

Margaret Atwood, “It’s not climate change – It’s everything change,” *Medium*, 27 July 2015, <https://medium.com/matter/it-s-not-climate-change-it-s-everything-change-8fd9aa671804>

Oil! Our secret god, our secret sharer, our magic wand, fulfiller of our every desire, our co-conspirator, the sine qua non in all we do! Can’t live with it, can’t—right at this moment—live without it. But it’s on everyone’s mind.

Back in 2009, as fracking and the mining of the oil/tar sands in Alberta ramped up—when people were talking about Peak Oil and the dangers of the supply giving out—I wrote a piece for the German newspaper Die Zeit. In English it was called “The Future Without Oil.” It went like this:

The future without oil! For optimists, a pleasant picture: let’s call it Picture One. Shall we imagine it?

There we are, driving around in our cars fueled by hydrogen, or methane, or solar, or something else we have yet to dream up. Goods from afar come to us by solar-and-sail-driven ship—the sails computerized to catch every whiff of air—or else by new versions of the airship, which can lift and carry a huge amount of freight with minimal pollution and no ear-slitting noise. Trains have made a comeback. So have bicycles, when it isn’t snowing; but maybe there won’t be any more winter.

We’ve gone back to small-scale hydropower, using fish-friendly dams. We’re eating locally, and even growing organic vegetables on our erstwhile front lawns, watering them with greywater and rainwater, and with the water saved from using low-flush toilets, showers instead of baths, water-saving washing machines, and other appliances already on the market. We’re using low-draw lightbulbs—incandescents have been banned—and energy-efficient heating systems, including pellet stoves, radiant panels, and long underwear. Heat yourself, not the room is no longer a slogan for nutty eccentrics: it’s the way we all live now.

Due to improved insulation and indoor-climate-enhancing practices, including heatproof blinds and awnings, air-conditioning systems are obsolete, so they no longer suck up huge amounts of power every summer. As for power, in addition to hydro, solar, geothermal, wave, and wind generation, and emissions-free coal plants, we’re using almost foolproof nuclear power. Even when there are accidents it isn’t all bad news, because instant wildlife refuges are created as Nature invades those high-radiation zones where Man now fears to tread. There’s said to be some remarkable wildlife and botany in the area surrounding Chernobyl.

What will we wear? A lot of hemp clothing, I expect: hemp is a hardy fiber source with few pesticide requirements, and cotton will have proven too costly and destructive to grow. We might also be wearing a lot of recycled tinfoil—keeps the heat in—and garments made from the recycled plastic we’ve harvested from the island of it twice the size of Texas currently floating around in the Pacific Ocean. What will we eat, besides our front-lawn vegetables? That may be a problem—we’re coming to the end of cheap fish, and there are other shortages looming. Abundant animal protein in large hunks may have had its day. However, we’re an inventive species, and when push comes to shove we don’t have a lot of fastidiousness: being omnivores, we’ll eat anything as long

as there's ketchup. Looking on the bright side: obesity due to over-eating will no longer be a crisis, and diet plans will not only be free, but mandatory.

That's Picture One. I like it. It's comforting. Under certain conditions, it might even come true. Sort of. More or less.

Then there's Picture Two. Suppose the future without oil arrives very quickly. Suppose a bad fairy waves his wand, and poof! Suddenly there's no oil, anywhere, at all.

Everything would immediately come to a halt. No cars, no planes; a few trains still running on hydroelectric, and some bicycles, but that wouldn't take very many people very far. Food would cease to flow into the cities, water would cease to flow out of the taps. Within hours, panic would set in.

The first result would be the disappearance of the word "we": except in areas with exceptional organization and leadership, the word "I" would replace it, as the war of all against all sets in. There would be a run on the supermarkets, followed immediately by food riots and looting. There would also be a run on the banks—people would want their money out for black market purchasing, although all currencies would quickly lose value, replaced by bartering. In any case the banks would close: their electronic systems would shut down, and they'd run out of cash.

Having looted and hoarded some food and filled their bathtubs with water, people would hunker down in their houses, creeping out into the backyards if they dared because their toilets would no longer flush. The lights would go out. Communication systems would break down. What next? Open a can of dog food, eat it, then eat the dog, then wait for the authorities to restore order. But the authorities—lacking transport—would be unable to do this.

