

INDUSTRY'S PLAN FOR US

[Rachel's introduction: The fossil fuel corporations have a plan for us, and it does not include any substantial investment in renewable solar energy. Their plan is focused on "geo-engineering" -- which means re-engineering the oceans, the atmosphere and the earth itself to make it possible to continue burning fossil fuels. U.S. EPA is on board with the plan.]

By Peter Montague

It now seems clear that the coal and oil industries are not going to allow the United States to curb global warming by making major investments in renewable sources of energy. These fossil fuel corporations simply have too much at stake to allow it.

Simple physics tells us that the way to minimize the human contribution to global warming is to leave the remaining fossil fuels in the ground -- stop mining them as soon as humanly possible. This obvious solution would require us to turn the nation's industrial prowess to developing solar power in its many forms as quickly as we can -- we would need a "["Manhattan Project' for Energy,"](#)" as the strategy journal of [the top U.S. military planners](#) said recently.

Look at the relative size of our current government investments in solar vs. fossil fuels. In 2007 the federal Department of Energy spent [\\$168 million](#) on solar research. On the other hand each year since 1991 the U.S. government has spent 1000 times that amount -- \$169 billion -- subsidizing the flow of oil from the Middle East, according to the [Joint Chiefs of Staff](#), our top military planners. And that figure doesn't include what consumers paid for the oil itself. If our solar investment remains one-tenth of one percent of our investment in oil, there will be no solar power to speak of in our future.

A rapid shift to renewables based on solar would not be easy and I don't want to minimize the effort required. It's stupendously large. But we've undertaken heroic industrial projects before -- and with notable success. We mobilized quickly and massively to defeat the combined industrial might of Germany, Japan, and Italy in less than five years after Pearl Harbor. The original [Manhattan Project](#) turned a

physicist's theory into a working A-bomb in less than 6 years; just building the gaseous diffusion plant near Oak Ridge, Tennessee was a scientific, engineering and industrial feat of astonishing magnitude and complexity. The [Marshall Plan](#) successfully rebuilt Europe after WW II. Our Man-on-the-Moon program succeeded just 11 years after the Russians tweaked our national ego by launching Sputnik into orbit in 1957.

Yes, a shift to solar-powered renewables would be difficult, but it's doable. Unfortunately, any plan to shift from fossil fuels to solar has three fatal flaws, from the viewpoint of Big Oil and Big Coal:

1. The fossil fuel corporations have an enormous investment in fossil infrastructure and they own vast quantities of fossil fuels that they plan to exploit with little real effort over the next 50 years. They have been making excellent profits for a century and, as fossil fuels get scarcer, prices will only rise. In 2006, ExxonMobil reaped profits larger than any other corporation in history (\$39.5 billion). If the U.S. does not invest seriously in renewable alternatives, we'll have no choice but to pay whatever price the fossil corporations demand. Just a few days ago oil hit \$90 a barrel; eight years ago it was selling for \$10 a barrel. No wonder [ExxonMobil now has a book value larger than the national budget of France](#). Naturally, they intend to maintain their market share, even if it means doing everything in their power to thwart progress.

2. The fossil fuel business is 100 years old and fully understood. No surprises lie ahead. But renewables? Who knows which renewables will win out in the marketplace of ideas? If Uncle Sam were to invest as much money in solar power as it has so far invested in the Iraq war (roughly \$800 billion), who knows what new technologies would emerge? (Incidentally, if we maintain our current solar research budget at \$168 million per year, it will be 4761 years before we have spent as much on solar research as we have, so far, spent in Iraq.) New technical innovations could be very unsettling for complacent industries like coal and oil. For them, innovation spells trouble. Innovation could render them irrelevant in a decade or two and they could disappear just like the makers of whale-oil lamps and buggy whips 100 years ago.

3. Coal and oil are highly centralized. It's their nature. Whoever owns the fossil fuels, the big central power plants, and the distribution systems can call the shots.

But solar? The sun shines everywhere and it's free. Suppose some woman at MIT develops a solar panel that you paint onto your roof (from a can you buy at Home Depot), attach some wires, and start generating your own electricity? Central control disappears. This would be like tossing a hand grenade into the current corporate/political structure. Of course even right-wing politicians love lefty-sounding slogans like "power to the people," but they don't mean real power like electricity or hot water or home-made hydrogen for transportation fuel. (Check out the Nova TV program, "[Saved by the Sun](#)," which briefly mentions paint-on solar panels.)

