The political debate over climate change has long resembled a contest to see which party can discredit itself more. Liberals have seized upon outlandishly improbable climate scenarios to urge drastic and immediate action. Former vice president Al Gore, a leading liberal voice on the subject, has compared global warming to “an asteroid colliding with the Earth and wreaking havoc.” “Our food systems, our cities, our people and our very way of life developed within a stable range of climatic conditions on Earth,” Gore has written. “Without immediate and decisive action, these favorable conditions on Earth could become a memory if we continue to make the climate crisis worse day after day after day.”

The truth is that the most authoritative, mainstream scientific predictions envision some serious, undesirable changes, but hardly the dystopia of Gore’s imagination. Yet, as liberals have yelled that the sky is falling, conservatives have plugged their own ears not only to ludicrous exaggerations, but also to the available facts. Liberal alarmism could be countered with arguments and with constructive policy alternatives to the administrative power grabs that the left prefers. Instead, for years those conservatives with access to the biggest megaphones have announced that the science underlying global warming is somewhere between highly speculative and “the greatest hoax,” to quote from the title of a book on the subject by Senator James Inhofe, a Republican with significant influence on climate matters.

Many more Republicans are uncomfortable making accusations of corruption and conspiracy against so much of the scientific community, but they too have struggled to sustain an untenable position. Senate majority
leader Mitch McConnell, House speaker John Boehner, presidential candidates Bobby Jindal and Marco Rubio, and rising star Senator Joni Ernst have all adopted the new talking point on the issue: “I’m not a scientist.” This is an attempt to invoke ignorance in order to avoid embarrassment.

Scientific ignorance is not an excuse for refusing to stake out a position. Politicians rely on engineers to help them figure out which bridges are worth building, on physicists to suggest which defense projects are most feasible, and on biologists to better understand the threat of Ebola or Swine Flu. There is no reason why climate change should be different.

Of course, there are always a few scientists who challenge this mainstream view. But too often politicians have chosen the side of the outlier scientist whose conclusion they like instead of the widely accepted view that might challenge their own preferences. Now and then scientific paradigms will be radically rethought by some inventive thinker, but politicians are not to be relied upon to figure out who is a Galileo and who is a quack. Where there is an almost universally held scientific conclusion, politicians—absent some extraordinary circumstance—should take it seriously.

The Republican position—either avowed ignorance or conspiracy theorizing—is ultimately unsustainable, but some still cling to it because they believe that accepting the premise that some climate change is occurring as a result of human action means accepting the conclusions of the most rabid left-wing climate activists. They fear, at least implicitly, that the politics of climate change is just a twisted road with a known destination: supporting new carbon taxes, a cap-and-trade system, or other statist means of energy rationing, and in the process ceding yet another key economic sector to government control. Conservatives seem to be on the horns of a dilemma: They will have to either continue to ignore real scientific findings or accept higher taxes, energy rationing, and increased regulation.

This kind of conundrum is not a new problem for conservatives. In his famous essay “Why I Am Not a Conservative,” written more than half a century ago, the great Austrian economist Friedrich Hayek pointed to exactly this “propensity to reject well-substantiated new knowledge because [the conservative] dislikes some of the consequences which seem to follow from it” as the most objectionable feature of conservatism. Yet in the same essay Hayek pointed to the resolution to this problem: “By refusing to face the facts, the conservative only weakens
his own position. Frequently the conclusions which rationalist presumption draws from new scientific insights do not at all follow from them.” Hayek’s “rationalist” — akin to today’s progressive — sees the expansion of centralized state power as the eternal solution. Every new problem revealed by science, in the progressive view, can be solved by empowering expert administrators. The conservative’s response should be to embrace new scientific insights when they seem validated by available knowledge, while offering superior, market-based alternatives to the progressive’s favored solutions.

The truth is that the best approach to the problem of climate change is one rooted in deeply held conservative ideas. The right kind of approach will build on the tried policy of economic growth rather than the untried policy of carbon rationing and pricing schemes. It will recognize that society as a whole, working through its free institutions, is more adaptable and more inventive than regulators with limited imaginations tend to expect. It will seek to safeguard the future through the example of the past and the energies of the present. And it will be rooted in the most modern and reliable science.

