

CLIMATE CHANGE 101 FOR LANDMEN AND LAWYERS: UNINHABITABLE EARTH OR FALSE ALARM?

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“A cry for survival comes from the planet itself. . . .”

—President Joseph R. Biden,
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Joe Biden’s inauguration as President of the United States promises to bring the issue of climate change to the fore in the United States like never before. There is likely no issue on the horizon more likely to affect the careers of landmen and the lawyers who support them than climate change. While opinions vary, there are increasingly few people in denial over the fact of man-made climate change. The real debate is over how best and how quick to mitigate its effect.

Three best-selling books published during the past two years have set the framework for that debate. The first of these, *The Uninhabitable Earth: Life After Warming*, was published by journalist David Wallace-Wells in 2019 and makes the case that the world is at a tipping point, with about three decades left before a chain of climate related events could inexorably lead to the extinction of the human race. Wallace-Wells places most of the blame for the crisis on the fossil fuels industry. His book became a *New York Times* best seller.

Michael Shellenberger, partially in rebuttal, in 2020 published *Apocalypse Never: Why Environmental Alarmism Hurts Us All*. This was followed by another book in 2020, *False Alarm: How Climate Panic Costs Us*

Trillions, Hurts the Poor, and Fails to Fix the Planet, by Bjorn Lomborg. Both authors offer measuredly different perspectives of the climate debate than that of Wallace-Wells. Both of their books also became best sellers.

None of these three authors are climate scientists. Wallace-Wells graduated from Brown University with a history major. Shellenberger was a Peace and Global Studies major at Earlham College. Lomborg holds a PhD in Political Science from the University of Copenhagen. All three authors, however, cite numerous scientific studies in support of their arguments. Not surprisingly, critics accuse all three authors of “cherry picking” scientific facts to support their positions. Some of these same critics arguably commit the same offense. More on this later.

Neither Shellenberger nor Lomborg are climate change deniers. Lomborg relies heavily on economic data, while Shellenberger approaches the subject from an “environmental humanism” perspective. Though Shellenberger’s book was the more enjoyable read, I have selected Lomborg’s book for review because of what I believe to be the cogency of his arguments (and its shorter length). But before turning to Lomborg’s book, an overview of the basics of climate change and a summary of key points in Wallace-Wells’ *Uninhabitable Earth* are offered.

CLIMATE CHANGE 101

In 2006, Al Gore published the book, *An Inconvenient Truth*, with an accompanying documentary, which raised international awareness of global warming and earned Gore a Nobel Peace Prize the following year. Gore's book begins by asking, what is greenhouse gas? Greenhouse gases are those gases in the atmosphere that hold in heat, such as carbon dioxide, methane, and nitrous oxide. They maintained an average temperature on earth of around 59 degrees Fahrenheit (°F) through most of the 20th century. Without them average temperatures on earth would drop to around 0°F.

Of all the greenhouse gases, carbon dioxide (CO₂) gets top billing because it accounts for about 80% of all greenhouse emissions. The largest contributor to CO₂ from human activities is the burning of fossil fuels for transport, heating, cooking, and power. The total concentration of CO₂ in the atmosphere today is about 400 parts per million (ppm). This compares to about 280 ppm at the dawn of the Industrial Revolution around the year 1750, and has led, most scientists say, to an increase in average temperatures of the earth to slightly higher than 1 degree Celsius (°C), or a little over 1.8°F, since the Industrial Revolution began. The conversion factor is 1°C for every 1.8°F, which is convenient since that is approximately where the postindustrial temperature rise was at the time of Gore's book.

According to *An Inconvenient Truth*, mankind's burning of fossil fuels has been largely responsible for increases in global temperatures due to releases of greenhouse gases. Gore forecasted that the world had about ten years (or until 2016) to drastically cut carbon emissions or imminent disasters would come to pass. The year 2016 was also the expected tipping point for longer-term

global catastrophes, such as massive flooding due to melting of the polar ice caps, increasing drought, wildfires, hurricanes, and the extinction of polar bears and other species. Gore featured a picture of polar bears on the cover of his book. The decline in polar bear populations became emblematic of the international problem of global warming.

In response to concern about global warming, many nations of the earth, including the US, have entered into three major international agreements on climate change to date. The first and second of these predated Gore's book, being made in Rio de Janeiro, Brazil, in 1992 and in Kyoto, Japan, in 1997. These were followed in December 2015 by the Paris Agreement. The stated goal of the Paris Agreement was to limit further global warming to 2°C (3.6°F) over preindustrial temperatures, compared to the 1°C (1.8°F) that global temperatures had risen to around the time of the accord.

The most expansive commitments to reduce carbon emissions made under the Paris Agreement were originally those by the United States, the European Union, China, and Mexico. Together those commitments made up roughly 80% of total promised carbon reductions. Though the US Congress never ratified the Paris Agreement, President Obama committed the US by executive order and set the goal of reducing greenhouse emissions in the US by 2025 to a range around 26% to 28% below what US greenhouse emissions were in 2005, the effective date of the Paris Agreement.

China, the world's largest emitter of greenhouse gases both then and now (the US is second), signed the Paris Agreement but did not commit to reduce CO₂ emissions until 2030, and then on a less significant scale than the US. The most significant carbon reductions the Chinese committed to were deferred to 2060 and beyond.

Russia, the world's fourth largest emitter, had signed the Paris Accord originally but delayed ratifying it until 2019, after intense international pressure. This was despite Vladimir Putin's history of mocking climate change, once quipping that it would save Russians money on fur coats. The Russians, however, added the proviso they receive credit for emissions reductions back to 1990, instead of 2005, which was the baseline for all other Paris signatories. The year 1990 was before the collapse of the Soviet Union with its emissions-intensive heavy industry. This enabled the Russians to credit themselves with 25% emission reductions in meeting their Paris Agreement commitments without taking any actual further action.

