

2.16.2023 SHOW NOTES:

Billy Joel Needs to Add Chinese Alien Balloons, Train Wrecks, Food, Energy and Water Shortages, Chinese Pay-Offs and Fake Green (\$\$\$) Agendas to 'The Fire'

(All material is used for educational purposes only)

NOTE: I have tried to make sure that none of the stories in this collection are duplicates, but I am allowing for the possibility that I may have missed cross-over referencing.

FURTHERMORE: Many of the articles I have posted here have video links imbedded in them that did not copy over to this page. You might want to reference the original sources for further investigation.

THE EPOCH TIMES

Audio of US Fighter Pilot Who Shot Down Chinese Spy Balloon Reveals Lake Huron Strategy

By [Andrew Thornebrooke](#) February 15, 2023

Audio recordings of radio chatter taken during the United States' shoot down of a Chinese spy balloon earlier this month may provide insights into how the military later shot down an unidentified object over Lake Huron.

In over 20 minutes of radio chatter, U.S. pilots and ground teams can be heard discussing their approach and shoot down of the Chinese spy balloon off the coast of South Carolina.

The audio was captured by aviation radio enthusiast Ken Harrell and first [published by The Drive](#). The Air Force declined to share its own audio files but confirmed the authenticity of the recordings to The Epoch Times.

In one exchange, the lead fighter pilot and his wingman can both be heard preparing their missiles to fire on the balloon, suggesting that the wingman was prepared to take down the balloon immediately following a failed attempt by the lead pilot.

"FRANK01 is switches hot," the lead pilot says.

"FREANK02 is switches hot," the wingman follows.

The two F-22 stealth fighters' call signs, FRANK01 and FRANK02, were named after World War I flying ace Frank Luke Jr., who earned the epithet of "Arizona Balloon Buster" for his successful shootdowns of 14 German balloons during the conflict.

Notably, the brief exchange may reveal exactly what happened during the United States shoot down of an unidentified object over Lake Huron on Feb. 12.

During that encounter, the lead pilot fired an AIM-9X missile at the object, the same type of missile used on the Chinese spy balloon and two other unidentified objects this month.

That missile missed, however, plunging into the waters of Lake Huron. The object was instead destroyed by a second missile fired by the pilot's wingman.

The difficulty in targeting the unknown object was likely expected, given that it was only about as large as a car, and, once again, audio from the initial encounter with the Chinese spy balloon demonstrated the difficulty that aircraft might have in targeting balloons with such slow speeds and low temperatures.

In one segment of audio, a supporting pilot in an F-15C can be heard expressing just that problem with the Chinese spy balloon.

"I'm having trouble keeping a radar lock for any more than a second on him," the pilot said. "I will keep trying."

Later, a call from the U.S. Air Force's Eastern Air Defense Sector, which was controlling the operation from the ground, clarifies that the pilots are authorized to use any weapons they deem necessary to take the balloon down.

[F-15 Fighter Pilot Explains Why Latest Object Shot Down Over Alaska Is 'Unusual'](#)

INSIDER

The US military didn't know if the missile that took out a Chinese spy balloon would work when an F-22 took the shot, commander says

[Jake Epstein](#) and [Christopher Woody](#) Feb 8, 2023, 10:25 AM

A US Air Force F-22 fighter jet fired a single air-to-air missile at a Chinese surveillance balloon over the weekend, sending the system crashing into the Atlantic Ocean in a moment of heightened tension between Washington and Beijing.

But before the pilot took the shot on Saturday, the US military wasn't sure that the missile would actually work for this specific operation, a top US commander said on Monday.

The F-22, which was operating at an altitude of 58,000 feet, used an AIM-9X Sidewinder air-to-air missile to take down the balloon, which was hovering between 60,000 and 65,000 feet, a senior US defense official told reporters after the mission.

Gen. Glen VanHerck, commander of NORAD and US Northern Command, told reporters on Monday that he was unsure if the Air Force ever tested an AIM-9 against a balloon target at such a high altitude.

altitude balloon such as this. We did not have the weapons data," he said.

VanHerck was asked in a follow-up question why the US decided to use the short-range AIM-9 missile instead of the advanced medium-range [AIM-120](#) — a beyond-visual-range missile that can operate in all weather conditions.

VanHerck said the AIM-120 has a "significantly" longer range and a bigger warhead, making it less safe than the AIM-9. "We assessed from an effectiveness standpoint that it was going to be highly effective, and that was proven on Saturday," VanHerck said of the AIM-9.

Weapons evaluators for the Air Force could not immediately address Insider's inquiry on the matter.

The [AIM-9 Sidewinder](#) is a supersonic heat-seeking missile, the first of which was developed by the US Navy in the 1950s and adopted by the US Air Force years later. It is powered by a rocket motor, carries a high-explosive warhead, and uses infrared guidance to home in on an aircraft's engine exhaust.

The [AIM-120](#), on the other hand, is a "new generation" missile that succeeded the AIM-7 Sparrow, according to the Air Force. At nearly 12 feet long, it's significantly longer than the AIM-9 and has a heavier launch weight of 335 pounds compared to 190 pounds for the AIM-9.

China's spy balloon was downed by the newest variant of the AIM-9, the AIM-9X, which has smaller fins than previous versions. Not only was this apparently the AIM-9s first high-altitude balloon target, but this was also the [first air-to-air kill](#) by the stealthy fifth-generation F-22 Raptor, which used the [callsign](#) "FRANK" in a nod to a legendary aviator who [downed over a dozen German military balloons](#) during World War I.

