

## **A Necessary Conversation: Nuclear in the Age of Anthropogenic Climate Change**

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[Jen'sci](#)

The idea looks something like this: Humanity will see the error of our ways and install LED bulbs in every socket, solar panels on every roof and wind farms wherever the wind blows regularly; all of us will become vegan, turn off the A/C open a window, and trade in their gas guzzling 4x4 for an electric car or, better yet, take public transit, and we will have saved ourselves and the biosphere - the only one we know for certain that can support life - from the impending disaster of anthropogenic climate change.

What is imaginable is possible, and this idea is powerful and well worth pursuing, a uniting project for the world if... if... if...

We might well have succeeded in all of this had we continued Jimmy Carter's alternative energy policies but instead, Americans had Ronald Reagan and "killer trees" when NASA climatologist Jim Hansen first addressed Congress about climate change. We might well have succeeded under George HW Bush at the first Earth Summit in Rio, but instead the fossil fuel companies blew up the bipartisan consensus that had helped stop ozone depletion in the upper atmosphere. We might well have succeeded under Clinton, but for an overarching concern that he be viewed as kind to business. We might well have succeeded under Obama but for the equation of the incandescent light bulb with freedom... And here we are, with a little over a decade - we hope - to take serious action before action becomes useless.

There is hope. In the few months I've been associated with the MAHB, I've learned and written about amazing people and projects, and there is progress being made on multiple fronts. I've also been confronted, perhaps more than at any time during my years of activism, with how dire the situation truly is, and that has brought me to consider and reconsider assumptions I had long taken for granted.

What gives lie to the idea in the opening paragraph is human nature, or at least the nature of the denizens of Western Civilization - I think we can leave out indigenous peoples as they seem content wrapped in the arms of Mother Earth, a situation to which we might all return one day but probably won't during the next decade.

If you're reading this, you're probably like me in the fact that you're more environmentally aware than 90% of the people you know. People - even people who regularly vote for the American Republican Party - care a great deal about the environment, are deeply concerned about climate change and really want something done about it. They also care deeply about their next paycheck, whether they're going to have enough money to get the car fixed so they can get to work, whether Papa John's or Domino's has better pizza and whether they're going to get laid on Saturday night. It's not flippant - this is the world we live in.

I plead guilty as charged: I live in a small (by contemporary standards, microscopic) house; I ride the bus often but not all the time; I'm vegetarian but I love coffee; I buy avocados in the middle of the country... in the middle of January; and I travel regularly on airplanes.

"They're coming for your hamburgers!" "They're coming for your old Ford Truck!" "They're going to outlaw farts!" has been the entirely silly response to the emergence in the US Congress of the "Green New Deal." To the best of my knowledge, no one has proposed outlawing farts or anything else. Rather, the "Green New Deal" is a set of goals to encourage modernizing infrastructure, creating reliable, long-term, well-paying jobs, and discouraging the use of fossil fuels and incentivizing the use of clean energy and transportation. No one has proposed banning anything because anyone with half a political brain knows that banning things doesn't work except in the direst of circumstances, after all the alternatives have been exhausted and after the Public has come to the realization that whatever is getting banned is so stupid they can't believe it hasn't been banned already.

That being said, if we fail to act immediately and dramatically on climate change, we will have our little conveniences taken away from us, not at the point of Alexandra Ocasio-Cortez's finger and those of her Birkenstock-clad minions, but by the inevitable collapse triggered by catastrophic climate change. If the breakdown of empire looks like India at the partition, the

total breakdown of civil society looks something like Somalia and Liberia. Some wealthy individuals may indulge in sociopathic fantasies of escaping post-societal chaos in bunkers with private armies to protect them or in colonies on Mars, but the fact of the matter is, if we're sinking, we're all going down together and what a post-climate change future really looks like is the total absence of art and music and literature and all the worst images we can conjure of endless war and, ultimately, a few thousand of us, clustered along grasslands near the North Pole, eating each other.

If we're going to stop climate change and still hope to have something resembling civilization, we're going to need reliable power. Reliable power means having a muscular power source to provide "base load" that is available whenever the light is switched on, the computer booted up or the Tesla plugged in. Historically, the heavy lifting has been done by fossil fuels, coal primarily, but also oil and diesel. Over the past few decades, natural gas has assumed a larger role. Hydro is a low emission contender, but causes difficulty for fish and the people whose farms are flooded and, for the past two decades, the popular thrust has been toward decommissioning dams rather than building them.

As annoying as it is when fossil fuel fans (and we must call them fans now because their desire to keep burning fossil fuels has outstripped any capacity they might have had for rational thought) point it out, wind turbines don't produce power when the wind blows and solar panels don't produce power at night. There probably isn't enough lithium in the world to electrify transportation, let alone the entire electrical grid, so we need a low emission source to provide the base load.

By far and away, the heavyweight champion low emission power source is nuclear.

