

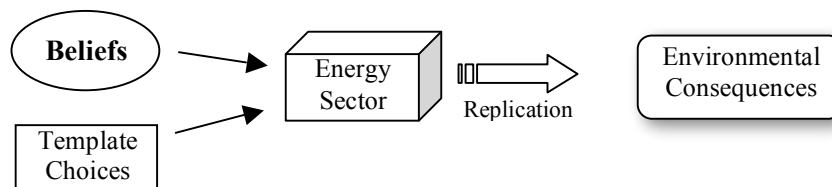
CHAPTER EIGHT

Choosing Our Beliefs Carefully*Energy Choices and the Battle over Beliefs*

We are in the midst of an interesting political contest in the United States just now. It is far more polarized along identity lines than it should be. Those who brand themselves as “conservatives” see rejection of the global warming argument as part of their identity branding, just as those who brand themselves as liberals see acceptance of the global warming argument as part of their identity brand. It creates an odd alignment on economics. Conservatives normally champion the free market as an engine of innovation, but not on energy matters, where they prefer the traditions of Big Oil and Big Coal. And liberals, who so often worry that innovation kills off blue collar middle class jobs, are now the stronger champions of energy industry innovation. It is an odd realignment of the two camps.

The stakes in this contest are enormous. Established energy corporations enjoy enormous flows of wealth and understandably dislike the argument that the days of coal and oil and natural gas should soon be brought to an end. On the other side are all those, environmentalists and others, who see climate disaster as a terrible threat to the future well-being of all humanity, one to be averted by fundamental changes in how we produce and consume energy.

And this contest creates a vigorous battle over what it is we are all to believe, both about the energy industry and about the susceptibility of the climate to a rising concentration of carbon dioxide. How we act will depend on our beliefs. The battle to shape the belief battlefield has been joined, and we are all in the midst of it.



Are we to accept the existing templates for fossil fuel combustion, and replicate them without a second thought, as rapidly as we can, for as long as we are able? Or shall we switch to a full portfolio of renewable energy templates, and replicate them with the same enthusiasm we used to give to coal and oil?

This is not a simple umpiring call. A long ball down the foul line into the stands is either fair, and a home run, or foul. The ball is hit. It sails to one side or the other of the foul pole. It's all in plain sight and everyone knows the right call.

In this instance, though, the fossil fuel industry wants to send billions of tonnes of carbon

dioxide into the air every year, for decades to come, and no one absolutely knows for sure whether it will be fair or foul, from a climate perspective, till it is far too late for anyone to make amends, should the claims of the fossil fuel industry turn out to have been wrong. We have to make a reasonable guess, now, as to the ultimate consequences. The future does not yet exist, and cannot possibly text us with the final results.

I know several conservatives who are viscerally incapable of even imagining that global warming is an issue. For them it is not a rational debate, not a subject for fair-minded weighing of competing claims. It is an issue of deep conviction. They cannot stand Al Gore; so if Al Gore said it, it must be wrong. No evidence to the contrary has a chance of being considered.

They are in good company. On the American Solutions website, sponsored by Newt Gingrich and others, one finds not a trace of concern for the consequences of endless increases in total carbon dioxide. A 2009 mailing from the Heritage Foundation, a prominent conservative think tank, polls conservatives on their reactions to President Obama's agenda. It asks but one question of renewable energy – can it replace fossil fuel in the near future? Tellingly, the Heritage Foundation doesn't even want to know whether its conservative audience regards global warming as an issue to be taken seriously. There are some topics that conservative Republicans do not mention in polite society, and, sadly, the risk of global warming is one of them.

There are a number of legitimate scientists who remain unconvinced by the argument that rising amounts of atmospheric carbon dioxide can make a serious difference, either now or in the future. The earth's climate system is extremely complicated, pushed and pulled by a great many variables, and has shown considerable variation in the past without any help from humans. How can we know that modest additions to a trace gas like carbon dioxide really matter at all?

A spirit of honorable scientific debate is, of course, exactly what America needs at this crucial juncture. Thoughtful citizens on both sides have an obligation to listen to honest argument on both sides. If the weight of the argument indicates that global warming is indeed a serious risk, political ideology should be irrelevant. Patriotism ought incline all of us to want a constructive response.