The debris from the balloon fell into waters roughly 47 feet deep off the coast of South Carolina, a senior US military official said on Saturday. VanHerck said on Monday that US forces have begun the process of recovering the debris, which fell in an area as large as "15 football fields by 15 football fields." The Navy [released the first photos](#) of the balloon recovery operation on Tuesday.

ADDITIONAL INFORMATION:

[AIM-9X Sidewinder Missile](#)

[AIM-9X Sidewinder Air-to-Air Missile](#)

WATER SUPPLY STORIES

Water scarcity

Addressing the growing lack of available water to meet children's needs.

South-to-North Water Diversion Project

Can A Pipeline Really Bring Drinking Water From Mississippi To The West?

Pipe dream or possible? Experts weigh in on idea of sending Mississippi River water to West

Solution to solve California drought? Some say it's water from the Mississippi

A letter sent to the Desert Sun in Palm Springs posed the idea to siphon water from the Mississippi River. Now, the idea has taken on a life of its own.

Climate Change, Global Food Security, and the U.S. Food System

Climate Change, Global Food Security, and the U.S. Food System is a peer-reviewed scientific assessment that identifies climate change effects on global food security. The assessment is a contribution to the U.S. National Climate Assessment.

Water Shortages Slow Energy Production Worldwide January 20, 2014

Food and Water Shortages May Prove Major Risks of Climate Change

Poor people will suffer the most, unless the world exploits vanishing opportunities to adapt

March 30, 2014

The Challenges of Meeting Future Food, Energy, and Water Needs

The inherent interlinkages between food, energy, and water systems present both challenges and opportunities for a more sustainable future on Planet Earth.

27 July 2018

Billions face food, water shortages over next 30 years as nature fails

A new model shows which areas of Earth will likely be hit the hardest by the changes caused by human activity, also revealing possible solutions.

October 10, 2019

How the COVID-19 Pandemic Affects Food, Energy, and Water Systems in the U.S. May 13, 2020

Overpopulation and water scarcity leading to world future food crisis

| July 12, 2020

Triple Threat: Water, Energy and Food Insecurity October 19, 2020

[Resilience of food, energy, and water systems to a sudden labor shortage](#)

04 January 2021

[Water Shortages Threaten the Economy and Our Food Supply](#)

Oct 04, 2021

[Prediction – Food and Water Shortages for Northern California Late Summer / Fall – 2022. Surging Inflation](#)

March 30, 2022

[This chart shows how much Ukraine and Russia export to the world](#)

Apr 13, 2022

[World Bank Announces Planned Actions for Global Food Crisis Response](#)

May 18, 2022

[Water Storage Is at the Heart of Climate Change Adaptation](#)

February 3,

2023

[Hydrogen Production Would Exacerbate Water Shortages](#)

Federal government's production goals would require massive quantities of fresh water

[Feb 7, 2023](#)

[In drought-stricken states, fossil fuel production jeopardizes limited water supplies](#)

Some of the country's leading oil and gas producing states are facing drought and water shortages.

Feb. 08, 2023

UNITED NATIONS

Water, Food and Energy

Water, food and energy form a nexus at the heart of sustainable development. Agriculture is the largest consumer of the world's freshwater resources, and water is used to produce most forms of energy.

Demand for all three is increasing rapidly. To withstand current and future pressures, **governments must ensure** integrated and sustainable management of water, food and energy to balance the needs of people, nature and the economy.

[Water And Energy Shortages Are Fueling A Global Food Crisis](#)

By [Haley Zaremba](#) - Sep 14, 2022, 3:00 PM CDT

- The ongoing energy crisis is weighing on the global economy.
- High energy costs are also sparking a fertilizer shortage and in turn, food shortages.
- **North America, Europe, and China are all facing unprecedented droughts.**
- [The Colorado River drought is so bad you can see it from space.](#) Lake Powell and Lake Mead, which supply drinking water to millions of people in Colorado, New Mexico, Utah, Wyoming, Nevada, Arizona, and California, are each currently down to just [27% of their capacity](#), a near-complete collapse from being 95% full in 2000. In China, record heatwaves and drought have [dried up the Yangtze River](#). Yale Environment 360 is warning that the [drying up of Europe's great rivers](#), which function as the arteries of the continent's economy, could be the new normal. Nearly two-thirds of the world's population, or about four billion people, suffer from severe water scarcity for at least one month each year, and half of the global population could face water scarcity [by just 2025](#). This is terrifying for a wide number of reasons. We've all heard that water is life, and most of us can't fathom our day-to-day tasks without abundant potable water at the twist of a tap. **But water scarcity isn't just water scarcity. It's food scarcity and energy scarcity too.** Scientists and academics are increasingly approaching issues of food, water, and energy not as separate fields of study and development but as one [water-energy-food nexus](#) which is inherently interdependent and interrelated. We can't hope to address the crises facing any of these sectors without discussing all of them.
- **Climate change poses an enormous and unprecedented threat to water, energy, and food,** at the same time that demand for all three is steadily increasing. The current drought conditions around the globe are putting [enormous pressure on the nexus](#) and squeezing the energy supply even tighter amid **a worldwide energy crisis spurred by the Covid-19 pandemic and compounded by the Russian war in Ukraine.** The lack of water has devastated hydropower sectors and limited the navigability of waterways

that are central to global supply chains of fossil fuels and cooling nuclear energy plants.