Other authorities would take over. These would at first be known as thugs and street gangs, then as warlords. They'd attack the barricaded houses, raping, pillaging and murdering. But soon even they would run out of stolen food. It wouldn't take long—given starvation, festering garbage, multiplying rats, and putrefying corpses—for pandemic disease to break out. It will quickly become apparent that the present world population of six and a half billion people is not only dependent on oil, but was created by it: humanity has expanded to fill the space made possible to it by oil, and without that oil it would shrink with astounding rapidity. As for the costs to "the economy," there won't be any "economy." Money will vanish: the only items of exchange will be food, water, and most likely—before everyone topples over—sex.

Picture Two is extreme, and also unlikely, but it exposes the truth: we're hooked on oil, and without it we can't do much of anything. And since it's bound to run out eventually, and since cheap oil is already a thing of the past, we ought to be investing a lot of time, effort, and money in ways to replace it.

Unfortunately, like every other species on the planet, we're conservative: we don't change our ways unless necessity forces us. The early lungfish didn't develop lungs because it wanted to be a land animal, but because it wanted to remain a fish even as the dry season drew down the water around it. We're also self-interested: unless there are laws mandating conservation of energy, most won't do it, because why make sacrifices if others don't? The absence of fair and enforceable energy-use rules penalizes the conscientious while enriching the amoral. In business, the laws of

competition mean that most corporations will extract maximum riches from available resources with not much thought to the consequences. Why expect any human being or institution to behave otherwise unless they can see clear benefits?

In addition to Pictures One and Two, there's Picture Three. In Picture Three, some countries plan for the future of diminished oil, some don't. Those planning now include—not strangely—those that don't have any, or don't need any. Iceland generates over half its power from abundant geothermal sources: it will not suffer much from an oil dearth. Germany is rapidly converting, as are a number of other oil-poor European countries. They are preparing to weather the coming storm.

Then there are the oil-rich countries. Of these, those who were poor in the past, who got rich quick, and who have no resources other than oil are investing the oil wealth they know to be temporary in technologies they hope will work for them when the oil runs out. But in countries that have oil, but that have other resources too, such foresight is lacking. It does exist in one form: as a Pentagon report of 2003 called “An Abrupt Climate Change Scenario and its Implications for United States National Security” put it, “Nations with the resources to do so may build virtual fortresses around their countries, preserving resources for themselves.” That's already happening: the walls grow higher and stronger every day.

But the long-term government planning needed to deal with diminishing oil within rich, mixed-resource countries is mostly lacking. Biofuel is largely delusional: the amount of oil required to make it is larger than the payout. Some oil companies are exploring the development of other energy sources, but by and large they're simply lobbying against anything and anyone that might cause a decrease in consumption and thus impact on their profits. It's gold-rush time, and oil is the gold, and short-term gain outweighs long-term pain, and madness is afoot, and anyone who wants to stop the rush is deemed an enemy.

My own country, Canada, is an oil-rich country. A lot of the oil is in the Athabasca oil sands, where licenses to mine oil are sold to anyone with the cash, and where CO₂ is being poured into the atmosphere, not only from the oil used as an end product, but also in the course of its manufacture. Also used in its manufacture is an enormous amount of water. The water mostly comes from the Athabasca River, which is fed by a glacier. But due to global warming, glaciers are melting fast. When they're gone, no more water, and thus no more oil from oil sands. Maybe we'll be saved—partially—by our own ineptness. But we'll leave much destruction in our wake. The Athabasca oil-sand project has now replaced the pyramids as the must-see manmade colossal sight, although it's not exactly a monument to hopes of immortality. There has even been a tour to it: the venerable Canadian company Butterfield & Robinson ran one in 2008 as part of its series “Places on the Verge.”

Destinations at risk: first stop, the oil sands. Next stop, the planet. If we don't start aiming for Picture One, we'll end up with some version of Picture Two. So hoard some dog food, because you may be needing it.

It's interesting to look back on what I wrote about oil in 2009, and to reflect on how the conversation has changed in a mere six years. Much of what most people took for granted back

then is no longer universally accepted, including the idea that we could just go on and on the way we were living then, with no consequences. There was already some alarm back then, but those voicing it were seen as extreme. Now their concerns have moved to the center of the conversation. Here are some of the main worries.

Planet Earth—the Goldilocks planet we’ve taken for granted, neither too hot or too cold, neither too wet or too dry, with fertile soils that accumulated for millennia before we started to farm them — that planet is altering. The shift towards the warmer end of the thermometer that was once predicted to happen much later, when the generations now alive had had lots of fun and made lots of money and gobbled up lots of resources and burned lots of fossil fuels and then died, are happening much sooner than anticipated back then. In fact, they’re happening now.