Donald Trump was elected President of the US in 2016. In 2017, he withdrew the US from the Paris Agreement, though complete withdrawal would not occur until after his hoped-for re-election in 2020. Trump's hope was not realized, and President Biden, on his first day in office in January 2021, recommitted the US to the Paris Agreement. Even before Trump took office in 2016, the US was one of the few countries in the world meeting its CO₂ reduction commitments under the Paris Agreement. This was because the US, like Russia, benefited from having its commitments made retroactive, though with the US no special proviso was needed. The effective date of the 2015 Paris Agreement, year 2005, was about the time that the "Shale Revolution" took off in the US with its accompanying increases in domestic natural gas production. This had led many US utility companies to switch from coal to natural gas as a power source, since natural gas emits 50% to 60% less CO₂ when combusted in power plants than coal. It is ironic that this was largely due to fracking, something that is opposed in most "blue" US states and by many environmentalists worldwide.

2016 has come and gone, and Gore's 2006 predictions that the world had ten years before climate change would cause imminent disasters did not come to pass. This did not stop Gore from making a serial documentary in 2017 called *An Inconvenient Sequel: Truth to Power* with similar claims but with extended timing for the disasters to come.

"IT IS WORSE, MUCH WORSE, THAN YOU THINK."

In 2019, two years after Gore's sequel and four years after the Paris Agreement had been signed, Wallace-Wells published *Uninhabitable Earth*, continuing the alarm over climate change raised by Gore. In *Uninhabitable Earth*, Wallace-Wells includes terrifying forecasts of wildfires, hurricanes, flooding, drought, climate refugees, food shortages, and disease that, unless abated, will make the 21st century what he calls the "century of Hell." Wallace-Wells asserts that global temperatures had risen since publication of Gore's 2006 book to about 1.1°C (or about 1.98°F) over where temperatures were at the outset of the Industrial Revolution. He further asserts that about 85% of all carbon emissions since the Industrial Revolution have occurred since World War II. If unabated, says Wallace-Wells, continued usage of fossil fuels will cause global temperatures to rise by 4.5°C (8.1°F) by the end of the century. Like Gore before him, Wallace-Wells asserts that the world has a deadline, about three decades, at most, to completely de-carbonize before truly devastating climate horrors begin, possibly leading to mankind's extinction.

At a 2°C rise in temperature, Wallace-Wells predicts that the polar ice sheets will begin to collapse, major cities in the equatorial band of the earth will become unlivable, and flooding will inundate coastal cities worldwide. At 3°C, much of the world will be in permanent drought. And as 4°C of

warming is approached toward the end of the 21st century, there will be global flooding, famine, refugees, and disease on a scale the likes of which the world has never seen. This will collapse the world economy and usher in worldwide political anarchy. “Our grandchildren will curse us,” a reviewer of his book said. All of this, according to Wallace-Wells, will be irreversible. He says, “You might hope to simply reverse climate change; you can’t. It will outrun us all.”

In fairness to Wallace-Wells, buried throughout his book are qualifiers to the effect that the extreme picture he paints is unlikely to happen. (For example, he states, “[Because] the devastating effects of warming will soon become too extreme to ignore, or deny, . . . it is unlikely that climate change will render the planet truly uninhabitable.”) But the book became an international best seller and a clarion call for environmentalists. Millions of people the world over accept Wallace-Wells’s conclusions, and Gore’s before him, as mainstream environmental orthodoxy. We hear this from the media, from politicians, from Hollywood celebrities, from a teenager in Sweden, from Prince Charles, from the Sierra Club, and from a host of other environmental lobbyists and activists. We are told it is the “consensus” of experts and to offer skepticism is to reject science. To the extreme proponents of this view, the costs of curing the problem have become irrelevant. Shellenberger quotes Congresswoman Alexandria Ocasio-Cortez in a 2019 interview, “The world is going to end in twelve years if we don’t address climate change, and your biggest issue is how we are going to pay for it?”

This barrage from the media, politicians, activists, and others has resulted in near hysteria over climate change among millions the world over. A 2019 poll found that almost half of the world’s population believes

climate change will likely end the human race. Shellenberger quotes teenage Swedish climate activist Greta Thunberg on the subject in 2019, “I don’t want you to be hopeful, I want you to panic.”

“FIRST WE NEED TO CALM DOWN.”

Into this maelstrom of climate hysteria entered the publication of Shellenberger’s and Lomborg’s books in 2020. They both make the point that climate hysteria has itself become destructive. Tens of millions of children, says Lomborg, have become terrified, depressed, and unduly pessimistic about their futures. Many prospective parents are questioning whether to bring children into the world because of fear over climate change.

The fundamental issue, says Lomborg, is not the existence of man-made climate change, that is a given. The issue is the pace of response. This leads to the central thesis of Lomborg’s book—that environmental alarmism is crowding out rational analysis in the climate debate. Environmental alarmism hastens bad decisions, says Lomborg, and is leading the world to unnecessarily waste trillions of dollars that might otherwise be available to assist the most vulnerable of the seven billion people living on the planet—the three billion people living in poverty.

We have many tools to fight climate change, says Lomborg, that are not given enough credence. These include innovation, adaptation, a worldwide carbon tax, and increasing prosperity. Continued growing prosperity is essential, says Lomborg, so nations can afford to expend more resources arresting climate change without bankrupting their economies. History has shown that richer countries are better equipped and more resilient than poorer countries in dealing with challenges, whether climate related or not.