No, a serious plan to focus the nation's industrial prowess onto a solar-powered rebirth will not be allowed by the fossil corporations. Instead we'll be offered a rolling circus of technical fixes aimed at keeping coal and oil streaming out of the ground. The circus is already well under way.

A Sulfur Parasol to Blot Out the Sun

Just this week the New York Times published [a proposal to attach a fire hose to some lighter-than-air balloons](#) for the purpose of injecting at least a million tons of sulfur particles into the upper atmosphere, to create a giant parasol to cool the planet. Such a scheme might further deplete the Earth's ozone shield, which remains frayed from DuPont's earlier botched experiment with [CFCs](#). And it could create large-scale acid rain. But contemplating these clownish Rube Goldberg solutions may at least relieve the stress of facing what really needs to be done.

A new word enters our vocabulary: Geo-engineering

Instead of allowing the U.S. to make the transition to solar power, the fossil corporations have evidently decided it's better to re-engineer the oceans and the atmosphere -- and perhaps even the planetary orbit of the Earth itself -- to make it possible to continue burning fossil fuels for another 50 years.

Grand schemes for re-engineering the planet now have their own special name -- geo-engineering. The word means, "global-scale interventions to alter the oceans and the atmosphere so fossil corporations can continue business as usual."

The fire-hose-and-balloon project is only one of many "geo-engineering" schemes

in the works.

Fertilizing the Oceans with Iron

There are serious plans afoot to [dump huge quantities of soluble iron into the oceans](#) as fertilizer, intending to stimulate the growth of plankton, which will then eat carbon dioxide from the air. As the plankton die, their carcasses will sink to the bottom of the ocean, carrying all that carbon dioxide with them, where it will remain for... for... well, actually, nobody knows for how long. How long might it be before that dormant carbon dioxide comes back to bite us? Nobody knows. Would such a plan disrupt life in the oceans? Nobody knows. But private firms are pressing ahead with large-scale ocean- fertilization experiments as we speak. (They are hoping to get rich selling "carbon credits" to polluters so the fossil corporations can continue contaminating the atmosphere with carbon dioxide. We might well ask the ethical question, who gave these cowboys permission to run geo-engineering experiments in the world's oceans?)

This is all very reminiscent of earlier plans to [bury nuclear waste in the floor of the Pacific Ocean](#), on the theory that the seabed has lain dormant for many millions of years. But that plan never caught on because few people could develop sufficient confidence that the future would unfold exactly like the past. There was that nagging doubt... what if we've missed something important and we turn out to be wrong? What if our understanding is flawed? There was too much at stake, and the plan was shelved. (With carbon dioxide, of course, there's far more at stake.)

Mirrors in Orbit

Now there's a new plan to rocket [mirrors into orbit](#) around the earth. Another parasol to block sunlight. The mirrors would consist of a mesh of aluminum threads a millionth of an inch in diameter, "like a window screen made of exceedingly fine metal wire," says Lowell Wood at Lawrence Livermore Lab, who dreamed up the idea. The only drawback to this plan mentioned so far is its enormous dollar cost: to reduce incoming sunlight by 1% would require -- get this -- 600,000 square miles of mirror, which is larger than the combined areas of Arkansas, Alabama, Louisiana, Mississippi, Pennsylvania, Ohio, Virginia, Tennessee, Kentucky, Indiana, Maine, South Carolina, West Virginia, Maryland, Hawaii, Massachusetts, Vermont, New Hampshire, New Jersey, Delaware and

Rhode Island.

Of course the U.S. has a long history of large-scale interventions above the clouds. In 1962 we conducted an experiment called "[Starfish Prime](#)" in which we exploded a small nuclear weapon (equivalent to 1.4 million tons of TNT) 400 miles up in the atmosphere, just to see what would happen. What happened came as a complete surprise to the geniuses who set off the blast. The explosion left so much residual radiation trapped in space that the world's first communication satellite -- Telstar, which was launched after Starfish -- failed because it encountered crippling levels of radiation. Ultimately, one-third of all the low-orbit satellites in space at the time were disabled by the residual radiation from Starfish Prime. Another unanticipated cost of Starfish was the temporary shutdown of communications and electrical supply in Hawaii, 1300 kilometers from the blast. Who knew?