WHAT TO EXPECT FROM CLIMATE CHANGE

First, we should acknowledge the science as we know it today. Greenhouse gases absorb and redirect longer-wavelength radiation, but not shorter-wavelength radiation. When radiation from the sun hits the earth, some of it is absorbed by the land and the sea, which are consequently warmed by the energy. As a result, when the earth re-emits the sun’s radiation in the form of heat, it is disproportionately of the lower-energy, longer-wavelength sort that the greenhouse gases, carbon dioxide (CO$_2$) foremost among them, trap or send back to earth. Thus, more carbon-dioxide emissions lead to a hotter planet. How much hotter is a complicated question that has been the subject of intense scientific inquiry over the past several decades.

The United Nations Intergovernmental Panel on Climate Change has the task of integrating the best available knowledge on technical questions relating to climate change. The IPCC produces an Assessment Report every five to seven years that seeks to forecast climate change given fairly reasonable assumptions for world population and economic growth. These projections are therefore premised on various potential global-development scenarios for the 21st century. The fifth and most
recent Assessment Report (known as AR5), published last year, projects that, without significant interventions to reduce emissions, global temperatures will rise on the order of two degrees Celsius by the end of the century in moderate emissions scenarios, and closer to four degrees in the most aggressive emissions scenarios.

Advocates for emissions controls, such as the Copenhagen Accord that the United States signed, often argue that scientific findings imply that we must keep the total global-temperature increase below two degrees Celsius in order to avoid disaster. So, it is argued, disaster looms unless we take decisive action.

Unfortunately for such advocates, the IPCC also estimates the economic impacts of various levels of warming. AR5 estimates that “global annual economic losses for additional temperature increases of ~2°C are between 0.2 and 2.0% of income” — no one’s idea of economic disaster. The median estimate of the six studies cited by the report was that three to five degrees of warming would cause a reduction of approximately 3.6% in global gross economic product (the total gross domestic product of all the world’s nations) at the end of the century. This is broadly consistent with the panel’s previous Assessment Report 4 of 2007, which itself “confirm[ed]” the results of Assessment Report 3 of 2001. AR3 estimated that a four-degree increase in global temperatures should cause a reduction in global economic output of 1% to 5%. These estimates have been stable for more than a decade.

The key takeaway is this: According to the IPCC, the expected economic costs of global warming over a hundred years from now are likely to be about 3% of GDP. Now, of course, there is more to the world than GDP, and climate change would put more than just the economy at risk, like the well-being of different species and plant life. Moreover, the damage won’t be uniformly distributed — some countries could have their economies damaged by much more than 3% and some countries by much less. The point is that 3% as a world figure signals that the challenge posed by climate change is not one of averting a global disaster in which Manhattan becomes an underwater theme park. Rather, climate change is likely to involve a modest risk that will have to be managed and a series of tradeoffs to be hotly debated.

If we are to seek to reduce the damage of greenhouse gases a hundred years from now, we will have to constrain emissions somehow in the near term. Since carbon dioxide is produced by nearly every aspect of
the industrial economy, that means we would need to reduce current-day economic growth by some amount. We have to weigh the near-term and long-term costs to economic growth from emissions-abatement policies against the long-term benefits of those policies — namely, the extent to which global warming is avoided.

This kind of tradeoff presents a classic economic problem. Some individuals are consuming an item (like carbon) that damages the well-being of others who are not involved in the transaction (such as those who will suffer from whatever effects a slightly warmer world could cause decades from now). One common way of solving the problem is to tax the item so that the amount the consumer pays is closer to the actual cost society bears. If the tax is set at the right amount, everyone is, in aggregate, better off.