- Just this summer, a [Swiss nuclear facility](#) scaled back operations as the volume of cooling water in the Aare river was so low that the temperatures were growing dangerous for the local wildlife. [In France](#), several nuclear reactors were similarly shut down, but because the dwindling and warmed waters of the Rhône and Garonne were simply unable to cool the systems of nuclear power plants – and that’s just the latest in a series of unfortunate events for the [beleaguered French nuclear sector](#) this year. And [all along the Rhine](#), barges that carry coal and oil to millions of people are waylaid.
- [Related: Another European Steel Plant Scales Back Amid Ongoing Energy Crisis](#)
- The timing of this blow to Europe's already tenuous and tight energy supply could not be worse. As Russia plays a cat-and-mouse game with the European Union by conveniently experiencing “infrastructural issues” with its pipelines every time the bloc makes a political agreement that doesn’t agree with Putin, Europe is staring down the barrel of a long, cold winter with insufficient energy supply.
- Meanwhile, in China, a prolonged and severe drought in the Sichuan province – which was also rocked by a [magnitude 6.6 earthquake](#) last week – has slammed the brakes on the hydropower industry that much of the nation depends on. To fill the gap, China has begun to [burn even more coal](#), fueling the very greenhouse gas emissions that contributed to the drought in the first place in a vicious cycle. While experts argue that the real lesson to be learned here is to diversify your energy mix, many Chinese people have instead become [distrustful of hydropower](#) and renewables in general.
- Meanwhile, these water and energy troubles fuel a third looming crisis: [a global food shortage](#). Remember that water-energy-food nexus? Soaring gas prices have caused a critical fertilizer shortage, which, coupled with a water shortage, spells serious trouble for agricultural yields.
- Yes, the prognosis is grim. But the nexus approach also brings hope. The growing recognition of the interconnectedness of these problems also sheds new light on the potential for synergistic, long-term solutions instead of stopgap measures that fail to see the bigger picture. And these challenging times have made many people increasingly aware of the preciousness of these resources that once seemed infinitely abundant.
- By Haley Zaremba for Oilprice.com

POPULAR MECHANICS

Giant Wind Turbines Keep Mysteriously Falling Over. This Shouldn't Be Happening.

The taller the turbine, the more epic the tumble.

By [Tim Newcomb](#) Published: Jan 23, 2023

- [Turbine](#) failures are on the uptick across the world, sometimes with blades falling off or even full turbine collapses.
- A [recent report](#) says production issues may be to blame for the mysterious increase in failures.
- Turbines are growing larger as quality control plans get smaller.

The taller the wind turbine, the harder they fall. And they sure are falling.

Wind turbine failures are on the uptick, from Oklahoma to Sweden and Colorado to Germany, with all three of the major manufacturers admitting that the race to create bigger turbines has invited manufacturing issues, according to a [report](#) from *Bloomberg*.

Multiple turbines that are taller than 750 feet are collapsing across the world, with the tallest—784 feet in stature—falling in Germany in September 2021. To put it in perspective, those turbines are taller than both the Space Needle in Seattle and the Washington Monument in Washington, D.C. Even smaller turbines that recently took a tumble in Oklahoma, [Wisconsin](#), [Wales](#), and Colorado were about the height of the Statue of Liberty.

Turbines are falling for the three largest players in the industry: General Electric, Vestas, and Siemens Gamesa. Why? “It takes time to stabilize production and quality on these new products,” Larry Culp, GE CEO, said last October on an earning call, according to *Bloomberg*. “Rapid innovation strains manufacturing and the broader supply chain.”

Without industrywide data chronicling the rise—and now fall—of turbines, we’re relying on industry experts to note the flaws in the wind farming. “We’re seeing these failures happening in a shorter time frame on the new turbines,” Fraser McLachlan, CEO of insurer GCube Underwriting, told *Bloomberg*, “and that’s quite concerning.”

The push to produce bigger wind-grabbing turbines has sped production of the growing apparatuses. *Bloomberg* reports that Siemens has endured quality control issues on a new design, Vestas has seen project delays and quality challenges, and GE has seen an uptick in warranty costs and repairs. And this all comes along with uncertain supply chain issues and fluctuating material pricing.

With heights stretching taller than 850 feet, blades 300 feet long, and energy generation abilities ratcheting up accordingly, the bigger the turbine, the more energy it can capture. But the bigger the turbine, the more that can go wrong—and the farther it falls.

WORLD NEWS ERA

Analysis | The World Bank Must Take Bolder Action on Climate

[Laurie Foti](#)

Time is running out for the World Bank to become the leader on climate change that we need it to be. While all multinational development banks should be doing more, the World Bank in particular lags behind — and is still not aligned with the Paris climate agreement. The good news is that what needs to change at the bank is clear, and it seems to be moving in the right direction. But it must move more boldly, and more rapidly.

The heart of the World Bank's mission — reducing poverty and increasing economic development — is severely threatened by climate change. As warming intensifies and extreme weather worsens, the developing world will increasingly suffer the worst harms, making it more difficult for countries to meet their economic and social development goals. Putting access to clean, reliable and affordable energy at the center of its work is the only way the bank can fulfill its mission of supporting economic development and improving lives.

While many developing nations are eager to move beyond fossil fuels, they aren't getting the support they need from the World Bank and other development banks. At the United Nations' COP27 climate summit in November, one of the few points of consensus was the need for development banks to fully incorporate the urgency of climate action into their lending models. In the leadup to the summit, G-20 nations recommended changes to development banks that would facilitate more capital flows to climate-related projects. And months earlier, leading environmental groups made their own recommendations for change.

For any large organization, adapting to a changing landscape is difficult. But the World Bank's history — it came into existence to help rebuild countries shattered by World War II — shows the power of multinational development banks to tackle global challenges. And no challenge is bigger, or requires more international cooperation and coordination, than climate change.