Here are three top warning signs. First, the transformation of the oceans. Not only are these being harmed by the warming of their waters, in itself a huge affector of climate. There is also the increased acidification due to CO₂ absorption, the ever-increasing amount of oil-based plastic trash and toxic pollutants that human beings are pouring into the seas, and the overfishing and destruction of marine ecosystems and spawning grounds by bottom-dragging trawlers. Most lethal to us—and affected by warming, acidification, toxins, and dying marine ecosystems—would be the destruction of the bluegreen marine algae that created our present oxygen-rich atmosphere 2.45 billion years ago, and that continue to make the majority of the oxygen we breathe. If the algae die, that would put an end to us, as we would gasp to death like fish out of water.

A second top warning sign is the drought in California, said to be the worst for 1,200 years. This drought is now in its fourth year; it is mirrored by droughts in other western U.S. states, such as Utah and Idaho. The snowpack in the mountains that usually feeds the water supplies in these states was only 3% of the norm this winter. It’s going to be a long, hot, dry summer. The knockon effect of such widespread drought on such things as the price of fruit and vegetables has yet to be calculated, but it will be extensive. As drought conditions spread elsewhere, we may expect water wars as the world’s supply of fresh water is exhausted.

A third warning sign is the rise in ocean levels. There have already been some noteworthy flooding events, the most expensive in North America being Hurricane Katrina, and the inundation of lower Manhattan at the time of Hurricane Sandy in 2012. Should the predicted sea-level rise of a foot to two feet take place, the state of Florida stands to lose most of its beaches, and the city of Miami will be wading. Many other lowlying cities around the world will be affected.

This result, however, is not accepted by some of the politicians who are supposed to be alert to dangers threatening the welfare of their constituents. The present governor of Florida, Rick Scott, is said to have issued a memo to all government of Florida employees forbidding them to use the terms “climate change” and “global warming,” because he doesn’t believe in them (though Scott has denied this to the press). I myself would like to disbelieve in gravitational forces, because then I could fly, and also in viruses, because then I would never get colds. Makes sense: you can’t see viruses or gravity, and seeing is believing, and when you’ve got your head stuck in the sand you can’t see a thing, right?

The Florida government employees also aren’t allowed to talk about sea-level rise: when things get very wet inside people’s houses, it’s to be called “nuisance flooding.” (If the city of Miami

gets soaked, as it will should the level rise the two feet predicted in the foreseeable future, it will indeed be a nuisance, especially in the real-estate sector; so the governor isn't all wrong.) What a practical idea for solving pesky problems: let's not talk about it, and maybe it will go away. The Canadian federal government, not to be outdone in the area of misleading messages, has just issued a new map that shows more Arctic sea ice than the previous map did. Good news! The sea ice is actually increasing! So global warming and climate change doesn't exist? How reassuring for the population, and how convenient for those invested in carbon fuels!

But there's some fine print. It seems that this new map shows an *average* amount of sea ice, and the averaging goes back thirty years. As the Globe and Mail article on this new map puts it:

In reality, climate change has been gnawing away at the planet's permanent polar ice cap and it is projected to continue doing so.

'It's a subtle way, on a map, to change the perspective on the way something is viewed,' said Christopher Storie, an assistant professor of geography at the University of Winnipeg and president of the Canadian Cartographic Association.

Whereas the older version of the map showed only that part of the sea ice that permanently covered Arctic waters year round at that time, the new edition uses a 30-year median of September sea-ice extent from 1981 through 2010. September sea ice hit a record low in 2012 and is projected to decline further. The change means there is far more ice shown on the 2015 version of the map than on its predecessor.

'Both are correct,' Dr. Storie said. 'They've provided the right notation for the representation, but not many people will read that or understand what it means.'

Cute trick, wouldn't you say? Not as cute as Florida's trick, but cute. And both tricks emphasize the need for scientific literacy. Increasingly, the public needs to know how to evaluate the worth of whatever facts they're being told. Who's saying it? What's their source? Do they have a bias? Unfortunately, very few people have the expertise necessary to decode the numbers and statistics that are constantly being flung at us.

Both the Florida cute trick and the Canadian map one originate in worries about the Future, and the bad things that may happen in that future; also the desire to deny these things or sweep them under the carpet so business can go on as usual, leaving the young folks and future generations to deal with the mess and chaos that will result from a changed climate, and then pay the bill. Because there will be a bill: the cost will be high, not only in money but in human lives. The laws of chemistry and physics are unrelenting, and they don't give second chances. In fact, that bill is already coming due.