Focusing on single solutions, such as wind or solar, and going too fast, leading to irrational decisions, can be more destructive and dangerous to the mass of humanity, says Lomborg, than not going fast enough. According to Lomborg, one of the great ironies of climate change activism is that the same proponents who are adamantly opposed to global economic inequality are seemingly blind to the fact that the costs of most climate policies fall disproportionately upon the poor. “We have it in our power to make a better world,” says Lomborg, “but first we need to calm down.”

EXTREME WEATHER OR EXTREME EXAGGERATION?

About half of Wallace-Wells’ book, *Uninhabitable Earth*, is devoted to what he describes as the “Elements of Chaos” that will result from man-made climate change unless fossil fuels are abandoned within the next several decades. This was the part of Wallace-Wells’ book that earned him an avalanche of criticism from Lomborg, Shellenberger, and others. As Shellenberger put it (quoting another reviewer), “like other activist journalists, [Wallace-Wells] simply exaggerated the exaggerations. He assembled the best of this already selective science to paint a picture containing enough horror to induce a panic attack in even the most optimistic.”

Lomborg likewise says Wallace-Wells exaggerates the problems and devotes the first several chapters of his book, *False Alarm*, to fact checking many of Wallace-Wells assertions, culminating in Chapter IV, “Extreme Weather or Extreme Exaggeration?” A partial list of topics addressed by Lomborg and summaries of some of his comments follow. The headings in quotes are borrowed from the names of chapters in Wallace-Wells’ book.

POLAR BEARS

What about polar bears, the iconic metaphor for global warming in Al Gore’s *An Inconvenient Truth* that has so distressed children and others the world over? The biggest threat to the global polar bear population, according to Lomborg, is indiscriminate hunting, not global warming. Since nations have regulated hunting of polar bears beginning in the 1960s, their population has increased five-fold, to around 26,500 polar bears in 2019. Because of the increase in the polar bear population, mention of them has decreased among climate activists. There was no reference to them, says Lomborg, in Al Gore’s film, *An Inconvenient Sequel*, which came out in 2017. The real threat to polar bears, Lomborg concludes, “isn’t climate change, it’s people.”

“DISASTERS NO LONGER NATURAL”

What about hurricanes? Both Lomborg and Shellenberger cite data indicating that globally such weather events have declined over the past century. The cost of these events, however, has increased significantly. But this is not due to climate change, says Lomborg, this is due to sixty-seven-fold more people living in Florida, as an example, in 2020 than there were in 1900. Globally burgeoning populations on coastlines have led to what Lomborg calls the “expanding bull’s eye effect.” In reality, says Lomborg, “much (and often all) we’re seeing is that more people with more stuff live in harm’s way.” The solution is not to be found by reducing CO2 emissions, says Lomborg. The solution is “to stop building lots of big, expensive houses in flood zones.”

DROUGHT AND “WILDFIRE”

What about drought and wildfires? Lomborg cites the recent US National Climate Assessment (NCA), which states

unequivocally that “drought has *decreased* over much of the continental United States in association with long-term increases in precipitation” (emphasis added).

But what about wildfires in California? While Lomborg agrees that climate change is contributing to the problem, he also reminds that, since 1940, the number of homes built in high-risk fire zones in California has risen from half a million to almost seven million in 2010, three times faster than the rest of the US over the same time period. This is another example of the “expanding bull’s eye effect” Lomborg cited with hurricanes. The rapid growth in California home building is projected to continue. But to Lomborg this suggests “our first target for reducing wildfire damages to homes . . . [ought to be] to deter people from building houses in high-risk zones.”

Shellenberger, a California resident, says much the same thing about California wildfires but adds that, before Europeans arrived in the United States, data shows that fires burned up woody biomass in forests every 10 to 20 years, and fires burned the shrublands every 50 to 120 years. During the last 100 years, however, the policy of the US Forest Service and other agencies has been to extinguish most forest fires when they occur. This is due to concerns about air pollution as well protecting surrounding communities from fire. This policy, however, has resulted in the accumulation of far more wood fuel on forest floors in California and elsewhere than otherwise would exist. Add to that the six million more people living in California today than there were in the year 2000, and the results are not surprising.

Likewise, in Australia, a scientist has estimated there is ten times more wood in Australia’s forests than when Europeans arrived, though the Australian government, like California, refuses to undertake

controlled burns for both environmental and human health reasons.

These examples support Lomborg’s point that it is over simplistic to blame the wildfires in California solely on climate change. Many politicians in California and elsewhere, however, would prefer not to highlight the non-climate related factors that might cause more wildfires. That might hold them partially accountable for enacting short-sighted policies.

“DROWNING”

What about global flooding? According to Lomborg, Wallace-Wells cites a study stating that coastal flooding caused by sea level rises due to global warming will cause somewhere between \$14-\$100 **trillion** of damages each year between now and the year 2100. What Wallace-Wells fails to mention, says Lomborg, is the assumption behind these figures that not a single country will ever increase heights of protective dikes beyond current levels or construct new ones. Dikes have been used historically in the Netherlands and elsewhere in the world to hold back the ocean for hundreds of years. The study that Wallace-Wells cites, says Lomborg, acknowledges this and states that even relatively low amounts of spending on adaptation would lower their estimates by 88%.

Wallace-Wells also asserts that if 2°C of warming is reached, the Greenland ice sheet will collapse. In response, Lomborg cites the UN Intergovernmental Panel on Climate Change (IPCC) as saying that, even absent climate control policies, 60-70% of the Greenland ice sheet is likely to be around for at least the next thousand years.