There is broad overlap on the changes being called for by environmental groups; economists like Larry Summers; the leaders of the major financial institutions; the Bridgetown Initiative led by Barbadian Prime Minister Mia Mottley; and French President Emmanuel Macron, who is planning a summit for a new global financial pact next June. Some steps can be taken immediately, such as making the data it collects on credit risk available to outside investors — something all development banks should do — which would help investors assess opportunities in countries where they lack experience. But far more fundamental changes are needed, and they fall into two main categories: ambition and risk.

Ambition. The World Bank has agreed to direct 35% of its financing to climate-related projects by 2025. That's a step forward, but not far enough. The Asian Infrastructure Investment Bank and European development banks set their targets at 50%. The 550 financial institutions that comprise GFANZ (the Glasgow Financial Alliance for Net Zero), as well as thousands of companies, cities and other organizations, have made ambitious net-zero commitments. It's critical that the World Bank follows suit by setting higher investment targets, putting more of its capital to work in ways that align with the Paris Agreement, and increasing the amount of private-sector capital it mobilizes.

The fact is: If emerging markets and developing countries don't transform their energy systems, the world will not be able to meet its goals under the Paris Agreement. Nor can that transformation take place without a tremendous amount of new energy investment, which neither the public nor private sector alone can supply. While the World Bank has stopped investing in coal plants, it is still supporting the construction of gas plants, without adopting energy transition timelines.

Risk. In the developing world, clean energy projects can run up against any number of obstacles that lead private investors to view them as too risky: weak credit ratings, concerns about a nation's fiscal or political stability, uncertainty about exchange rates, and fear of inflation. But those obstacles can be overcome if public financing is used as a form of insurance for private investors, by reducing the risk of losses. This can be done, for instance, by having the World Bank be first or second in line to accept losses if an investment proves unsuccessful, or by guaranteeing loans.

The World Bank already has deep experience providing guarantees to support both public and private investment in developing countries. It just needs to do more. The whole point of a publicly funded bank is to take risks that the private sector would not, to achieve a goal that carries broad public benefits.

Critics charge that private investors should not be able to push losses off on the World Bank. And certainly, there should be guardrails. But that criticism ignores all the public benefits that come with accepting higher tolerance for risk, and it pretends that private investors can be pushed into accepting higher risks simply because the public needs them to. That's not the real world, where there are regulatory, fiduciary and other binding constraints. Incentives are necessary and could unlock financing at enormous scale, given that hundreds of global financial institutions are actively seeking investment opportunities aligned with the net-zero transition.

Of course, the World Bank would like countries to give it more capital to finance green projects. And more funding is necessary, but it must be accompanied by a commitment from the bank to leverage it more aggressively, to mobilize more private capital.

Each of those areas will require operational reforms to the World Bank's traditional ways of doing business, and bringing that kind of change to a large organization is no small task. But it can and must be done. The bank was created through US leadership, and it's imperative that Washington lead the charge in transforming it, so it can rise to the epic challenge facing our generation, just as it did after World War II.

Michael R. Bloomberg is the founder and majority owner of Bloomberg LP, the parent company of Bloomberg News, UN Special Envoy on Climate Ambition and Solutions, and chair of the Defense Innovation Board.

More stories like this are available on [bloomberg.com/opinion](https://www.bloomberg.com/opinion)

FORBES

How Much Is A Climate Change ‘Solution’ Worth?

Dec 6, 2019

Numerous policies are being proposed to combat climate change. The cost of some of these policies are estimated to be in the trillions, tens of trillions and even near 100 trillion dollars. By claiming their policies resolve an “existential” threat, some advocates justify implementation *at any cost*. **Governments would impose these costs on the public, reducing standards of living and quality of life.**

But what is the true nature of the presumed threat? Is it existential? If not existential, then what are the potential costs to human welfare, and what is the largest price the public should reasonably be willing to pay to counter the threat?

Public interest in the thesis of climate change (previously termed “global warming” in public discourse) has steadily grown since June 23, 1988, when NASA’s James Hansen gave testimony to the United States Senate’s Committee on Energy and Natural Resources’ Subcommittee on Water and Power, supporting the claim that global climatic effects may result from carbon dioxide (CO₂) emitted by combusting fossil fuels for energy. Politicians have since commissioned a plethora of studies to explore the issue.

The [Fourth National Climate Assessment](#) (4NCA) is one such recent study published in November 2018, just a few months following the 30-year anniversary of Hansen’s testimony. It makes many predictions that are now quite familiar – the marginal growth in atmospheric CO₂ levels caused by combusting fossil fuels will cause temperatures and sea levels to gradually increase over the next 100 years at greater rates than the existing natural trends already in place.

By itself, this information does not suggest any cause for extraordinary action.

Of course this conclusion distinguishes those who may be motivated by a philosophy of disallowing global effects by humans from those who are motivated by interest in human welfare.

In the latter case, a cost-versus-benefit analysis needs to be part of evaluating the best course of action and deciding what level of effort should be expended to prevent or mitigate human-induced climate change. The conclusion will depend on a comparison of the costs of proposed preventive policies with the value of avoiding climate change induced by CO₂ emissions from fossil fuel combustion.

The prognostications of the 4NCA includes estimates of the economic effects of climate change. This information can be used to estimate the value of avoiding climate change, thereby setting a maximum value for a climate change “solution.” As a society, we should not want to pursue any solutions whose costs exceed that value.