But honorable argument and respectful disagreement is not the sort of climate we see very often in today's America. On both sides of this issue, as with so many issues, we see instead flat-out partisan attacks aimed and shaping and controlling public beliefs. Evidence and nuance and trade-offs are nowhere to be seen. The habits by which we develop our beliefs weaken our culture and make it more difficult for us to teach ourselves to be stewards of the common good.

Shaping Beliefs to Protect the Status Quo

On the conservative side, three sets of evidence strike me as being particularly telling.

One is the artful way in which Exxon seeks to shape public opinion while keeping its own image out of the picture. Exxon helps fund dozens and dozens of "institutes" and "research" organizations that do "educational" and "scientific" work. If an independent research organization publishes a paper casting doubt on climate change, this will be picked up as news by today's understaffed media and played up as part of the controversy over global warming. Exxon's money and Exxon's name don't appear on the organization's letterhead and won't be mentioned in the press release that explains its research findings. Were the same story to be issued by a public relations firm, operating openly as a spokesperson for Exxon's interests, it would have far less

impact. Funding others to make the case for the Exxon point of view has much greater political value.

Fortunately, those troublesome folks at Greenpeace have gone to some trouble to document Exxon's conduct as a corporate donor. They have created a website, exxonsecrets.org, on which they list more than a hundred organizations that benefit from Exxon funding. The campaign to discredit global warming in the public eye may appear to come from a thousand different sources, but the financial energy behind the campaign has more concentrated origins.

Sober scientific reasoning is not, alas, part of the code of honor for many who campaign on behalf of today's fossil fuel energy templates. Take, for example, one of the prominent books written to discredit the notion of global warming, *Unstoppable Global Warming: Every 1500 Years*, by Fred Singer and Dennis Avery. The central issue, as should be obvious by now, is the consequence of allowing the carbon dioxide overload to grow larger and larger without any limit. What will happen to the climate when the carbon dioxide overload reaches 60%? Or 100%? Or 160%? Those who claim that fossil fuels are safe have an obligation, as scientists, to focus on the central threat and give us a responsible argument as to why these ever-rising stocks of carbon dioxide pose no danger. I read the Singer and Avery book with interest, curious to see how they would approach this vital question.

Finally they got to it, and they gave it all of half a page, dismissing it with a single quote from a gentleman, John Bluemle, whom they introduced as the North Dakota State Climatologist. Here is what Mr. Bluemle has to say:

“Atmospheric physics is quite clear that increasing CO₂ concentrations increases temperature. The best way to demonstrate this is to model the temperature of the atmosphere with all CO₂ removed. It is *very* cold. Then, increase CO₂ by small increments and plot the graph of temperature increase. It is very rapid initially and then flattens out. Doubling CO₂ from today's concentration, holding all other parameters constant, has a ‘negligible’ effect.”¹

This statement subtly distorts the message of atmospheric physics. The formula that physicists use to correlate temperature with concentrations of carbon dioxide is a logarithmic formula. By raising total carbon dioxide from 2,175 billion tonnes (280 ppm) to 3,000 billion tonnes, we have raised the total by 38%, and set in motion a temperature increase whose full effects won't be felt for some years to come, as ocean temperatures slowly but surely rise to a new level. Should we raise the carbon dioxide concentration by another 38%, from 3,000 billion tonnes to 4,140 billion tonnes, we will generate a similar increase in temperature, with a similar amount of delay as oceans rise to the new equilibrium state. The temperature curve slows down, but it is grossly misleading to say that it flattens out. And this argument also leaves out the issue of climate risk. The warmer the planet becomes, the more severe the possible climate change becomes. The temperature curve may slowly decline, but what we really want to know is whether the climate risk curve declines, rises on a linear path, or accelerates. Odds are that the risk of climate damage follows an accelerating curve, even if the temperature curve from CO₂ slows down.