“HEAT DEATH”

What about heat waves? Wallace-Wells asserts that, by 2025, 255,000 people will die annually across the world of heat stroke and that, by 2100, half the world’s population will be at risk, even if the world pulls up slightly short of 2°C of additional warming. Lomborg counters that Wallace-Wells apparently assumes that no additional air conditioners will be sold over the next 80 years and ignores the technological improvements to air conditioning and building design likely to prevent such widespread deaths. Also, what about the offsetting number of people spared death due to exposure to cold? Lomborg points to a 2015 scientific study indicating that, globally, people are 17 times more likely to die of cold than heat.

SAVE THE RAINFORESTS

What about deforestation’s impact on climate change? Lomborg cites studies indicating that, contrary to popular perception, increased CO₂ in the atmosphere has greatly boosted global greening due to what agricultural scientists call the “fertilization effect.” Not all this new vegetation is optimal—weeds are included—but it is remarkable, says Lomborg, that thanks to carbon dioxide fertilization together with reforestation and expanding cropland, we have added the equivalent of two entire new continents of green over the last few decades. The media and climate activists, however, rarely acknowledge this. By one estimate, says Lomborg, the world has more green space now than it did around the year 1500, before widespread reduction of global vegetation had begun.

SAVE THE WHALES

What about ocean acidification? The basic problem of ocean acidification comes from the earth’s oceans taking up CO₂ from the

atmosphere. This hurts marine organisms that build their shells from calcium carbonate and helps to destroy ocean reefs and reduce wild fish in oceans, not to mention negative impacts on tourism and recreation. As devastating as this is, Lomborg reminds that two-thirds of the global value of fish produced as food for humans is produced in onshore aquaculture farms where ocean acidification has little to no impact. In a later chapter, Lomborg describes how harvesting oil from algae cultivated on a mass scale on the ocean’s surface, a potentially carbon neutral innovation, could have the added benefit of dramatically reducing ocean acidification.

“ECONOMIC COLLAPSE”

One more “Element of Chaos” that Wallace-Wells points to is the economic collapse in the world economy he forecasts unabated climate change is likely to bring about. He cites research on the economics of warming from a trio of UC Berkeley and Stanford economists (Hsiang/Burke/Marshall) that indicates that, for every 1°C of warming, economic growth is reduced by about one percentage point. This is disturbing because economic growth is normally counted in low single digits.

The result, based on projections by Hsiang/Burke/Marshall, is that unmitigated global warming will cause an average 23% loss in per capita earning globally by the end of the 21st century, with a 12 percent chance that the decrease could be 50%. By comparison, the Great Depression of the 1930s dropped global gross national product (GNP) by 15%. Other economists, says Wallace-Wells, believe it could be worse, hastening an economic depression worldwide the likes of which have never been seen.

This is perhaps where Lomborg and Wallace-Wells differ the most when discussing the

“Elements of Chaos.” Lomborg’s perspective is that global GNP has increased inexorably since the Industrial Revolution, and especially in the last several decades, which have seen billions of people lifted out of poverty. Citing the work of Professor William Nordhaus of Yale University, who so far is the only climate economist to ever be awarded a Nobel Prize in economics (in 2018), Lomborg calculates the cost of climate change, even without drastic reductions in fossil fuels, will be about 4% of GNP in 2100.

How is this possible, one might ask, given that Hsiang/Burke/Marshall claim that the costs of climate change are so much higher? Because, says Lomborg, when Hsiang/Burke/Marshall make their case they leave out adaptation, CO2 fertilization, the impact of the “expanding bull’s eye effect,” and the many other factors Lomborg cites in his book. As Lomborg’s critics are fast to point out (more on them later), missing from his analysis, and his argument more generally, is a detailed factoring in of the uncertainties. What if Wallace-Wells is right, and a 4°C temperature increase wreaks unparalleled global havoc? Is an economic decline of only 4% credible in such a scenario? This begs the question, are the scientific and other studies Lomborg cites outliers, or are his conclusions supported by credible experts?

WHAT DO THE EXPERTS REALLY SAY?

Dr. Bjorn Lomborg, whom *Time Magazine* has selected as one of 100 Most Influential People in the World, heads a Danish think tank called the Copenhagen Consensus Center and is a visiting professor at the Copenhagen Business School and a visiting fellow at the Hoover Institute of Stanford University. Lomborg relies on two major sources for his book, *False Alarm*, being reports and findings from the UN

Intergovernmental Panel on Climate Change (IPCC) and the National Climate Assessment (NCA) from the US government. As already mentioned in Part II of this series, he also relies on the work of Professor William Nordhaus of Yale University, who in 2018 was awarded what so far has been the only Nobel Prize given to a climate economist.

Both Wallace-Wells and Lomborg acknowledge that the IPCC assessment on climate change is the “gold standard,” and both claim that its conclusions should guide the world. The IPCC and the NCA have forecasted global temperatures in the 4°C to 5°C range above preindustrial times by the end of the 21st century, *assuming nothing is done to mitigate the increase*. That caveat, to Lomborg, is the kicker. Such higher temperature ranges are unlikely to occur, says Lomborg, because they only occur in scenarios of high, very unlikely, carbon emissions.

What the IPCC actually wrote in its 2018 report, says Lomborg, is that to have a good chance of limiting warming to 1.5°C from preindustrial times, global carbon emissions needed to decline dramatically. The report never said that the world would end, or civilization would collapse, if temperatures rose above 1.5°C of warming. The 1.5°C goal, as Lomborg reminds, was inserted into the Paris Climate Accord by politicians, not by scientists.

So what is happening today? As Lomborg point outs, carbon emissions are on the decline in the developed world. In the US, for example, carbon emissions from electricity generation have declined by an astonishing 27% between 2007 and 2018, primarily due to the “Shale Revolution” and accompanying large-scale switches from coal to natural gas-fired power plants.