Before building on information from the 4NCA report, it is important to understand its limitations. Predictions from this, as well as other climate change reports, are based on a pretense of knowledge and understanding of earth’s complex climate system, the many natural systems affecting it, and the resulting effects on human economy and welfare that are sufficiently complete to make century scale forecasts.

Unfortunately, such capability is untested and empirically unproven.

From a scientific point of view, this is a critical flaw. Scientific methodology requires empirical verification. Even Einstein’s work in relativity was not accepted as valid until experiments demonstrated it capable of making more accurate predictions than previously accepted theory. (The year 2019 marks the 100-year anniversary of the first experimental confirmation of Einstein’s relativity.) Experiments compare concepts we imagine to the reality of the physical universe. Our concepts are never complete. Physical reality, particularly under conditions previously unobserved, is routinely found to be much more complicated and surprising than anticipated.

Because underlying capabilities are empirically unproven, long-term climate predictions from the 4NCA and other climate change reports are best understood as hypothesis or conjecture rather than scientific conclusion.

This caveat notwithstanding, one may hypothetically consider a case where predictions made by the 4NCA are assumed to be usefully accurate. In particular, the report’s predictions for global temperature rise and consequential effects on

U.S. gross domestic product (GDP) can be used to evaluate the potential value of a climate change solution.

The 4NCA predicts an increase in global average temperatures by 4.2° to 8.5° F (2.4° to 4.7° C), relative to the 1986-2015 average, for the years around 2090 under the RCP8.5 scenario. The burnt orange shaded area in Figure 1 (taken from the 4NCA) illustrates this prediction. RCP stands for “Representative Concentration Pathways”, and the RCP8.5 scenario is the so-called “worst case” scenario where fossil fuel use continues unimpeded and no extraordinary efforts are made to counter growing CO₂ emissions.

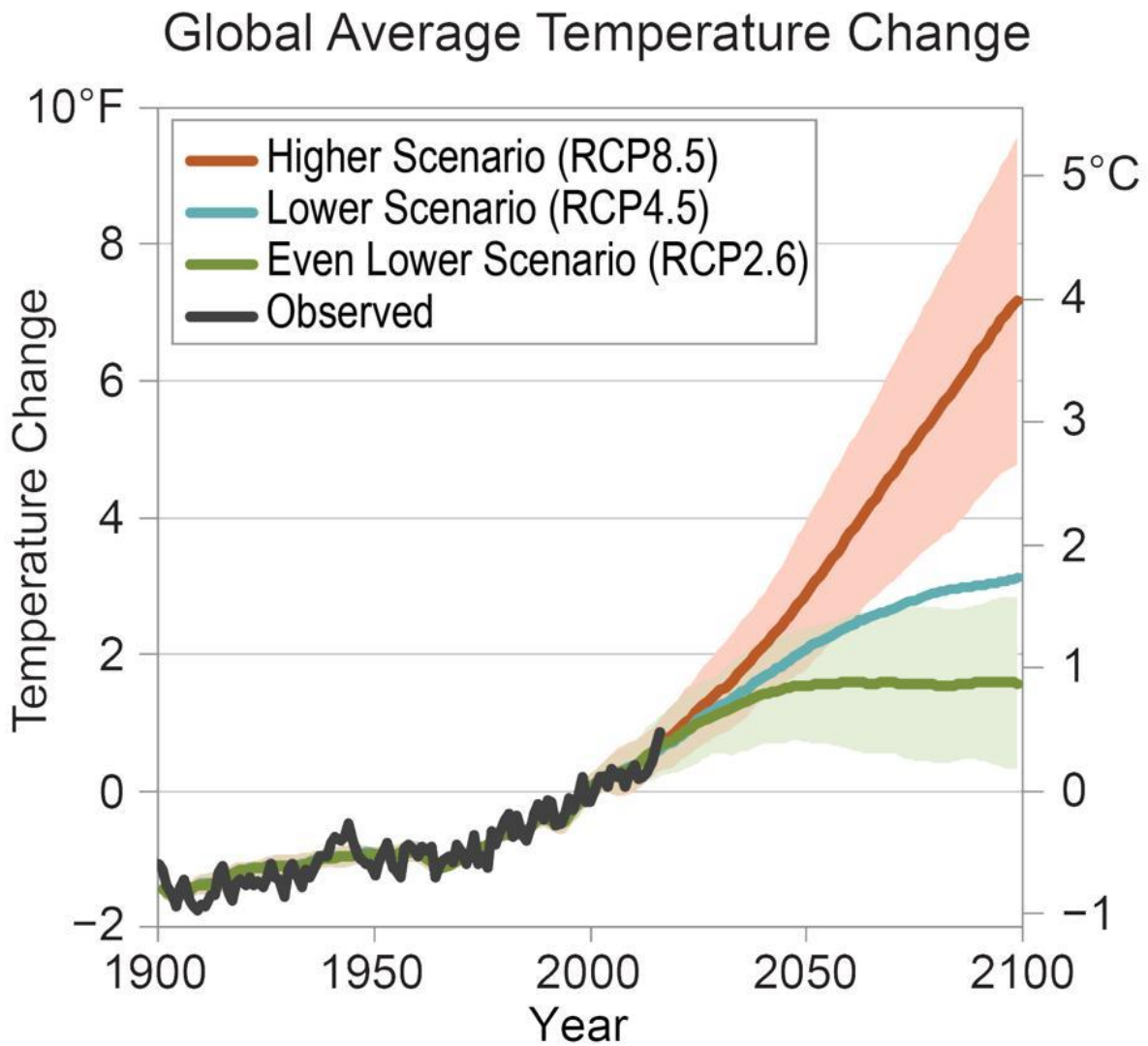


Figure 1: Human induced global average temperature change. Figure taken from 4NCA.