Project RBR

Despite lessons supposedly learned from Starfish, just last year the Pentagon proposed [a project called RBR](#) ("Radiation Belt Remediation"). The RBR project would generate "very low frequency radio waves to flush particles from the [Van Allen] radiation belts and dump them into the upper atmosphere over one or several days." (There are two Van Allen radiation belts; the one closest to earth lies 400 to 4000 miles in the sky.) The stated purpose of the RBR project is to "protect hundreds of low earth-orbiting satellites from having their onboard electronics ruined by charged particles in unusually intense Van Allen radiation belts 'pumped up' by high-altitude nuclear explosions or powerful solar storms." It seems the Pentagon is making plans for conducting nuclear warfare above the clouds. But I digress.

Luckily a small group of scientists from Britain, New Zealand and Finland (organized as the "British Antarctic Survey") caught wind of the RBR plan and actually gave it some thought. They concluded that RBR would "significantly alter the upper atmosphere, seriously disrupting high frequency (HF) radio wave transmissions and GPS navigation around the world." The world's commercial (and military) transport systems are now almost completely dependent upon [GPS](#) navigation, so disrupting the global GPS system would create economic chaos, not to mention loss of life. Who knew?

A Plan to Change the Earth's Orbit

As pressure builds on the fossil corporations to quit contaminating the atmosphere with CO₂, plans for geo-engineering the planet grow ever-more grandiose and desperate. There is now talk of moving the Earth 1.5 million miles out of its orbit around the sun, to compensate for doubling carbon dioxide levels in the atmosphere. Ken Caldeira of Stanford University has calculated that moving the Earth in this fashion would [require the energy](#) of five thousand million million hydrogen bombs (that's 5,000,000,000,000,000 hydrogen bombs). No doubt the Pentagon is studying it with considerable interest.

The Biggest Geo-engineering Project: Carbon Sequestration

Now, the biggest earth-based geo-engineering project of all is in the late stages of development by the coal and oil industries, and [is about to be "regulated" by U.S. Environmental Protection Agency](#) (EPA). **This is the plan that convinces me that the fossil corporations have no intention of allowing the U.S. to make a rapid transition to solar power.** This Big Fossil plan is called CCS, short for "carbon capture and sequestration" and it, too, closely resembles dozens of previous unsuccessful attempts to figure out what to do with radioactive waste.

Carbon sequestration is a fancy name for what used to be called the "kitty litter solution" to radioactive waste: bury it in the ground and hope it stays there. Carbon sequestration is a plan to capture gaseous carbon dioxide from coal-fired power plants (and perhaps from other industrial operations as well), turn it into a liquid, and [pump it into the deep earth or perhaps into the ocean](#), where it will remain for an unknown period of time. Professional optimists employed by the fossil industries claim the unknown period of time is "forever." But how can they be sure?

Saving the Coal Industry

The future of the coal industry, in particular, is at stake. Without carbon sequestration, the coal industry will not survive. Just this month the state of Kansas refused to license the construction of a new coal-fired power plant simply [because of its carbon dioxide emissions](#). This is the first time a coal plant has been turned down merely because of its contribution to global warming. The hand writing is on

the wall: Big Coal is doomed unless they can find some way to demonstrate that "clean coal" is more than an advertising slogan. This is what carbon sequestration geo-engineers are being paid to do.

Saving the Oil Industry (and the Automobile Industry)

But there's more at stake than just the coal industry. The oil industry, too, is depending on "carbon sequestration" to convince the public that continuing to burn fossil fuels is safe. Even the car companies have recognized that their future depends upon convincing us all that carbon sequestration will work -- and work **forever**.

We know this is really, really important to the fossil corporations because some of the biggest names in global industry are underwriting "geo-engineering" solutions for the carbon dioxide problem at some of the most prestigious U.S. universities. The Center for Energy & Environmental Studies at Princeton University is conducting geo- engineering studies ([1.4 Mbyte PDF](#)) funded by BP (the [felonious](#) oil corporation formerly known as British Petroleum) and by Ford Motor, the troubled manufacturer of SUVs. Geo-engineering work at Stanford University is being [supported](#) by ExxonMobil, by General Electric, by Schlumberger (the oil-drilling services giant), and by Toyota.

To convince the U.S. environmental community that geo-engineering carbon dioxide is the only way to go, the [Stanford geo-engineering group](#) has linked up with [NRDC](#) (Natural Resources Defense Council). Together, they are publishing clever propaganda masquerading as science. For example, in a recent [letter](#) to California legislators they say, "We only wish to address the science of CCS [carbon capture and sequestration] here." So we are expecting a scientific argument. Instead, the letter tries to persuade legislators to support carbon sequestration using arguments that have nothing to do with science.