In the developing world, in contrast, carbon emissions are on the rise. Roughly half of the world's population, almost four billion people, live in India, China, and Southeast Asia. Half of these countries' energy sources come from coal. China, for example, is the world's largest CO₂ emitter and, unlike the US, has tripled its carbon emissions since 2000, with its reliance on renewable energy decreasing by half in the same period. China and other developing countries in Asia continue to build dozens upon dozens of new coal-fired power plants each year to supply electricity to burgeoning populations.

This leads to one of the most important points that Lomborg makes in his book. "Without drastic climate policies, the expectation is that annual emissions will go up and up and up over the century." The predicted annual temperature in this scenario is around 7.4°F, or 4°C. This is not Lomborg's conclusion—it is the conclusion of UN researchers using computer models developed by the US Environmental Protection Agency. Under this model, even if all the rich countries in the world stopped all fossil fuel use in 2020 (which would grind their economies to a halt), temperatures at the end of the century would be just 0.8°F cooler. Since the US itself emits about 40% of rich country CO₂, the effect of the US abandoning fossil fuels from 2020 forward would amount to a reduction in global temperatures of about 0.33°F in year 2100. So the US alone cannot save the planet from the ravages of climate change through self-imposed restrictions on carbon emissions—not by a long shot. This seems forgotten, at times, when passions in the US flair on the subject of climate change.

What does all this tell us? It does not, as some critics of Lomborg's book assert, tell us that Lomborg thinks that climate change is inevitable or that 4°C of warming is "optimal." Instead, it should tell us we need to put the full array of climate change

weapons on the table. What if, as Lomborg asks, instead of burning half of the coal used in the world for power generation, China switched its power production to natural gas? Global CO₂ emissions cuts would be massive, dwarfing the cuts already made in the US.

Or what about increasing use of nuclear power, which emits zero carbon power? Or what about quadrupling research and development budgets, something that former President Obama proposed, so innovations such as nuclear fusion, fission, carbon capture, water splitting, geoscience engineering, or oil produced from ocean grown algae (also carbon neutral and a great way to mitigate ocean acidification) could be introduced? Or what about wind and solar energy?

WIND AND SOLAR

Few of the alternatives to wind and solar power mentioned above, and especially natural gas and nuclear power, are currently in vogue among most environmental progressives. Instead, in New York, California, and other progressive US states, and to a certain extent in Europe, natural gas and nuclear power plants are being shut down prematurely to be replaced by wind and solar facilities. I have written about the land use, inherent intermittency, and battery storage problems endemic to wind and solar power sources separately and will not revisit those subjects here. Lomborg's broader point is that, today, solar panels and wind turbines deliver about 1.1% of global energy. The International Energy Agency estimates that, by 2040, solar and wind will meet less than 5% of global energy needs. Though solar and wind are constantly trumpeted by the media as fast-growing energy sources (and statistically they are, which is to be expected on the front end when base usage levels are low), they are a long way from meeting

current global power generation needs in 2040 and beyond. They are likely to remain so in 2050, when the world is expected to have two billion more people than the seven billion living on the planet today.

President Biden, on his first day in office in January 2021, recommitted the US to the Paris Climate Accord by executive order. So, given their low current and expected low future projected contributions to the world power grid, how will utilization of solar and wind power enable the world to meet the Paris Accord goals of holding climate change increases to 2°C? Wind and solar alone obviously cannot accomplish the goal of the Paris Accord except under one scenario. That scenario would be governments around the world collectively forcing citizens to eschew all usage of fossil fuels for wind and solar power sources, political consequence be damned. But how likely is that? Putting aside the other issues with wind and power sources, what are the chances politically that billions of people will embrace exclusive reliance on wind and solar power, or something close to it, over the next three decades and before Wallace-Wells's climate change deadline expires?

The chances are not great, says Lomborg. First, the cost of such policies will fall disproportionately upon poorer countries, though they are the ones least able to afford the leap to wind and solar. Lomborg reminds that approximately a billion people in the world rely on wood and dung for their primary energy supplies. A solar panel on a thatched roof might supply power for a light at night or a cell phone charger, but it cannot deliver enough power to replace a wood-burning stove or refrigerator. What poorer countries want and need, says Lomborg, are functioning power grids like wealthier countries have. Nuclear power is an emission-free option, but high start-up costs and safety concerns, justified or not, are

chilling its expansion globally. Power grids relying on coal or natural gas as sources of fuel are currently much cheaper, more reliable, and more flexible when it comes to meeting peak demand than power grids relying primarily on wind and solar. Plus, battery storage technology has not advanced to the point where massive power grids relying exclusively on wind and solar are feasible from an engineering standpoint.

Even in a wealthy country like the US, polls indicate that the public, though it is concerned about climate change, is generally unwilling to pay the higher taxes and utility bills needed to convert the US power grid completely to wind and solar, even if it was technologically feasible. Lomborg says the estimated cost of such a total transformation of the US power grid is estimated to be in the \$23 trillion range, or roughly a \$1 trillion dollars higher than the US GNP in 2019. An Associated Press/University of Chicago poll conducted in 2018 indicated that 57% of Americans were unwilling to pay a \$1 more a month to combat climate change, that only 23% would pay \$40 a month, and only 16% would pay \$100 a month. Forty-three percent of the Americans polled were unwilling to pay anything extra per month to combat climate change. How ready then are Americans to embrace the astronomically higher utility bills that can be predicted by a premature national shift to exclusive wind and solar power generation?

So what is the solution, according to Lomborg? In three words (mine, not his)—all of the above. We should not limit ourselves to solar and wind power sources. Natural gas can serve as a bridge to nuclear power and hasten the end of coal usage. Adaptation, which is perceived by many environmentalists as “throwing in the towel,” must be embraced, not scorned, as another arrow in our quiver in the battle against climate change. Most of all, and as President

Obama proposed, massive commitments to research and development must be made to foster innovation. Who would have thought a COVID-19 vaccine could be developed as quickly as it was? Similar public/private partnerships are needed to come up with practical, economic solutions to the problem of climate change. And above all, we need a healthy, thriving global economy to create additional wealth that can simultaneously mitigate the worst effects of climate change while developing the solutions needed to eliminate it.