4NCA

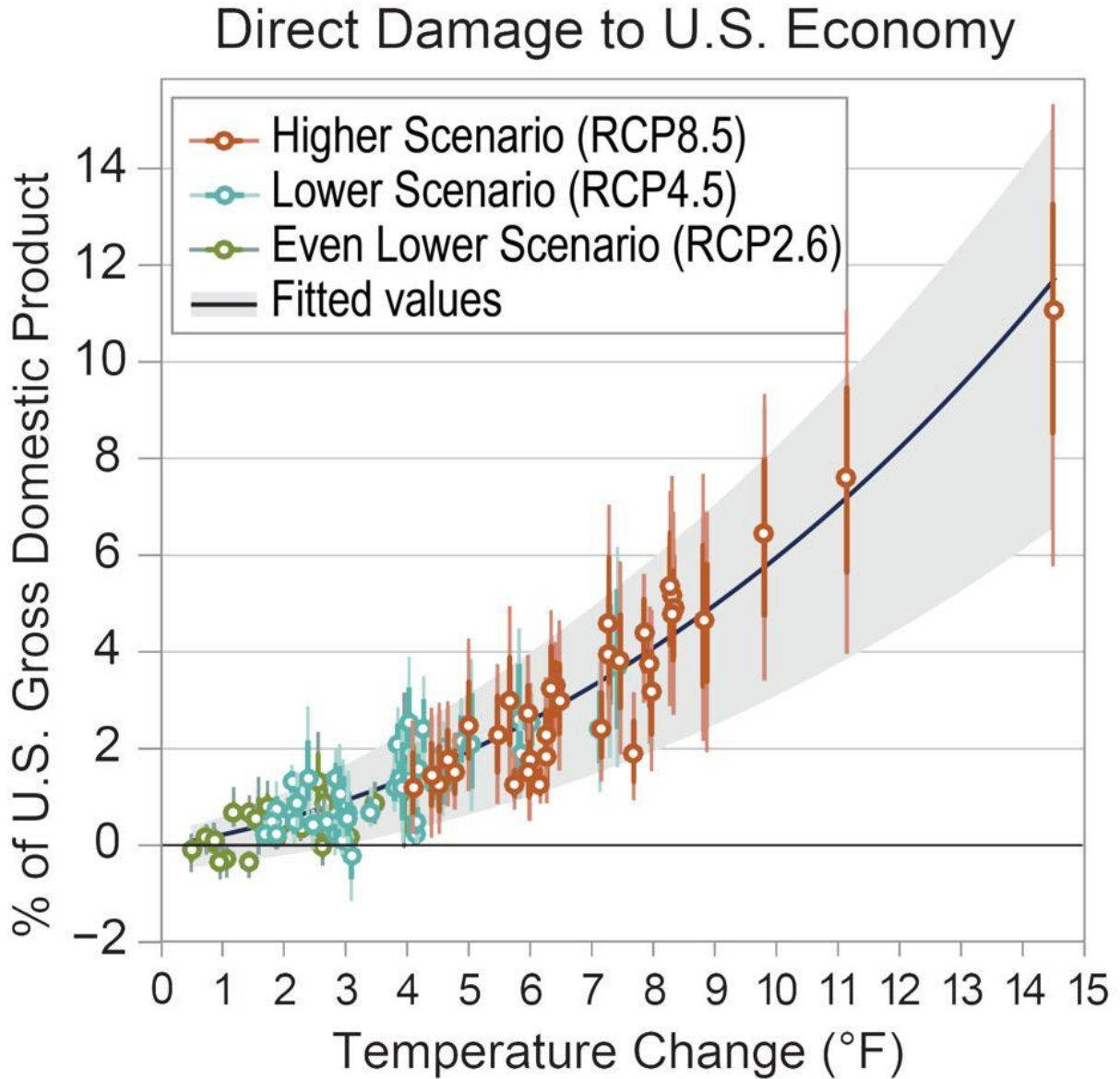


Figure 2: Direct damage to U.S. economy from human induced climate change. Figure taken from 4NCA.

4NCA

Figure 2 (also taken from the 4NCA) shows the percentage loss of U.S. GDP in 2090 (average of 2080 - 2099) as a function of global average temperature change (given in Figure 1). The gray shading represents the 90% confidence interval around the best prediction shown by the black line.

This information tells us that, if we take no action to counter rising CO₂ emissions and the use of fossil fuels continues unimpeded, the temperature rise may be as low as 4.2° F (2.4° C), with a corresponding GDP loss in 2090 somewhere between 0.5% and 2.5%, and may be as high as 8.5° F (4.7° C), with a corresponding GDP loss in 2090 of between 2.0% and 6.0%. So, GDP loss in 2090 is predicted to be anywhere between 0.5% and 6.0%.

To help illustrate this prediction, consider the case of 4.0% GDP loss in 2090 corresponding to the best estimate of GDP loss for highest predicted temperature rise of 8.5° F. Assuming a constant rate of change in GDP loss between 2018 and 2090, this amounts to a loss rate in GDP increasing by 0.05% every year. (This observation was also made by [Steven Koonin in a Wall Street Journal article](#).)

Keep in mind, the 4NCA report does not try to predict what the economic growth will be over the rest of the century. It only tries to predict what marginal effect climate change may have on economic growth. Though predicting economic growth over the rest of the century is a far simpler problem than predicting the climate, few economists are reckless enough to venture such predictions.

