acreage of productive land required to meet our needs, including food, timber, infrastructure, and the removal of carbon from the atmosphere (CO_2 sinks.). Currently carbon emissions make up 60% of humanity's Ecological Footprint. The footprint is a good proxy for the land area needed for carbon sinks.

The ability of nature to restore land depleted by human consumption is called Biocapacity. It also is expressed in terms of land area, reflecting the dependence of the restoration process on photosynthesis.



As seen in the graphic, prior to about 1970 human consumption was smaller than the Earth's natural ability to renew. We were living within our ecological means. Thanks to technological change and land management practices, biocapacity has increased about 27% in the past 50 years. But it has not nearly kept pace with human consumption: the Ecological Footprint has increased about 190% over the same period.

In 2014 (latest available data) the world Ecological Footprint covered 20.6 billion hectares, an area 1.7-times the 12.2 billion hectare biocapacity. In other words, humans are depleting nature 1.7 times faster than ecosystems can regenerate.

Earth Overshoot Day marks the day that humanity's annual demands on nature exceed the ability of nature to regenerate. In 2018 Overshoot Day fell on August 1st, the earliest since the Earth went on overshoot in the early 1970s.[23]

We can reverse the trend, but it will take time. Replacing meat consumption with a vegetarian diet will move Overshoot Day back by only five days. We would need to replicate that success in other ways for 30 years to push the global footprint down to biocapacity.[24]

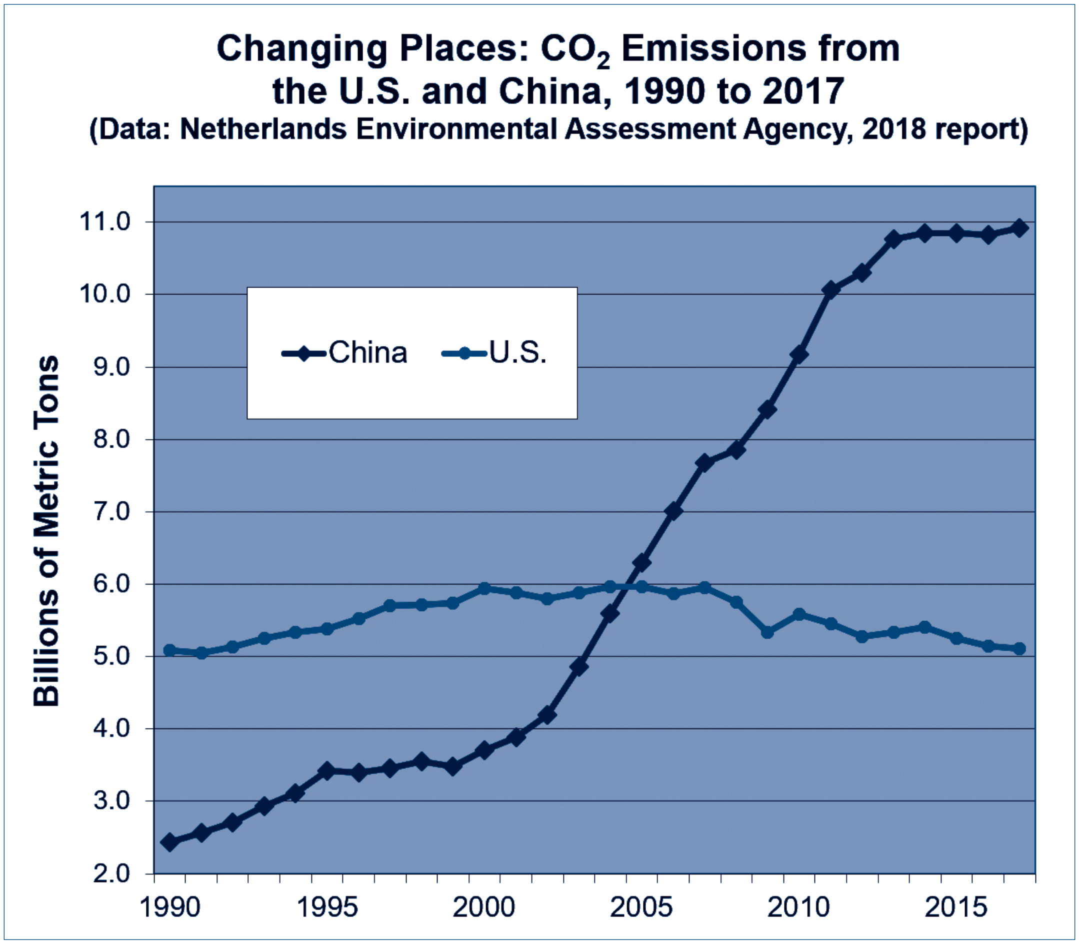
One way or another, future generations will pay for the profligate ways of the past generations. The big question is: how will this retrenchment happen. Will humans control the process, or will they be controlled by starvation, natural disasters, oppressive heat, and the breakdown of societal norms.