Another partial solution that Lomborg proposes is a worldwide carbon tax. Space does not permit a detailed discussion of his plan. Carbon taxes, generally, are favored by many economists, Al Gore, and some of the major oil companies including ExxonMobil, BP, and Shell, though most independent oil and gas producers have balked. Carbon taxes have been enacted in many foreign countries and by local jurisdictions in some US states, such as California and Colorado.

But higher taxes in any form are anathema to many Americans and the politicians who represent them. Carbon taxes would likely impact rural Americans disproportionately as mass transit options are limited outside of cities. Author and *Power Hungry* podcast host Robert Bryce has also questioned whether such taxes in the US at the federal could survive the ravages of Washington lobbyists seeking exceptions or, at an international level, loopholes in tariff laws. It would take a huge amount of both coordination and discipline for the international community to come together and then follow through with enforcement of a unified worldwide carbon tax. How likely is that?

But would carbon taxes lead more people to purchase electric vehicles? Even if electric cars were more affordable, as Lomborg

points out, they are not carbon neutral. The electricity that powers their batteries is still produced predominately in fossil fuel-powered electric plants. Carbon taxes would need to be assessed on emissions from those plants, which would be presumably passed on to consumers in higher utility bills.

THE PARIS CLIMATE ACCORD

In his book, *False Alarm*, Lomborg harshly criticizes the 2015 Paris Climate Accord. First, he makes the point that the 2°C target for limiting postindustrial emissions in the Paris Agreement was not set by scientists, but by politicians. The UN science reports, says Lomborg, never established 2°C as the tipping point where climate change becomes irreversible and disaster ensues. This is “not what science tells us,” says Lomborg, “it is what politics tells us.”

Next, Lomborg correctly points out that the 2015 Paris Agreement, like the 1997 Kyoto and 1992 Rio de Janeiro accords before it, has failed in its goal of arresting the increase of CO2 emissions worldwide. This is primarily due to increases in fossil fuel usage and, most notably, increases in coal-fired power plants in India, China, and other parts of the developing world. Even left-leaning Germany has recently announced that it will be constructing a new coal-fired power plant after overreliance on wind and solar power has caused German consumer electricity rates to skyrocket.

It is ironic that the US, despite the Trump administration’s now-rescinded withdrawal from the Paris Accord, is one of the few of the almost 200 signatories to the agreement meeting its Paris Accord commitments. This is due largely to the conversion of so many coal-fired power plants in the US to natural gas, in spite of fierce opposition to fracking by many environmentalists.

Lomborg's basic criticism of the Paris Climate Agreement is that, even if its signatories undertook all the carbon emission cuts they have agreed to so far, according to the only report the UN has released on the Paris Agreement's costs, in a best-case scenario it will cause temperatures only about 0.05°F lower by the end of the 21st century than what they would otherwise be. And this is achieved at costs to the economy, which by that time could exceed \$2 trillion annually. Lomborg then calculates the cost benefits of the Paris Agreement to be 11 cents for every dollar spent. "It's simply a bad deal for the world," he says.

So where do the \$1 in costs for every 11 cents in benefits calculated by Lomborg originate? Mostly, says Lomborg, from governmental subsidies in transitioning to wind and solar, carbon taxes, and lost growth, which today is costing the world about \$400 billion annually and is on the rise. Of these three, lost growth is what primarily concerns Lomborg. The losses in growth spawned by the Paris Accord, says Lomborg, will fall disproportionately on poorer countries who will be asked to abandon cheaper fossil fuels for less reliable wind and solar energy at a time when they are in most need of fossil fuels to lift their populations out of poverty.

Lomborg's calculations are admittedly above my head. But I note he apparently includes carbon taxes in the costs though he himself is proposing them. On the other hand, his point about wind and solar subsidies is easy to understand. As Warren Buffet famously said in 2014 when being asked about his investments in wind turbines in Iowa, "We get a tax credit if we build a lot of wind farms. That's the only reason to build them." Energy writer Robert Bryce recently reported in *Forbes* that Buffet's wind energy company, Mid America, expects to collect a whopping \$10 billion in tax credits for

spending \$12.9 billion on wind projects in Iowa.

Whether or not you accept Lomborg's calculations of the costs and benefits of the Paris Accord, it beggars belief for some climate activists (and politicians) to say that transitioning the world from fossil fuels to wind and solar over the next couple of decades will be cost neutral or cheap. Lomborg points out that the Yellow Vest movement in progressive France, which organized massive government protests against a 13-cent rise in gasoline tax, might be a harbinger of what could happen in the US if policies are adapted that dramatically raise the price of gasoline or consumer electricity bills.

Irrespective, President Biden recommitted the United States to the Paris Agreement by executive order on his first day in office. The Biden administration believes an American commitment to the Paris Accord is highly symbolic and can foster further international dialogue and progress against climate change. Even the Russians now have a seat at the table in discussing the Paris Accord following their 2019 ratification. Whether US consumers (and voters) will tolerate the higher energy costs eventually fostered by the Paris Accord, both at the pump and in their utility bills, remains to be seen.