Yet, even in this imagined, perfectly efficient scheme, a policy of carbon mitigation shows few net benefits. According to the modeling group led by William Nordhaus, a Yale professor widely considered to be the world’s leading expert on this kind of assessment, an optimally designed and implemented global carbon tax would provide an expected net benefit of about 0.2% of the present value of global GDP over the next several centuries. Even in Nordhaus’s theoretical world, the tax would be set at a level that would still allow about 75% of the unconstrained damages from emissions to take place, since it would be economically more damaging to set the tax high enough to prevent them.

A gain of 0.2% of future global GDP is in fact a lot of money, about $3 trillion in present value. Usually a policy predicted to net $3 trillion would be attractive. Yet, in this case, it would be unwise to work toward a global carbon tax or carbon-auctioning system. To understand why, we must move from the world of academic model-building to the real world of geostrategic competition and domestic politics. To realize this gain of $3 trillion, every nation would have to agree to and then enforce a global, harmonized tax on all significant uses of carbon and other greenhouse gases in any material form. This would require the agreement of — just to take a few examples — the Parliament of India, the Brazilian National Congress, the Chinese Politburo, the authoritarian leader of Russia, and the U.S. Congress. Each of these entities and individuals has been known throughout history to elevate narrow, sectarian interests above the comprehensive good of all mankind, to put it kindly.
For the sake of argument, let’s suppose we actually could negotiate such a binding agreement. All the side deals that would be required to get this done—ranging from grandfathering provisions for pre-existing factories and power plants, to special exemptions for “strategically important” industries, to carve-outs for poorer countries, to offsets for often dubious promises not to clear rainforests, and the like—may well create enough economic drag to more than offset the benefit of 0.2% of the present value of global output. Our track record of closing and implementing deals like the Kyoto Protocol, or even the recent rounds of WTO and regional trade deal negotiations (which, remember, are supposed to make the signatories richer), shouldn’t inspire much confidence that the theoretical net benefits will outweigh the costs created by a global greenhouse-gas agreement.

In recent years, the U.S government has not seriously considered a carbon tax, which is the carbon-mitigation policy preferred by almost all academic economists. Instead, Congress considered a cap-and-trade system, a form of emissions rationing, and the Obama administration is currently proposing sector-specific regulation of coal plants, because it is more politically palatable to hide the costs to consumers through such profoundly inefficient tools. Yet even all the side deals, offsets, special auctions, and so forth that were added to the Waxman-Markey cap-and-trade bill in 2009 were not enough to build a winning congressional coalition.

Further, even if we got to an agreement, we would then have to enforce, for hundreds of years, a set of global rules that would run directly contrary to the narrow self-interest of most people currently alive on the planet. How likely is it, for example, that a rural Chinese or Indian official would enforce the rules on a local coal-fired power plant? These bottom-up pressures would likely render such an agreement a dead letter, or at least effectively make it a tax applicable only to the law-abiding developed countries that represent an ever-shrinking share of global carbon emissions.

Despite the dire warnings from progressives, the best models show us that global warming is a problem that is expected to have only a limited impact on the world economy. Any attempt to do anything about those damages would be rife with unintended consequences and, in any case, is geopolitical fantasy. Sober minds should select laissez faire as the best of imperfect options.
CONFRONTING WORST CASES

But what if our best estimate is wrong and devastatingly optimistic? After all, it’s only an estimate. Predicting the cost impact of various potential warming scenarios requires us to concatenate these climate predictions with economic models that predict the cost impact of these predicted temperature changes on the economy in the 21st, 22nd, and 23rd centuries. It is hubris to imagine that these can guarantee accuracy, and it is impossible to validate such a claim in any event.

Though three degrees Celsius is the most likely case, competent modelers don’t assume that the most likely case is the only case. Rather, they build probability distributions for levels of warming and their associated economic impacts. For instance, there is an X% chance of warming that is four and a half degrees or greater, a Y% chance of four degrees or greater, and so on. The concern is thus with the inherently unquantifiable possibility that our probability distribution itself is wrong.