The letter is peppered with distinctly unscientific language like "perfectly safe" to describe the fossil corporations' favorite geo- engineering solution. "Perfectly safe" is not a scientific concept. It is a political concept.

To be fair, deep in their letter NRDC and friends add a few caveats to their "perfectly safe" claim. For example, they say, "Leakage is conceivable but it is

unlikely in well-selected sites, is generally avoidable, predictable, can be detected and remedied promptly, and in any case is extremely unlikely to be of a magnitude to endanger human health and the environment **if performed under adequate regulatory oversight and according to best practices.**" [Emphasis in the original.]

So carbon sequestration will be "perfectly safe" **if it occurs at "well-selected sites" and if performed under adequate regulatory oversight and according to best practices.**"

Let's examine these caveats. Are these scientific concepts? Do they even refer to anything in the real world?

Human History: Selecting Sites for Dangerous Projects

What experience do humans have siting dangerous facilities at only "well-selected sites"? I am thinking of the atomic reactor in Japan sited near an earthquake fault and [recently shut down by serious earthquake damage](#). I am thinking of the U.S. radioactive waste site proposed for Yucca Mountain in Nevada where government and private engineers felt the need to [falsify data to make the site appear acceptable](#). How do NRDC and Stanford propose to avoid a repeat of these fiascos when it comes time to select dozens or hundreds (perhaps thousands) of sites for pumping carbon dioxide into the ground?

Human history: Best practices with Dangerous Technologies

And that about "best practices"? Does this phrase take into account actual human experience with power plant operators photographed [asleep in the control room](#) of nuclear reactors? Or young men deep in missile silos relieving their boredom by [getting drunk](#) or [taking drugs](#) while standing ready to launch intercontinental ballistic missiles armed with hydrogen warheads?

Will Every Nation Abide by the NRDC/Stanford Prescription?

After the U.S. begins injecting billions of tons of liquid carbon dioxide into the earth, won't China, India and other countries do the same? If they do, can they be counted on to choose only "well-selected sites" and to follow only "best practices"

for the next hundred years? Who will oversee carbon sequestration in Nigeria or Uzbekistan?

How do NRDC and Stanford imagine that standards for site selection and "best practices" will be enforced around the globe? Have NRDC and Stanford published solutions to these problems? Or are they just putting empty words on paper hoping to fool clueless legislators into adopting untestable technical solutions that the fossil corporations are paying them to promote?

But the most dubious part of the NRDC plan to geo-engineer carbon sequestration is their claim that it will be "perfectly safe" if performed with "adequate regulatory oversight." Can NRDC and their friends at Stanford point to any instances of large-scale industrial enterprises that currently have "adequate regulatory oversight?"

Everyone knows that regulators quickly get captured by the industries they are supposed to regulate. There is a substantial body of social science literature on this point. Regulators are poorly paid, but if they look the other way at regulatory violations, they may find a lucrative job awaiting them when they retire from government. Less sinister but more pervasive is the simple fact that regulated corporations spend a lot of time befriending regulators, dropping by to say hello, asking about the kids, gaining their trust and ultimately their allegiance. Are NRDC and Stanford prepared to deny this indisputable history of regulatory collapse? Have they examined the dismal record of the Food and Drug Administration, the Consumer Product Safety Commission, the Nuclear Regulatory Commission, the Securities and Exchange Commission, and the U.S. Environmental Protection Agency? Are they prepared to design and describe regulatory institutions that do not suffer from these same fundamental human flaws? Or are they just blowing smoke?

So let's examine these caveats just a bit more.

1. What actual experience do humans have designing anything to be kept out of the environment **forever**? Answer: None. Absolutely none. In this context, then, what can "perfectly safe" possibly mean?

2. What human regulatory institutions can NRDC and friends point to that have proven adequate? Let's see. The regulatory system for preventing the proliferation

of nuclear weapons? Today, 40 years after the inception of the non-proliferation treaty, Israel, India, North Korea, Pakistan -- all have The Bomb despite heroic efforts to prevent its spread. The only reason Iraq and Syria don't have a nuclear weapon is because Israel bombed their nascent nuclear power plants to smithereens.