There are many other effects, from species extinction to the spread of diseases to a decline in overall food production, but the main point is that these effects are not happening in some dim, distant future. They are happening now.

In response to our growing awareness of these effects, there have been some changes in public and political attitudes, though these changes have not been universal. Some acknowledge the situation, but shrug and go about their daily lives taking a “What can I do?” position. Some merely despair. But only those with their heads stuck so firmly into the sand that they’re talking through their nether ends are still denying that reality has changed.

Even if the deniers can be brought reluctantly to acknowledge the facts on the ground, they display two fallback positions: 1) The changes are natural. They have nothing to do with humankind’s burning of fossil fuels. Therefore we can keep on having our picnic, such as it is, perhaps making a few gestures in the direction of “adaptation”—a seawall here, the building of a desalination plant there—without worrying about our own responsibility. 2) The changes are divine. They are punishments being inflicted on humankind for its sins by supernatural agency. In extreme form, they are part of a divine plan to destroy the world, send most of its inhabitants to a hideous death, and make a new world for those who will be saved. People who believe this kind of thing usually number themselves among the lucky few. It would, however, be a mistake to vote for them, as in a crisis they would doubtless simply head for higher ground or their own specially equipped oxygen shelters, and then cheer while billions die, rather than lifting a finger to save their fellow citizens.

Back in 2009, discussion of the future of energy and thus of civilization as we know it tended to be theoretical. Now, however, action is being taken and statements are being made, some of them coming from the usual suspects—“left-wingers” and “artists” and “radicals,” and other such dubious folks—but others now coming from directions that would once have been unthinkable. Some are even coming—mirabile dictu!—from politicians. Here are some examples of all three kinds:

In September 2014, the international petition site Avaaz (over 41 million members) pulled together a Manhattan climate march of 400,000 people, said to be the largest climate march in history. On April 11, 2015, approximately 25,000 people congregated in Quebec City to serve notice on Canadian politicians that they want them to start taking climate change seriously. Five years ago, that number would probably have been 2,500. Just before that date, Canada’s most populous province, Ontario, announced that it was bringing in a cap-and-trade plan. The chances of that happening five years ago were nil.

In case anyone thinks that it’s only people on the so-called political left that are concerned, there are numerous straws in the wind that’s blowing from what might once have been considered the resistant right. Henry Paulson, Secretary of the Treasury under George W. Bush, has just said that there are two threats to our society that are even greater than the 2008 financial meltdown he himself helped the world navigate: environmental damage due to climate change, and the possible failure of China. (Chinese success probably means China can tackle its own carbon emissions and bring them under control; Chinese failure means it probably can’t.)

In Canada, an organization called the Ecofiscal Commission has been formed; it includes representatives from the erstwhile Reform Party (right), the Liberal Party (centrist), and the NDP (left), as well as members from the business community. Its belief is that environmental problems can be solved by business sense and common sense, working together; that a gain for the

environment does not have to be a financial loss, but can be a gain. In America, the Tesla story would certainly bear this out: this electric plug-in is doing a booming business among the rich. Meanwhile, there are other changes afoot. Faith-based environmental movements such as A Rocha are gaining ground; others, such as Make Way For Monarchs, engage groups of many vocations and political stripes. The coalition of the well-intentioned and action-oriented from finance, faith, and science could prove to be a very powerful one indeed.

But will all of this, in the aggregate, be enough?

Two writers have recently contributed some theorizing about overall social and energy systems and the way they function that may be helpful to us in our slowly unfolding crisis. One is from art historian and energetic social thinker Barry Lord; it's called *Art and Energy* (AAM Press). Briefly, Lord's thesis is that [the kind of art a society makes and values is joined at the hip with the kind of energy that society depends on](#) to keep itself going. He traces the various forms of energy we have known as a species throughout our pre-history—our millennia spent in the Pleistocene—and in our recorded history—sexual energy, without which societies can't continue; the energy of the body while hunting and foraging; wood for fire; slaves; wind and water; coal; oil; and “renewables”—and makes some cogent observations about their relationship to art and culture. In his Prologue, he says:

Everyone knows that all life requires energy. But we rarely consider how dependent art and culture are on the energy that is needed to produce, practice and sustain them. What we fail to see are the usually invisible sources of energy that make our art and culture(s) possible and bring with them fundamental values that we are all constrained to live with (whether we approve of them or not). Coal brought one set of values to all industrialized countries; oil brought a very different set... I may not approve of the culture of consumption that comes with oil... but I must use [it] if I want to do anything at all.