A sense of caution might lead us to suggest emissions caps as a form of insurance against the sort of devastating global warming that lies outside of the IPCC distribution. But standard cost-benefit analysis would suggest that such a precautionary policy is extraordinarily expensive. Suspend disbelief about the real-world politics for a moment, and assume that we could have a perfectly implemented global carbon tax. If the whole world introduced a tax high enough to keep atmospheric carbon concentration to no more than 420 parts per million — that’s one-and-a-half times the pre-industrial average and well above what many environmentalists worried about worst-case scenarios would deem “safe” — we would expect, using the Nordhaus analysis as a reference point, to spend about $14 trillion more than the benefits that we would achieve. To put that in context, it is an amount on the order of the annual GDP of the United States. That’s a heck of an insurance premium for an event so unlikely that it is literally outside of the probability distribution.

So what should we do? On some intuitive level, it is clear that rational doubt about our probability distribution of forecasts for climate change over the next century should be greater than our doubt surrounding the likelihood that a flipped quarter will land on heads around 500 times of 1,000. Yet we cannot incorporate this doubt into an alternative probability distribution without doing our own armchair climate science
in place of the IPCC, nor is it responsible to set a goal and announce “whatever it takes!” Furthermore, taking drastic action would also ignore the possibility that our models might be over-estimating the risks involved. It makes sense to try to prepare for the possibility of greater harm than we now project, but that goal has to be pursued in a way that takes account of the actual risks and costs involved.

As it happens, the problem of climate catastrophe is not without likenesses. There are other potential, unquantifiable dangers that are of comparable likelihood and severity to that of outside-of-distribution climate change. Our policy toward these dangers is never one of unreserved caution.

Start with the example of an asteroid striking the Earth. The consensus scientific estimate is that there is a 1-in-10,000 chance that an asteroid large enough to kill a large fraction of the world’s population will hit the earth in the next 100 years. That is, we face a 0.01% chance of sudden death for most people in the world, likely followed by massive climate change on the scale of that which killed off the non-avian dinosaurs. This scenario seems reasonably comparable to outside-of-distribution climate change. The U.S. government currently spends about $4 million per year on asteroid detection, in spite of an estimate that $1 billion per year spent on detection plus interdiction would be sufficient to reduce the probability of impact by 90%. Clearly for some potentially lethal threats we are unwilling to insure ourselves at spending levels that are orders of magnitude less than what is proposed for mitigating climate change.

Unfortunately for humanity, we face many dimly understood dangers: bioengineering technology gone haywire; a regional nuclear war in central Asia kicking off massive global climate change (in addition to its horrific direct effects); a global pandemic triggered by a modified version of the HIV or Avian Flu virus; or a rogue state weaponizing genetic-engineering technology. This list could go on almost indefinitely. To do everything conceivably possible to prevent catastrophic climate change is to become lost in the hot house of single-issue monomaniacs and to ignore the array of dangers and opportunities that we confront.

A healthy society is constantly scanning the horizon for threats and developing contingency plans to meet them. Yet the loss of economic and technological development that would be required to eliminate all theorized climate-change risk—or all risk from genetic and computational technologies or, for that matter, all risk from killer
asteroids—would cripple our ability to deal with virtually every other foreseeable and unforeseeable risk, not to mention our ability to lead productive and satisfying lives in the meantime.

We can be confident that humanity will face many difficulties in the upcoming century, as it has in every century. We just don’t know which ones they will be. In the face of massive uncertainty, hedging one’s bets and keeping one’s options open is almost always the right strategy. Money, technology, and a flexible and creative political and economic culture are the raw materials that will give us the most options to deal with physical dangers. Markets, democratic political institutions, and economic growth are therefore the means toward greater adaptability in the future.

**The Energy Innovation Example**

America faces a tradeoff in which neither option is appealing. On the one hand, we could continue to create wealth and, because of carbon emissions, see meaningful reductions in the rate of economic growth in less than a century. On the other hand, we could significantly clip the wings of the American economy, making ourselves poorer now and, because of compounding, possibly poorer later.

When presented with option A or option B, neither being ideal, the entrepreneur chooses to invent C. This is, in a way, what has happened in the energy sector over the past decade and can continue to happen. America has experienced a technology-driven energy revolution with little inducement or guidance from Washington. Within the last decade, the United States has developed a new green-energy technology, leading to the fastest rate of reduction in CO₂ emissions of any major country in the world and to permanent reductions in absolute emissions. The Department of Energy expects that energy-related carbon emissions will remain below 2005 levels for decades, despite population growth.