The jury is still out.

WILL CHINA RUIN IT?

In 1990, China was a largely rural country on the cusp of an historic economic transformation. That year its aggregate CO_2 emissions were less than half of ours; on a per capita basis, they emitted less than one-tenth as much. In 2005 China's emissions first exceeded our own, and by 2017 (latest available data), China emitted more than twice as much. China now generates almost as much CO_2 as the U.S. and Europe combined.

Economic growth explains most of the widening gap. From 1990 to 2017 China's real GDP increased by a whopping 1,397% – a 12-fold increase – while ours grew a comparatively modest 91%. This is not surprising: China is still relatively poor, playing catch-up with the world's wealthiest.



To its credit, by limiting coal use China has made progress in decarbonizing its economy. In fact, CO_2 per $1 of GDP declined more rapidly in China than in the U.S. over this period. But they started from a much higher level, so in 2017 their economy emitted four times more CO_2 per $1 of GDP than ours did.

There is a popular notion that U.S. emissions have decreased only because domestic companies have offshored their highly polluting operations to China for export back to the U.S. This assumption does not fit the facts. When measuring CO_2 emitted to make the goods actually consumed in both countries, the basic trend between the two nations looks much the same.[25] The Chinese people have become consumers. The "Chinese dream" may not be as costly as the "American dream," but it is as widely aspired to there as ours is here.

The birth of a consumer culture means that China's population is as important as its GDP in determining the future course of world emissions. For decades China's one child policy constrained population growth – too well, as it turns out. Today Chinese government officials believe the country's fertility rate is well below replacement. One recent government study estimated that China's labor force could shrink by 100 million people from 2020 to 2035, and by another 100 million from 2035 to 2050.[26]

Three years ago the one-child limit was replaced by a two-child limit. Still no baby boom. Pro-natalist tax incentives, restrictions on abortions, increased maternity leave, and finally, in one province in central China, the lifting of all numerical limits on children, ensued.[27]

So far Chinese millennials, like those in the U.S., are putting careers ahead of kids. But if pro-birth policies start to work, China could drive global emissions to the point of no return.

CONCLUSION

Evidence that economic growth is driving CO_2 emissions is overwhelming. While technological efficiencies have reduced global CO_2 emissions per unit of GDP, a growing world economy has overwhelmed those advances. CO_2 emissions continue to rise. When presented with a choice between reducing greenhouse gas and increasing economic growth, politicians worldwide opt for the latter.

For years politicians have managed national environmental policies the way Bernie Madoff managed his investment company. As a Ponzi scheme, relying on future generations to maintain the illusion of viability. In the short run, this may be a smart political move. We are in a time when an increasing share of private citizens discount any scientific evidence that conflicts with their own ideas.

Like all such schemes, the scam will eventually implode. Will it be a soft landing controlled by humans? Or will we be controlled by starvation, natural disasters, oppressive heat, and the breakdown of societal norms?

Stay tuned.

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Edwin S. Rubenstein, president of ESR Research, is an experienced business researcher, financial analyst, and economics journalist. He has written extensively on federal tax policy, government waste, the Reagan legacy, and – most recently – on immigration. He is the author of two books: *The Right Data* (1994) and *From the Empire State to the Vampire State: New York in a Downward Transition* (with Herbert London). His essays on public policy have appeared in *The Wall Street Journal*, *The New York Times*, *Harvard Business Review*, *Investor's Business Daily*, *Newsday*, and *National Review*. His TV appearances include Firing Line, Bill Moyers, McNeil-Lehr, CNBC, and Debates-Debates. Mr. Rubenstein has a B.A. from Johns Hopkins and a graduate degree in economics from Columbia University.

Negative Population Growth

Negative Population Growth, Inc.
2861 Duke Street, Suite 36
Alexandria, VA 22314

Phone: (703) 370-9510
Fax: (703) 370-9514
Email: npg@npg.org