CRITICS, ROUND ONE

Books that challenge climate change orthodoxy are bound to have critics, and *False Alarm* is no exception. Two negative reviews stand out. The first was a review of *False Alarm* appearing in the British newspaper, *The Guardian*, written by Robert ("Bob") Ward, Policy and Communications Director of the Grantham Research Institute, London School of Economics. Ward says that both Shellenberger in *Apocalypse Never* and Lomborg in *False Alarm* "rely on sources

that are outdated, cherry-picked or just wrong.” Ward, a geologist, also believes that William Nordhaus, the 2018 Winner of a Nobel Prize for his work on climate change economics, advanced conclusions that omitted the biggest risks. Apparently, Ward thinks the Nobel Prize committee got it wrong with Nordhaus.

In a follow-up two-minute review of *False Alarm* appearing on YouTube, Ward calls Lomborg “daft” for concluding that the “optimal” level of global warming would be 3.75°C by 2100. Ward claims that the last time the earth was over 2°C warmer than in preindustrial times was during the Pliocene Epoch, which occurred million years before humans appeared on the planet. Ward then dismisses *False Alarm* as “political propaganda.”

The first problem with Ward’s criticism is that nowhere in *False Alarm* does Lomborg state that 3.75°C is an “optimal” level for an increase in global warming. (I am not the only person to make that observation about Ward’s YouTube video.) Lomborg’s reference to 3.75°C was for projecting economic damages wrought by global warming in an extreme case, using an economic model that, according to Lomborg, was developed by the US government and relied upon by UN scientists in their climate reports. Elsewhere in the book, Lomborg repeatedly talks about the need to prevent extremes in global temperatures by a carbon tax, innovation, adaptation, and growing prosperity.

A second problem with Ward’s review is his assertion that the last time the world experienced over 2°C of warming compared to preindustrial times was 3 million years ago during the Pliocene Epoch. He also asserts that humans, having only been around 250,000 years, have never experienced such high global temperatures.

But what about the interglacial warming periods that have occurred during the last 250,000 years? Recent research based on studies of Greenland ice accumulated during the interglacial period known as the Eemian would contradict Ward’s claim. According to Gregory Wrightstone, author of *Inconvenient Facts: The Science That Al Gore Doesn’t Want You to Know*, the Eemian Period, which was only 115,000 to 130,000 years ago, saw temperatures 8°C (14.4°F) warmer than they are today. Yet the Eemian Period is well within the 250,000-year time span of homo sapiens. In addition, according to Wrightstone, there have been multiple interglacial periods through the 250,000-year time span of human history in which temperatures were 2°C (3.6°F) higher than at the outset of the Industrial Revolution. Wrightstone, like Ward, is an accomplished geologist with decades of experience.

Furthermore, though homo sapiens has only been around 250,000 years, animals much like humans have been around 2.5 million years, and apes, from whom Darwin tells us humans evolved, have been around for another 55 million years, which was eons before the Pliocene Epoch referenced by Ward. However, this does not mean that modern humans, air-conditioning aside, might not be more challenged by warmer temperatures than earlier humans or apes. Nor does it discount the uncertainty of the impact that rising global temperatures could have on modern humans since the world has not experienced such temperatures in a long while. This uncertainty and the existential threat that climate change poses for human survival, are acknowledged by Lomborg in *False Alarm*, though Ward implies otherwise, by saying that, “though [Lomborg] acknowledges the existence of climate change, he says there is nothing we can do about it.”

But are Ward and I reading the same book? Lomborg devotes almost a fourth of *False Alarm* to a section titled “How to Fix Climate Change.” That Ward may not agree with or discount Lomborg’s solutions does not mean that Lomborg did not suggest them. That Ward, a trained geologist, neglects to mention the Eemian and other more recent periods of interglacial warming as compared to the Pliocene Epoch—especially after calling Lomborg “daft”—is revealing.

Speaking of geologic time, a more cogent point, though Ward did not make it, is that concentrations of CO₂ in the atmosphere are today a little above 400 points per million (ppm), or about 0.04% of the atmosphere. This is the highest level of CO₂ concentration in the atmosphere, according to Wrightstone, in about 320,000 years. It is also, acknowledges Wrightstone, about 120 ppm higher than in the year 1750 when the Industrial Revolution began. This has provided the impetus behind the 350.org movement started by well-known environmentalist Bill McKibben, which is to get atmospheric concentrations back to 350 ppm through abandonment of fossil fuels as soon as possible.

But what is more important, arresting rising temperatures or getting CO₂ concentrations halfway back to preindustrial levels? Obviously, higher global temperatures and CO₂ levels are intertwined. The difference is that higher CO₂ levels are good for plant life, and as Wrightstone points out, throughout most of the earth’s history, CO₂ has been at levels higher than it is today. Higher temperatures are more problematic, having fewer benefits and exposing humans to higher risks. (Though not always—as Lomborg reminds, a lot more people die globally from cold each year than heat.) But higher temperatures can also be adapted to by humans through technologic innovations, such as making air conditioning more

efficient, portable, and affordable for masses of people in the underdeveloped world and elsewhere.

In deference to Ward, an accomplished geologist employed by one of the most prestigious academic institutions in the world, a short magazine review and a follow-up two-minute YouTube video have obvious limitations when dealing with a subject as complicated as climate change. But Ward’s diatribe against Lomborg on YouTube is an example of how quick many environmental activists, media outlets, and politicians are to dismiss anyone who expresses disagreement with them on climate change. In their view, to question prevailing climate change orthodoxy makes the questioner *ipso facto* opposed to science, if not an outright Luddite. Furthermore, since their views reflect “scientific consensus,” they are unimpeachable. Skeptics must be either dumb or unduly swayed by propaganda spewed by oil companies and their paid hirelings in conservative media and elsewhere.

But since when is “scientific consensus” a touchstone for truth? In Galileo’s time, there was a scientific consensus that the world was flat, leading to his persecution as a heretic. Scientific truth is correct, incorrect, or unknown. Consensus has little to do with it.