Those living within an energy system, says Lord, may disapprove of certain features, but they can't question the system itself. Within the culture of slavery, which lasted at least 5,000 years, nobody wanted to be a slave, but nobody said slavery should be abolished, because what else could keep things going?

Coal, says Lord, produced a culture of production: think about those giant steel mills. Oil and gas, once they were up and running, fostered a culture of consumption. Lord cites “the widespread belief of the 1950s and early '60s in the possibility of continuing indefinitely with unlimited abundance and economic growth, contrasted with the widespread agreement today that both that assumption and the world it predicts are unsustainable.” We're in a transition phase, he says: the next culture will be a culture of “stewardship,” the energy driving it will be renewables, and the art it produces will be quite different from the art favored by production and consumption cultures.

What are the implications for the way we view both ourselves and the way we live? In brief: in the coal energy culture—a culture of workers and production—you are your job. “I am what I make.” In an oil and gas energy culture—a culture of consumption—you are your possessions. “I am what I buy.” But in a renewable energy culture, you are what you conserve. “I am what I save and protect.” We aren't used to thinking like this, because we can't see where the money will come

from. But in a culture of renewables, money will not be the only measure of wealth. Well-being will factor as an economic positive, too.

The second book I'll mention is by anthropologist, classical scholar, and social thinker Ian Morris, whose book, *Foragers, Farmers, and Fossil Fuels: How Human Values Evolve*, has just appeared from Princeton University Press. Like Barry Lord, Morris is interested in [the link between energy-capture systems and the cultural values associated with them](#), though in his case it's the moral values, not only the aesthetic ones—supposing these can be separated—that concern him. Roughly, his argument runs that each form of energy capture favors values that maximize the chance of survival for those using both that energy system and that package of moral values. Hunter-gatherers show more social egalitarianism, wealth-sharing, and more gender equality than do farmer societies, which subordinate women—men are favored, as they must do the upper-body-strength heavy lifting—tend to practice some form of slavery, and support social hierarchies, with peasants at the low end and kings, religious leaders, and army commanders at the high end. Fossil fuel societies start leveling out gender inequalities—you don't need upper body strength to operate keyboards or push machine buttons—and also social distinctions, though they retain differences in wealth.

The second part of his argument is more pertinent to our subject, for he postulates that each form of energy capture must hit a “hard ceiling,” past which expansion is impossible; people must either die out or convert to a new system and a new set of values, often after a “great collapse” that has involved the same five factors: uncontrolled migration, state failure, food shortages, epidemic disease, and “always in the mix, though contributing in unpredictable ways— climate change.” Thus, for hunting societies, their way of life is over once there are no longer enough large animals to sustain their numbers. For farmers, arable land is a limiting factor. The five factors of doom combine and augment one another, and people in those periods have a thoroughly miserable time of it, until new societies arise that utilize some not yet exhausted form of energy capture.

And for those who use fossil fuels as their main energy source—that would be us, now—is there also a hard ceiling? Morris says there is. We can't keep pouring carbon into the air—nearly 40 billion tons of CO₂ in 2013 alone—without the consequences being somewhere between “terrible and catastrophic.” Past collapses have been grim, he says, but the possibilities for the next big collapse are much grimmer.

We are all joined together globally in ways we have never been joined before, so if we fail, we all fail together: we have “just one chance to get it right.” This is not the way we will inevitably go, says he, though it is the way we will inevitably go unless we choose to invent and follow some less hazardous road.

But even if we sidestep the big collapse and keep on expanding at our present rate, we will become so numerous and ubiquitous and densely packed that we will transform both ourselves and our planet in ways we can't begin to imagine. “The 21st century, he says, “shows signs of producing shifts in energy capture and social organization that dwarf anything seen since the evolution of modern humans.”

Science fiction? you may say. Or you may say “speculative fiction.” For a final straw in the wind, let’s turn to what the actual writers of these kinds of stories (and films, and television series, and video games, and graphic novels) have been busying themselves with lately.

A British author called Piers Torday has just come out with a Young Adult book called *The Wild Beyond*. In April, he [wrote a piece](#) in *The Guardian* that summarizes the field, and explains the very recent term, “cli-fi.”