More importantly, Singer and Avery mis-state Mr. Bluemle's credentials. He has never been North Dakota's State Climatologist.² He is a geologist, and has written on climate change from a geologist's perspective. The American Association of Petroleum Geologists co-published a book,

Geological Perspectives on Global Climate Change, produced by its Ad Hoc Committee on Global Climate Change. One of the chapters in this book was written by John Bluemle.³

So there we are. A petroleum geologist from North Dakota isn't too worried about rising levels of carbon dioxide, because his model shows a flattening temperature curve. You now have it on good authority that today's carbon dioxide overload can grow from 38% to 60% to 160% and it really won't matter.

This would be laugh-out-loud funny if it weren't so serious. When Singer and Avery first published their book, they were celebrated in a full page, page two story in the *Washington Times*, the conservative daily owned by Sun Myung Moon. They are touted as serious authorities, though they have nothing of substance to say about what will happen to temperatures as the carbon dioxide overload grows and grows and grows some more.

The larger point about this contest over beliefs, as it is being prosecuted by conservatives, is that it has no boundaries and no sense of honor. Scientists who have raised concerns about global warming, and who see evidence that supports the global warming hypothesis, are never honored as sincere and responsible professionals. The propaganda message is always the same. They're in it for the celebrity, for the grant money, for the chance to get their papers published. Thousands of scientists are regularly slandered as crooks rather than honored as hard-working professionals. The central issue – what will happen as carbon dioxide levels rise higher and higher – is routinely avoided. Side issues get the spotlight, and any little tidbit that can be cast as a refutation of global warming is seized upon as a “Gotcha!” Contradictory opposing theories are offered with a straight face. The Earth isn't warming. The Earth is warming, but only because the sun is producing more heat. The Earth is warming because solar storms change the upper atmosphere in ways that promote short term warming. All of these are meant to be true at the same time. Yet the greenhouse effect – a known scientific phenomenon – cannot possibly explain any part of what's happening.

The point of the propaganda campaign is to convince us that we are powerless. Learned powerlessness is the goal, and everything in the campaign is designed to achieve that goal. Learned powerlessness turns us into enablers of an industry whose survival goals are inconsistent with our national interest, inconsistent with our obligations to our children and grandchildren, and inconsistent with the common good. If we believe that global warming isn't “real,” the propagandists have won. They've convinced us that slandering science is a legitimate behavior for American citizens. They've convinced us not to think long. They've convinced us that we as a nation are not smart enough to create a new and healthier energy sector, so we best stay with what we have.

Beliefs that Reinforce In-Group Environmentalism

On the other side of the belief-shaping contest are those who find the risks alarming and who are convinced strong action is called for to avert the possibility of devastating climate consequences.

On the whole, these forces have not done a good job of explaining the central issue nor of describing the central solution. Their belief problem is rather different. They are so taken by their own beliefs that they fail to see the errors in their own reasoning. They are not half as useful to the public at large as they ought to be, and as a consequence we have fallen years behind on addressing this issue properly.

For many years, scientists and environmentalists have described the global warming problem as a carbon dioxide emissions problem. Because annual emissions are so high, the Earth is getting warmer. And, as the obvious corollary, for global warming to be halted, annual emissions have to be reduced.

One can understand the inclination of some scientists to frame the issue in these terms. That's how their climate models work. Plug in an annual emissions scenario, run the model for 36,500 days worth of global weather effects, and see what sort of global temperature increase it predicts. If global temperatures rise, on average, by only 1° Celsius, we're doing well. If global temperatures rise by 4° or 5° Celsius, we could be in real trouble.

This sort of modeling habituates scientists to a very particular way of describing global warming. The input logic is framed in annual emissions, the output logic is framed as a temperature increase. When people spend their working lives thinking in these terms, that's how they're likely to describe their findings to the public.

As so often happens in politics, though, what started out as a simplistic phrase got picked up and enshrined as a mantra. Environmentalists uncritically accepted the language they were given and turned it into their own. And they went a natural step further. If emissions are the problem, emission regulations must therefore be the solution. We've already been there and done that, haven't we? We did that with the Clean Air Act. Smokestack emissions were a problem, and we curbed the problem by regulating the emissions. Tailpipe emissions were another problem, and we curbed that problem too by regulating the emissions. So here we are again, with carbon dioxide emissions coming both from our smokestacks and our tailpipes. The reflexive response was almost hard-wired. Carbon dioxide emissions, too, must be regulated at the smokestack and the tailpipe. Just like before, with the Clean Air Act.