This enduring, structural change in the American energy sector is the result of a series of innovations allowing us to extract so-called unconventional fossil fuels. The most important of these innovations has been hydraulic fracturing, often called “fracking,” but other important developments include tight-oil extraction, horizontal drilling, and new applications of information technology. These combined efforts have allowed us to produce much more energy—an increase nearly equivalent to the total output of Iraq or Kuwait—and far cleaner energy. The
fracking revolution has shifted American energy sources toward gas and away from coal. Since natural gas emits about half the carbon dioxide that coal does, our impact on the climate has been reduced. America’s reduction in emissions—to say nothing of the jobs we’ve created and the energy independence we’re obtaining—is cause for celebration.

The elaborate climate models don’t account for this kind of innovation. Although they are, in a sense, models of change, they actually tend to be very static compared to the real world, as they can’t predict large structural shifts due to technological innovation. In the future, radically cleaner fuel sources or technologies that could remove carbon from the atmosphere would be game-changers in the debate about climate policy, just as the fracking revolution has already changed the conversation.

The question is how to bring about such game-changers.

The American energy revolution provides an example. It is important to remember that less than a decade ago, virtually no one saw the rapid development of an alternative energy source on the horizon. In 2008, the International Energy Agency projected that U.S. oil and natural-gas production would remain flat or decline somewhat through about 2030. The discussion of technological solutions focused on far-off, highly speculative, panacea-like technologies such as wind and solar energy. Yet there was something latent in the American economy that allowed it to dramatically and unexpectedly disprove policymakers’ lack of imagination.

The United States was able to launch its recent energy revolution for the same reason it has had revolutions in information technology, biotechnology, and certain other sectors. Three core elements undergird all these revolutions: a foundation of free markets and strong property rights; the new-economy innovation paradigm of entrepreneurial start-ups with independent financing and competitive-cooperative relationships with industry leaders; and support by government technology investments. (For a fuller discussion of these, see Jim Manzi’s “The New American System,” in the Spring 2014 issue of National Affairs.)

The primary driver has been the regulatory framework of strong property rights and free pricing. Among the world’s key petroleum-producing countries, only the United States allows private entities to control large-scale oil and gas reserves. And outside of North America, hydrocarbon pricing is typically governed by detailed regulatory frameworks that are built around the realities of conventional petroleum production. Freer pricing, in combination with ownership of mineral
rights, allows innovators in America to reap the economic rewards of their imagination and risk-taking.

Most of the recent technological advances have been made through trial-and-error and incremental improvements—a kind of Darwinian competition among a network of independent companies—as opposed to huge one-time projects by industry giants or quasi-governmental organizations. That is a credit to America’s more flexible regulatory structure.

Finally, government has served the role of catalyst rather than manager. The Breakthrough Institute has produced reliable evidence that government subsidies for speculative technologies and research over at least 35 years have played a role in the development of the energy boom’s key technology enablers, such as 3-D seismology, diamond drill bits, and horizontal drilling. Government-led efforts that are less obviously related—such as detailed geological surveys and earlier defense-related expenditures that enabled the U.S.-centered information-technology revolution, which has in turn created the capacity to more rapidly develop “smart drilling” technology—have also been important.

While various government ministers in well-tailored suits spent lots of time over the last several decades meeting in Copenhagen and Rio de Janeiro to talk *ad nauseam* about how the key to ameliorating climate change is to make human beings do as they are told, the American system rode to the rescue by inventing and deploying new technology at scale. It is a system that conservatives routinely defend against progressives who want government to manage more and more. And it is a system that has done more than any other to substantially reduce carbon emissions. It would be foolish to think that system couldn’t do it again.