So, an economic growth rate over the rest of the century can only be assumed. Figures 3 and 4 show two prospective futures based on two possible economic growth scenarios and a 4.0% loss in 2090 GDP. The red solid line in figure 3 illustrates 3¼% annual GDP growth as might be realized by a future of pro-growth policies (the historical average for the U. S. is between 3 and 3¼%). From 2018 to 2090, GDP grows from about \$20 trillion to about \$200 trillion (2019 dollars). The predicted losses due to climate change reduce the 2090 GDP by 4%, to about \$192 trillion. This is still an economy nearly 10 times bigger than today!

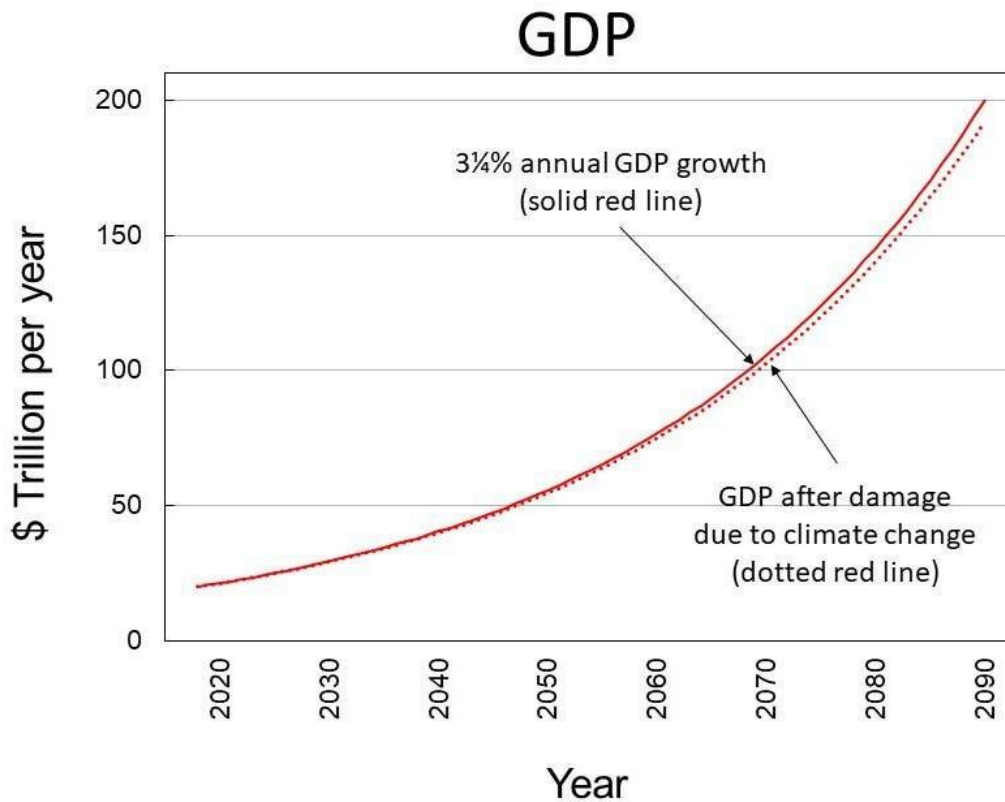


Figure 3: Annual GDP growth at 3¼% (solid line), and GDP after damage due to climate change (dotted ... [+]

Mark Meier

The blue solid line in figure 4 illustrates 2% annual GDP growth. Rates of growth near this value have been described as “the new normal” by political economists favoring low-growth policies. In this case, GDP grows from about \$20 trillion to about \$83 trillion. The predicted losses due to climate change reduce the 2090 GDP by 4%, to about \$80 trillion. Even this economy is four times bigger than today.