This is what happens we don't train ourselves to think rigorously. We get sloppy, and we reach for the soundbites at hand, because they seem to be right. Yet everything about these reflexive responses was wrong.

The science was wrong. Global temperature increase is a function of the total stock of carbon dioxide in the atmosphere. It's the 3,000 billion tonnes of carbon dioxide that go into CO₂'s share of the greenhouse effect, not the 30 billion tonnes of annual emissions, nor the 15 billion tonnes that the atmosphere annually retains. It is the total *stock* of CO₂ that drives global warming, not the annual *flow*.

The confusion among environmentalists on this point is much like the public confusion on the distinction between the national debt and the annual deficit. The annual deficit is a flow concept. The national debt is a stock concept. The deficit in normal times might be \$300 billion or \$600 billion or a number somewhere in that range. The national debt might be \$10 trillion in all, the total accumulation of years of deficits. Each year the Federal Government has to pay interest to its lenders. It would be nice if the lenders charged interest only on the annual deficit, but they're smarter than that. They charge interest on the entire debt. And it would be nice if global warming were being driven only by annual emissions, but that's not the case either. Global warming is driven by the total stock of CO₂. By stating the global warming as an emissions problem, environmentalists were guilty of deeply misleading the public into seeing the issue as one that can be resolved simply by cutting down on the annual flow. If we cut down today, or next year, or even

fifty years, what difference will it make? Once we cut back on annual emissions, the global warming problem will go away. That's the implicit message the environmentalists sent, by focusing only on annual flows, and that's the implicit message the public received. The public learned exactly the wrong lesson – timing doesn't matter. In fact, timing is everything. If we can cap atmospheric CO₂ at, say, 3,500 billion tonnes, the Earth won't be as hot as if we wait to cap CO₂ at 4,000 billion tonnes, or 4,500 billion tonnes, or somewhat more. The greater the delay, the greater the stock of CO₂ and the more severe the climate consequences.

By couching the solution in tailpipe and smokestack terms, environmentalists also misled everyone about the shape of the future we should strive to achieve. The implication was obvious – stay with fossil fuels, but consume them more sparingly. Tomorrow's energy sector will still depend on fossil fuels, but we will have to cut back on their use.

The problem is that carbon dioxide emissions at almost any magnitude will continue to drive the total stock of CO₂ to higher and higher amounts. What difference does it really make if we drive the stock of carbon dioxide into the Red Zone a bit more slowly, rather than with the pedal to the metal? If 3,700 billion tonnes turns out to be a fatal mistake, topping that threshold slowly rather than quickly will make no material difference to humanity's suffering. Had the world's leading environmental organizations been more honest with themselves, and with the rest of us, they would have stated the truth plainly and responsibly. We cannot run the global economy on an energy system that raises the total stock of carbon dioxide out of the safety zone and into the danger zone. We have to switch to a global energy system that keeps the stock of carbon dioxide in the safety zone where it belongs. Now and for the next ten thousand years. It is time to plan an orderly and timely conversion. The more quickly we are able to phase in carbon neutral energy technology, the more quickly we shall succeed in phasing out fossil fuel energy technology.

But this wasn't done. Environmentalists couldn't bring themselves to state the problem accurately, nor could they bring themselves to state the solution responsibly. What we got, instead, was a terrible form of code. They said "emission reductions" but they meant "a cap on the total stock of carbon dioxide." They said "more efficient automobiles" but what Mother Nature requires of us are automobiles that no longer burn fossil fuel.