In the instance of climate change, many of its long-term impacts, how humans will respond, and what new technological innovations may arise to help fight are simply unknowable at the present. So should we make extreme assumptions about the dangers of climate change, plan for the worst, overspend on wind and solar power, and underspend on the many other opportunities to improve life over the course of this century for the billions of people living in poverty, plus everyone else? Lomborg would say no.

As he puts it, “That’s not just inefficient. It’s morally wrong.”

CRITICS, ROUND TWO

Another negative review of Lomborg’s *False Alarm* is by Joseph Stiglitz and appeared in the *New York Times* on July 27, 2020. Dr. Stiglitz, a professor of economics at Columbia University and Nobel Laureate (Economics, 2001), was the lead author of the original 1995 report of the IPCC. He has been an advisor to both Presidents Clinton and Obama and was Chair of the Council of Economic Advisors during the Clinton Administration (1995-1997). Like Lomborg, Stiglitz has been selected by *Time Magazine* as one of the 100 Most Influential People in the World.

Stiglitz says that Lomborg’s book is simple and simplistic. Like the first negative reviewer, Bob Ward of the London School of Economics, Stiglitz criticizes Lomborg’s reliance on the work of Stiglitz’s fellow Nobel Laureate in economics, William Nordhaus, and accuses both Nordhaus and Lomborg of bias.

Stiglitz, as a Nobel Laureate himself, certainly has standing to criticize Nordhaus, and who am I to say which economist is correct? But with due respect, Stiglitz’s criticism in his review that Lomborg implies “there’s not much we can do about climate change” is unfair, as is his assertion that Lomborg’s modeling suggests “we have invested all we wisely can in innovation. . . .”

Again, are Stiglitz and I reading the same book? To repeat, Lomborg devotes almost a fourth of *False Alarm* to a section titled “How to Fix Climate Change.” This includes a chapter discussing carbon taxes (which Stiglitz acknowledges but says Lomborg’s tax rate is too low), as well as discussions of many other possibilities that innovation,

adaptation, and free markets might bring to bear on the problem. These include nuclear fusion, fission, carbon capture, water splitting, refining oil from algae grown on ocean surfaces, and in a pinch, geoscience engineering techniques like marine cloud brightening (following exhaustive research and experimentation first to better understand its effects). Stiglitz is of course very accomplished and is no doubt aware of all the possibilities that Lomborg discussed. But again, the fact that Stiglitz may disagree with or discount Lomborg’s solutions does not mean that Lomborg did not suggest them. Stiglitz accuses Lomborg of bias while demonstrating his own.

I have little doubt that Lomborg has other critics besides Ward and Stiglitz. Likewise, I have little doubt that progressive environmentalists and their media and political allies around the world take strong exception to Lomborg’s conclusions. Words like innovation, adaptation, and free markets do not come easily to the minds and lips of environmental extremists. Recall Congresswoman Alexandra Ocasio-Cortez’s quote at the beginning of this review: “The world is going to end in twelve years if we don’t address climate change, and your biggest issue is how we are going to pay for it?” After all, they say, we are dealing with the possibility of human extinction. Any means, therefore, to combat climate change is of necessity affordable.

But is that true? Lomborg uses speed limits as an example. Car crashes kill about 40,000 people a year in the US. We could virtually eliminate all car crashes by lowering the speed limit to three miles per hour. But is the benefit worth the cost?

Shellenberger uses similar examples in his book, *Apocalypse Never*. What about asteroids? We could also spend billions more a year than the world is now on tracking

100% of errant asteroids. But NASA has done a cost-benefit analysis and has concluded that tracking 90% is good enough. Beyond that, the cost is not worth the risk.

As COVID-19 has highlighted, we could also spend billions if not trillions more each year researching cures to infectious diseases. The same can be said for a multitude of other problems—eliminating poverty, reducing infant mortality, providing infrastructure for cleaner air and water sources for all, and so forth. But even with expected increasing global prosperity, each dollar spent on climate change is a dollar less than can be spent on many other problems. All these examples get back to Lomborg’s central thesis that, since human extinction because of climate change is so highly improbable, moving too fast on climate change, without appropriate cost-benefit analysis, could be more damaging to the mass of humanity than not moving fast enough. As Lomborg said at the beginning of his book, “we need to calm down.”

CONCLUSION: “A MANAGEABLE PROBLEM”

Lomborg ends his book on an optimistic note. In his concluding chapter, Lomborg reminds that the world has been down the road of environmental alarmism before. For example, when Paul Ehrlich’s book, *The Population Bomb*, was published in the 1960s, the author predicted mass starvation

would occur in the 1980s, resulting in the deaths of two billion people. Yet Ehrlich was off by a factor of 99%. So what saved the day? Research and innovation in the form of high-yield, disease-resistant wheat strains spearheaded by an American agronomist, Norman Borlang, earning Borlang a Nobel Peace Prize in 1970.

Wallace-Wells also mentions Borlang but views him as an anomaly. Lomborg disagrees. Lomborg reminds that the past 150 years when compared to the centuries before have been a time of unbelievable technological innovation and economic growth, lifting billions of people out of poverty and immeasurably improving the quality of life for billions more. According to Lomborg, we will find a way to beat climate change without having to sacrifice global economic growth. “Global warming is real,” says Lomborg, “but it is not the end of the world. It is a manageable problem.”

False Alarm by Bjorn Lomborg is an engaging and cogent analysis of one of the great challenges the world faces today. Justice cannot be done to the book in even a lengthy review such as this one. Lomborg’s book, only 224 pages long exclusive of notes, is a relatively quick read that can greatly serve to better educate landmen and the lawyers who support them on the highly complex issue of climate change, something that is directly impacting our lives and our careers. I highly recommend it.