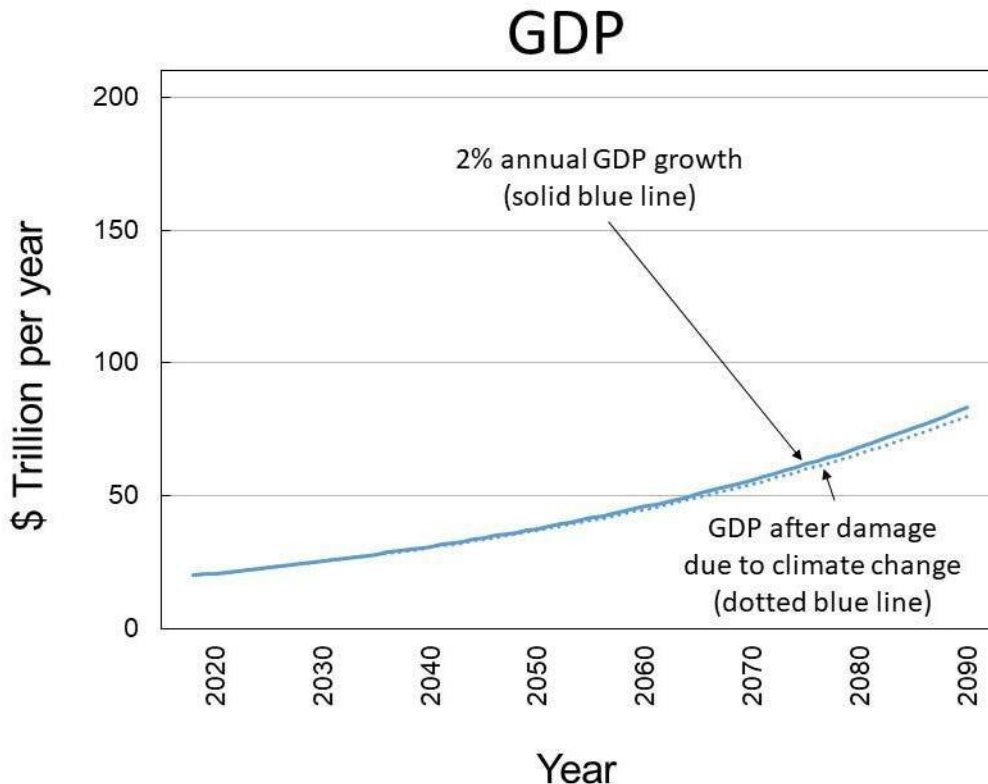


Figure 4: Annual GDP growth at 2% (solid line), and GDP after damage due to climate change (dotted ... [+]

Mark Meier

In each case, the GDP after losses due to human induced climate change is shown by the dotted lines of corresponding color. The figures show that GDP loss from human induced climate change is difficult to distinguish under either growth scenario due to its relatively small size. Clearly, the costs due to human induced climate change from CO₂ emissions are unimportant compared to other choices between pro-growth and low-growth policies. Pro-growth policies leave our society in 2090 nearly two and a half times wealthier than it would be under slow-growth policies.

What we want to know is the value of recovering that portion of GDP between the solid and dotted lines. For this, the concept of “present value” is needed to account for the time-value of wealth. That is, receiving a dollar today has more value than

receiving that dollar (inflation adjusted) 10 years from today. This is extremely important because we are considering value over a period of nearly a century.

To compute present value, an assumption of “annual rate of return” must be made. Typical values used in commercial planning can be around 15%. (That is, a dollar today returns two dollars in five years.) According to a study by the [Copenhagen Consensus](#), it is possible to reach returns of 21% to 30% from public spending on global scale problems by prioritizing 19 (out of the UN’s 169) development goals.

In the interest of understanding a maximum possible value for recapturing lost GDP, a rate of 15% is used for present value calculation. (Higher rates will result in smaller present value results.) In this case, the present value for lost GDP in figure 3 is \$0.97 trillion. For figure 4, the present value is only \$0.78 trillion.

Imagine it was possible to purchase a climate change solution that would be immediately effective. That is, the solution is purchased today and, the very next day, the climate change solution is immediately 100% effective; meaning there is no longer any net contribution of CO₂ to the atmosphere nor any additional human induced effects on climate change. In this case, GDP would grow without damages due to human induced climate change (the solid lines in figures 3 and 4) instead of growing at the slightly slower rates (the dotted lines in figures 3 and 4).

How much would we be willing to pay for this solution? Well, if we pay more than \$1 trillion, we are being foolish since the value of the recaptured GDP is less than that. We may not even want to pay the calculated \$0.97 trillion since that estimate is based on assumptions favorable to high valuations, such as high-end temperature and GDP loss rate assumptions, high-end GDP growth assumption and relatively small rate of return requirements.

Of course, the existence of such an immediately effective solution is highly unlikely and does not reflect the nature of preventive policies that are being proposed. Many proposals take a more realistic, though still incredibly ambitious, goal of implementing a solution over a period of 10 years. Suppose then that there is a solution that results in net contributions of CO₂ to the atmosphere and human-induced climate change ceasing around 2030, and GDP growth returning to an undamaged growth rate beginning around 2030.

The present value of this solution is much smaller due to the delayed effectiveness. In this case, the present value under the same assumptions of 15% return and 3¼%

annual GDP growth is only \$0.39 trillion. If we raise the rates to the range of the Copenhagen Consensus study, 21% to 30%, the present value for this solution falls between \$0.19 trillion and \$0.08 trillion.

It is evident that the value of a climate change solution is at most in the tens to hundreds of billions of dollars, and may be considerably less. It is certainly not in the trillions, tens of trillions, or one hundred trillion dollar range. And an existential threat is clearly not indicated.

Of course, this conclusion is based on the findings of climate change reports such as the 4NCA. As we noted, century-scale predictions from these reports are severely limited by the lack of scientific capability and are best understood as conjecture or hypothesis. Nonetheless, if we accept these reports as best available guidance, it is clear that expensive solutions for human-induced climate change are not justified.

Mark Meier is presently a Professor of Physics at the University of Houston. His career has focused on the development of energy science and technology with a goal for plentiful, more affordable, and widely available energy to sustain the growth, development, and prosperity of modern society. He has worked on prospective next generation energy technologies such as thermonuclear fusion, as well as technologies for the existing energy economy. His inventions and developments range from new instrumentation and measurement capabilities for high temperature plasmas to seismic instruments with new frequencies for exploring previously inaccessible realms of the earth. He holds a B.S. dual degree in Geology and Geophysics from the University of Tulsa, and M.S. and Ph.D. degrees in Electrical and Computer Engineering from the University of Texas at Austin.

UH Energy is the University of Houston's hub for energy education, research and technology incubation, working to shape the energy future and forge new business approaches in the energy industry.

Follow me on [Twitter](#). Check out my [website](#).

[How Wrong Were the Models and Why?](#)

[Failures of an Influential COVID-19 Model Used to Justify Lockdowns](#)

['Professor Lockdown' Modeler Resigns in Disgrace](#)

[The Failure of Imperial College Modeling Is Far Worse than We Knew](#)

[Britain got it wrong on Covid: long lockdown did more harm than good, says scientist](#)

[How UK government misrepresented Covid projections – explained](#)