“Cli-fi” is a term coined by blogger Dan Bloom to describe fiction dealing with the current and projected effects of climate change. ... Cli-fi as a new genre has taken off in a big way and is now being studied by universities all over the world. But don’t make the mistake of confusing it with sci-fi. If you think stories showing the effects of climate change are still only futuristic fantasies, think again. For example, I would argue that the only truly fantastical element in my books is that the animals talk. To one boy. Other cli-fi elements of my story that are often described as fantastical or dystopian, include the death of nearly all the animals in the world. That’s just me painting an extreme picture, right, to make a good story? I wish.

The recent 2014 [WWF Living Planet Report](#) revealed that the entire animal population of the planet had in fact halved over the last 40 years. 52% of our wildlife, gone, just like that. Whether through the effects of climate change to the growth in human population to the depredation of natural habitats, the children reading my books now might well find themselves experiencing middle-age in a world without the biodiversity we once took for granted. A world of humans and just a few pigeons, rats and cockroaches scratching around... So, how about the futuristic vision of a planet where previously inhabited areas become too hot and dry to sustain human life? That’s standard dystopian world-building fare, surely?

Yes, except that right now, as you read this, super developed and technological California—the eighth largest economy in the world, bigger than Russia—is suffering a record breaking drought. The lowest rainfall since 1885 and enforced water restrictions of up to 25%. They can track every mouse click ever made from Palo Alto apparently, but they can’t figure out how to keep the taps running. That’s just California—never mind Africa or Australia.

*Every effect of climate change in the books—from the rising sea levels of *The Dark Wild* to the acidic and jelly-fish filled oceans in *The Wild Beyond*, is happening right now, albeit on a lesser level.*

Could cli-fi be a way of educating young people about the dangers that face them, and helping them to think through the problems and divine solutions? Or will it become just another part of the “entertainment business”? Time will tell. But if Barry Lord is right, the outbreak of such fictions is in part a response to the transition now taking place—from the consumer values of oil to the stewardship values of renewables. The material world should no longer be treated as a bottomless cornucopia of use-and-toss endlessly replaceable mounds of “stuff”: supplies are limited, and must be conserved and treasured.

Can we change our energy system? Can we change it fast enough to avoid being destroyed by it? Are we clever enough to come up with some viable plans? Do we have the political will to carry out such plans? Are we capable of thinking about longer-term issues, or, like the lobster in a pot full of water that's being brought slowly to the boil, will we fail to realize the danger we're in until it's too late?

Not that the lobster can do anything about it, once in the pot. But we might. We're supposed to be smarter than lobsters. We've committed some very stupid acts over the course of our history, but our stupidity isn't inevitable. Here are three smart things we've managed to do:

First, despite all those fallout shelters built in suburban backyards during the Cold War, we haven't yet blown ourselves up with nuclear bombs. Second, thanks to Rachel Carson's groundbreaking book on pesticides, *Silent Spring*, not all the birds were killed by DDT in the '50s and '60s. And, third, we managed to stop the lethal hole in the protective ozone layer that was being caused by the chlorofluorocarbons in refrigerants and spray cans, thus keeping ourselves from being radiated to death. As we head towards the third decade of the 21st century, it's hopeful to bear in mind that we don't always act in our own worst interests.

“For everything to stay the same, everything has to change,” says a character in Giuseppe di Lampedusa's 1963 novel, *The Leopard*. What do we need to change to keep our world stable? How do we solve for $X+Y+Z$ — X being our civilization's need for energy, without which it will fall swiftly into anarchy; Y being the finite nature of the earth's atmosphere, incapable of absorbing infinite amounts of CO₂ without destroying us; and Z being our understandable wish to live full and happy lives on a healthy planet, followed by future human generations doing the same. One way of solving this equation is to devise more efficient ways of turning sunlight into electrical energy. Another way is to make oil itself—and the CO₂ it emits—part of a cyclical process rather than a linear one. Oil, it seems, does not have to come out of the ground, and it doesn't have to have pollution as its end product.

There are many smart people applying themselves to these problems, and many new technologies emerging. On my desk right now is a list of 15 of them. Some take carbon directly out of the air and turn it into other materials, such as cement. Others capture carbon by regenerating degraded tropical rainforests—a fast and cheap method—or sequestering carbon in the soil by means of biochar, which has the added benefit of increasing soil fertility. Some use algae, which can also be used to make biofuel. One makes a carbon-sequestering asphalt. Carbon has been recycled ever since plant life emerged on earth; these technologies and enterprises are enhancing that process.

Meanwhile, courage: homo sapiens sapiens sometimes deserves his double plus for intelligence. Let's hope we are about to start living in one of those times.