**Technology, not taxes**

In *How to Think Seriously About the Planet*, the conservative philosopher Roger Scruton argues that conservatism and conservation share a root that is not just etymological. They are both policies of “husbanding resources and ensuring their renewal.” Just as conservatives have championed the enduring value of our constitutional order, the institutions that have supported the free market, and our cultural capital, so too should they preserve and maximize our material capital on this planet. And the way to preserve our ecological riches is through those very same systems conservatives have long worked to conserve: a free market and a limited, flexible state.
The science is in. It is dubious at best to argue that large-scale attempts to manage the economy and mitigate carbon emissions will make us wealthier in the long run. The best models show that any realistic carbon tax—or worse, any set of command-and-control regulations or any crony-capitalist, carbon-credit auction scheme—will make us poorer, not richer. The first rule of conservative policymaking is to do no harm. Conservatives should oppose every large-scale, government-run carbon-mitigation plan, including the carbon tax that some on the right, like former congressman Bob Inglis, have hailed. Rigorous examination shows it would be better to do nothing than to accept the progressives’ favored options.

Conservatives, however, should not limit themselves to merely opposing Waxman-Markey. They can champion an agenda that understands human beings to be much more imaginative than the economic models expect. By fostering the legal and economic ecosystems most conducive to breakthrough energy technologies, conservatives can help lessen the harms of climate change. As stated above, this includes the property rights and modest regulatory state that allow would-be innovators to learn through trial and error.

The second priority should be the kinds of public policies that actually help foster innovation. Investment in general infrastructure—both classic projects, like roads and bridges, and newer ones, in the area of digital infrastructure—grease the economic wheels. We also need to invest in visionary technologies that are too long-term, too speculative, or have benefits too diffuse to be funded by private companies.

During the 1980s and ’90s, the Department of Energy drastically increased its micromanagement of its labs in response to Congressional pressure to reduce waste and increase safety. This removed responsibility for core operating decisions—including personnel, travel, and project management—from the contractors that operate the labs to the DOE itself. This has greatly constrained the ability of the labs to flexibly pursue new innovations. The labs should be returned to a more independent contractor-led model with clearer goals but greater operational flexibility. We might, for example, set for one lab the goal of driving the true unit-cost of energy produced by a solar cell below that of coal, and a second lab the same task for nuclear power.

At least one lab should be devoted to the geo-engineering technologies that can remove carbon dioxide from the atmosphere or mollify its heating effects. There is no reason why we should seek only technologies that lower
our carbon use when the real goal is to avoid the damaging effects of a much warmer world. Because it tries to “engineer” a system we know very little about, geo-engineering should be pursued with utmost prudence and held in reserve as a “break glass in case of emergency” option.

We should also reckon with the fact that discovering breakthrough technologies is not guaranteed, so our best option might be to adapt to a slightly warmer world. Trees and reflective paint are proven to cool urban areas substantially. There are likely other adaptations to be made. As the world becomes warmer, local municipalities are going to demand adaptive technologies, and innovators will work to produce better and better solutions.

Third, innovation will require human capital. Greater high-skill immigration will bring innovators here, and a better education system will make innovators out of today’s young people. Rather than ask government to “know” how to procure certain innovations by funding this or regulating that, public policy should help procure problem-solvers for the private sector. The focus of government action under this approach is to help create greater capabilities, not to direct resources.

There are many unknowns surrounding the question of climate change. We don’t know how much the world will warm. We don’t quite know how that will affect our day-to-day well-being. We can only estimate economic and ecological effects, and we can only speculate about future technologies—we don’t know what kind of energy revolutions or geo-engineering feats are scientifically and practically possible. The proper response to a future we do not know is to build upon what we do know: the systems, institutions, and dispositions that have helped us solve problems and improve our lives.

All of these proposed policies build upon successes. When it comes to climate change, the Republican Party need not theorize about conspiracies or hide behind ignorance. It should confront the facts as scientists generally understand them, as well as the limits of that understanding, and it should seek to empower innovators looking for solutions. The answer to the complex question of climate change will be neither a regulatory Rube Goldberg machine nor a massive new tax. Rather, conservatives should champion what they so frequently suggest as the best way to solve complex problems: policies that open the space for the private sector to innovate and adapt.