This is not the only point in this book that we will run into the terrible consequences of a political culture that doesn't give a rip about stating issues with the accuracy they require. Our school superintendents are habitually incapable of describing the challenge of public education in language that helps us leave behind the mistakes of the past. Our highway people cannot properly describe the dynamics by which growing metro areas so consistently create gridlock nightmares. Our Washington politicians cannot bring themselves to speak honestly about Social Security solvency. And of course George Bush's national security team could not bring itself to think rigorously about what would happen in Iraq after the toppling of Saddam Hussein. Nor could his domestic advisers bring themselves to think honestly about what would happen in New Orleans if a major hurricane were to hit dead on. And no one was capable of thinking clearly about what would happen to the global financial system if the world of go-go banking was allowed to hide toxic assets in off-balance sheet contrivances. The sound bite war over global warming is but a symptom of a terrible misreading of what it means to be a patriot and a citizen in modern day America. We cannot be good citizens if we insist on propagandizing ourselves and each other. Environmental

groupthink gave us a terrible misreading of what global warming is all about; White House groupthink gave us a terrible misreading of what the Iraq War would entail; Democratic Party groupthink gives us a terrible distortion of where Social Security is taking us; Washington groupthink completely disables our ability to think rationally about how to take cost out of our monstrously expensive medical sector. And on and on and on. What we did to ourselves around global warming is but a symptom of what we do to ourselves repeatedly, on issues that require deep honesty and maturity, on every front of any importance in our national life.

It is time to stop and count to ten. What is the point of characterizing global warming as “an emissions problem” and characterizing the solution in “emissions reduction” terms, when neither of those phrases point us in the right direction? Isn’t it time for a moratorium on feeding ourselves stupid pills?

From Careless Beliefs to Thoughtful Beliefs

Had we been more wise, as a society, executives in our energy corporations would long ago have recognized their responsibility to think clearly about the ways in which carbon dioxide might be undercutting critical forms of environmental capital. Leaders in our environmental groups would long ago have realized that they were facing a problem of excess stocks, not just annual flows, and they would have found better language to describe the problem. Business executives and environmental leaders, both, would have realized that what we now faced was an energy risk problem. Fossil fuel energy might be too risky to be adopted as our twenty-first century energy answer. It might be time for an energy answer that is considerably less risky.

What we face, we might have realized, is an extraordinary problem of asymmetric risk.

That’s a nice What If, but we cannot really reinvent the past. We must learn from it, and face the present with as much responsibility as it deserves. We humans face a bet. Are we to bet on the safety of fossil fuels, by staying with them? Or are we to bet that fossil fuels are too dangerous to retain, and adopt a plan that replaces fossil fuel technology with post fossil fuel technology? Whichever bet we place, it is up to Nature to give the verdict, to unfold the consequences for the natural environment of the bet we have placed. If our guess was correct, we enjoy the benefit we predicted. If our guess was wrong, we suffer the consequences of error.

The following two-by-two diagrams the possibilities.

		Nature’s Verdict	
		SAFE	NOT SAFE
Our Fossil Fuel Bet	Safe	Benign Climate	Climate Catastrophe
	Not Safe	Premature Technology Shift	New Tech Averts Catastrophe

If we bet that fossil fuels are safe, and Nature’s verdict agrees, we end up in the Benign

Climate quadrant, the upper left corner. Or, if Nature rules against us, we end up in the Climate Catastrophe quadrant, the upper right corner. Should we bet that fossil fuels are not safe, and decades later somehow realize that Nature didn't care, we will land ourselves in the lower left corner, Premature Technology Shift. Finally, if it is Nature's verdict that fossil fuels were indeed unsafe, and we have successfully moved our chips onto a safer energy portfolio, we will come to rest in the quadrant I have labeled "New Tech Averts Catastrophe."

These four possible outcomes lie at the heart of the issue. Together, not just as Americans, but as members of the same generations living in all the nations of our shared planet, we have a common bet to make. We can bet on fossil fuel energy, and run the risk that Nature's verdict will go against us. Or we can bet on new generation energy technologies, and expose ourselves to the different risk of having moved our chips earlier than we had to.