What about the regulatory system for controlling the discard of radioactive waste? Radioactive waste is loose at [thousands of locations around the planet](#). In hundreds (perhaps thousands) of instances we do not even know where the stuff has been dumped. This technology was developed by the smartest people in the world with unlimited budgets -- yet at places like the gold-plated Los Alamos Scientific Laboratory in New Mexico (now renamed the Los Alamos National Laboratory), plutonium, americium-241, strontium-90 and other supremely dangerous radioactive elements were buried in shallow pits, or simply [dumped into mountain canyons](#) without any records kept of their whereabouts. The kitty litter solution. And this was a federal scientific laboratory under strict military surveillance and control at the time. Can we expect the fossil corporations under the watchful eye of EPA (wink, wink) to do better?

How about the regulatory system for curtailing the widespread destruction of wildlife and human health from hormone-disrupting, cancer-causing chlorinated chemicals? The arctic, which has no industrial enterprises to speak of, is among the [most heavily contaminated places on earth](#) because the chemical regulatory system failed to consider how chemicals migrate once they are released into the environment.

So where can we find real-world examples of this "adequate regulatory oversight" that NRDC and Stanford say will be necessary to make carbon sequestration "perfectly safe"?

Maintaining vigilance for hundreds or thousands of years?

Elsewhere in their letter, NRDC and the engineers from Stanford say they believe carbon sequestration can be maintained for millions of years, but they say, if something goes wrong, rapid response will be possible.

Is this really true?

Again, let's return to the debates over radioactive waste from the late 1970s. Back then scientists were a bit more candid: they admitted they knew of no way to pass information reliably to future generations describing the location of radioactive waste dumps. Given human history and the evanescence of human institutions, they could not imagine a way to reliably warn future generations about dangers buried in the earth. At one point they considered writing a huge warning across the face of the moon using graphic symbols because they had no idea which human languages would survive thousands of years into the future. Have NRDC and Stanford published their solution for this problem?

Why should we assume that humans a hundred years from now -- let alone 500 or 5000 years from now -- will be able to monitor for carbon dioxide leaks, locate them, and take rapid action to control them? The prudent assumption would be that humans will **NOT** have those capabilities. It seems to me it would be unethical to design our technologies based on untested and untestable (and wildly optimistic) assumptions about future humans and their social organizations. Who gave us the right to make decisions now based on assumptions, which, if they are wrong, could destroy the planet as a place suitable for human habitation -- which is precisely what the carbon sequestration researchers are intending to do.

With the future of the human species at stake, isn't a little humility in order? Will these geniuses find themselves staring into the mirror one day toward the end of their shameful careers muttering, "Who knew?"

But ordinary people who aren't subsidized by energy or automobile corporations are asking the same sorts of common-sense questions they asked 20 years ago when the same sorts of brainy university types were telling us it was "perfectly safe" to bury radioactive waste in the ground:

** What if these scientists and engineers turn out to be wrong?

** What if there's something important they haven't thought of?

** Are these people infallible or are they human? They can't be both.

** Isn't it unethical to claim that something will be "perfectly safe" when as a

scientist you know you can't be perfectly sure?

** When the fossil corporations impose their plan on us and begin large-scale carbon sequestration, won't that become a powerful incentive to reduce federal funding for conservation, renewables, and solar power? Then won't we have all our eggs in one basket? And didn't our grandmothers tell us that was a bad idea?

** After the fossil corporations impose carbon sequestration on us, won't we be saddled with even more killer fly ash choking the air, and even more toxic bottom ash threatening groundwater supplies? Won't we have even more destruction from mountain-top-removal coal mining, plus the enormous waste of water and land in the mid-western and western coal states? "Clean" coal will still be one of the dirtiest and most destructive forms of energy. And oil will still keep dragging us into endless bloody resource wars because we will still need to funnel more and more of the world's remaining petroleum into our astonishingly wasteful and inefficient enterprises. Is this really the direction we want to be going? Is this a plan we can explain to our children with pride? Is this a plan that will give our children hope?

** Would carbon sequestration truly be reversible if we discovered far in the future that it was a mistake? If not, who can claim that it is ethical to proceed?

** If radioactive waste and carbon dioxide are so dangerous and so hard to manage, how does it make sense to steer the nation and the world onto a course that will guarantee continued production of these lethal substances far into the future?

** With the survival of humans at stake, isn't this a classic and urgent case for applying the [precautionary principle](#)?