Suppose we bet on the first option, fossil fuel safety, and we are wrong. Carbon dioxide is irreversibly higher, by hundreds of billions of tonnes, global temperatures are irreversibly warmer, and global climate has been irreversibly changed, with catastrophic consequences for hundreds of millions of people. No one can put Humpty Dumpty together again. That is the future we will have wished upon our descendants, and they will be stuck with it. We can never undo the damage, and we can never make them whole for the harm we have caused them. Bet on the first option, and have Nature rule against us, and that is the fate we will dump upon them.

Suppose, on the other hand, that we bet on the second option, the "Unsafe" option, and mandate a thorough elimination of fossil fuel energy through the adoption of a broad portfolio of carbon neutral and zero carbon technologies. Later on, half a century or a century from now, we somehow divine that all that effort had been premature by several decades. Have our descendants suffered as a consequence?

We know there will be regional economic costs, stretched over three or four decades but still of considerable consequence. Certain regions of the world will have lost revenue. Coal towns will have folded up shop. Drilling fields will have been shut down. Coal trains will no longer run. Of course, annual spending on fossil fuels will have fallen by a trillion dollars, just in the U.S., to say nothing of the savings to many other countries. Yes, some communities will have suffered an economic dislocation, but the economy as a whole is likely to be at least as well off as it would have been otherwise. One one-thousandth of the America's daily dose of solar energy, roughly 50 terawatt-hours a day, is very nearly enough, by itself, to drive our whole economy. If we have in place a system that captures all this free sunshine, plus geothermal energy, plus wave energy, the American economy of the future will run just as vigorously as the American economy of the present.

How shall we compare these two risks? Bet on fossil fuels, wrongly, and we lock future generations into an inferior climate, perhaps catastrophically inferior. We poison the oceans with carbonic acid, and if we do that for too long, we exterminate shellfish and coral.

Bet against fossil fuels, wrongly, and future generations end up with an energy system that costs no more than today's, and may well cost somewhat less. After all, one can never run a balance of payments deficit with the sun.

We are faced with asymmetric risk. Bet on the first option and lose, and we get catastrophe. Bet on the second option and lose, and we incur many short term economic dislocations, but over the long run we still reap economic benefit. The climate is healthier. And the oceans are less toxic.

No one, in the skeptics' camp, can guarantee the safety of fossil fuel energy. They can assert it, loudly, and with the backing of Exxon subsidized research institutes, but they cannot prove it. And they certainly cannot warrant its safety. The fine print disclaims all warranty responsibility. Let the buyer beware.

In the renewable energy camp, roughly the same observation holds. No one can prove, with absolute certainty, that fossil fuels positively must be abandoned in order to avert deadly climate change. There are many who believe this to be true, but the proof is in Nature's hands, not ours.

So, faced with this uncertainty, how shall we decide? Shall we go with those who would have us put the climate at risk? Or shall we go with those whose capital budget agenda in the end might have been unnecessary? Which would our grandchildren want us to do? Which would a prudent investor do? How does one conduct due diligence with the future of the planet possibly at stake? Should we bet on fossil fuels, even though the cost of being wrong can be catastrophic? Or should we bet on next generation energy?

One way or another, we will move forward. If we do nothing, our bet is made for us. Long ago we bet on fossil fuels. Are we still comfortable with this bet? Can we justify it to our grandchildren? Or is it time to change our bet?

Beliefs. They take hold of us and shape us. But the reverse is also true. We are responsible for the quality and integrity of the beliefs we hold, and if we discover that the beliefs we have adopted were not well-chosen, we have an ethical obligation to reconsider our beliefs.

This is not a matter to be settled with snap judgments and dueling soundbites, not one to be settled in a spirit of partisan rivalry. There is but one Earth, one Creator, and one human family. We should be tender with one another, and we should strive to practice wisdom. Together. And we should prayerfully work out, together, what we truly believe to be our best course of action.

¹ S. Fred Singer, Dennis T. Avery. *Unstoppable Global Warming: Every 1,500 Years*. Rowman & Littlefield. 2007. P 179.

² See <http://www.ndsu.edu/ndsu/ndSCO/about/history/northdakota.html> for a list of those individuals who have served as state climatologists in North Dakota.

³ See <http://spot.colorado.edu/~jsedr/BookReviews/August2003/Gerhard.pdf>