### **Born of War**

My own response to the idea of nuclear energy is visceral. There is something deeply disturbing about taking one of the basic building blocks of creation and splitting it in half. There is also, I agree with Heather Matteson of [Mothers for Nuclear](#), something seriously wrong with the idea that mankind can never have enough.

Most people don't get into the nuances but are afraid of the very idea of nuclear power. If you pair the enormous destructive power of nuclear weapons with the idea of nuclear power, it is scary. That the two are paired in the popular imagination was probably inevitable: The birth of the nuclear age started not when the start up of a reactor brought electricity to thousands of grateful people, but when the United States dropped an atomic bomb on Hiroshima. For those growing up in the 50's, duck and cover educational films and drills likely come quickly to mind

as well as films of the detonation of the hydrogen bomb. The 60's brought "End of the World" parties during the Cuban Missile Crisis and the 80's brought us "Let's bomb the Russians today," spoken to a live microphone by the President of the nation with the largest nuclear arsenal.

Military spending and research into ever more destructive capabilities was bound to catch the public imagination more than the efforts to use nuclear peacefully. Even President Eisenhower's 1953 "Atoms for Peace" speech reads a full 63 paragraphs discussing the horrors of war and the destructive power of nuclear weapons and a mere 20 paragraphs pointing out the peaceful possibilities, this a full two years after the first successful power generation experiment at Arco, Idaho.

The separation of power generation from military uses blurred further when the US Navy launched the *USS Nautilus*, the world's first nuclear powered submarine, in 1954.

Popular imagination did grab on to the idea, at least at first - the Atomic Age and the Space Age went hand in hand and the idea of limitless power appealed to an optimistic, young forward looking country that embraced science.

The anti-Vietnam War movement changed much of this, challenging preconceptions and questioning the status quo. The anti-nuclear movement was one child of the anti-war movement. Its twin was the environmental movement. In organizations like Greenpeace, the similarity is unmistakable - Greenpeace cut its teeth campaigning against weapons testing in the Pacific. They were so successful in their protests that the French government sank their boat.

### **Nothing to Be Frightened of**

"I think that one of the reasons people get so freaked out about nuclear is because our industry communicates in ways that sound scary," says Heather Matteson, cofounder of Mothers for Nuclear, an organization developing support for all forms of clean energy, but especially nuclear. We're on another subject, discussing the naturally-occurring nuclear reaction near Oklo, Gabon. The reaction was discovered by the identification of "daughter" elements, which are only present where a nuclear reaction has taken place. These were discovered when the French, who were mining uranium there, questioned why some of it was depleted. They were able to determine that a nuclear reaction had occurred there 1.6 billion years ago. Oklo is one of several places on Earth where nuclear fission has begun spontaneously.

"I still get scared if I think about it the wrong way," Matteson continues, telling the story of seeing the media portrayal of events unfolding at Fukushima while she was in the control room

at Diablo Canyon. “I started to feel a little panicky because what they were showing was basically my worst nightmare.”

Matteson says when the true impacts of Fukushima were understood, it became clear to nuclear professionals that even in a worst-case type of situation, nuclear energy is still really safe. But the public is fed another, more sensationalist, story - three meltdowns and explosions and radiation (in units no one understands), and leakage and dead fish and contamination - and it all sounds scary. In combination with the fact that 18,000 people died in the Tohoku earthquake and resulting tsunami, the public concludes that Fukushima is pretty bad.

The truth is that no one was hurt by any events at the nuclear plant itself. The only cause of any impact to human life or health was due to overreaction (panicked evacuation, mainly).

The same thing generally happened with Chernobyl. About 60 emergency responders ultimately perished, but today, we would know better than to send people into danger in that way. They could have waited it out. And none of the dire predictions about future sickness or cancer have come true. We know now, it’s been 33 years.

Matteson and Zaitz work at Diablo Canyon nuclear generating plant in California. Their activism sprung at least in part from the threat of the plant’s closure, not because they were concerned for their jobs, but because they were concerned about the amount of fossil fuels it would take to replace the facility.

Delving further into the inevitable question of nuclear accidents, Matteson replies “The worst nuclear accident in history took place on Bikini and we did that on purpose.”

The pair visited Fukushima last year. The accident was misconstrued and hyped up and the response, even among those in the industry, was such that it generated far more fear than necessary. During their visit, the site of the 2011 meltdown struck them as similar to any other site that is going through some sort of industrial clean up.

“As I drive around San Luis Obispo, I often cross Tank Farm Road,” Matteson says. “There was an oil fire there in the early-1900’s and they’re still doing remediation and controlling access. It’s been over 100 years!”

“We need a lot more perspective on nuclear,” Zaitz says, adding “We talk about the politics, not the science. The science says nuclear power is safe.”

That nuclear power generation is safe can not be disputed: Since the advent nuclear power generation in the United States *sixty years ago*, not one fatality has been attributed to an accident, an enviable track record unmatched anywhere else in the energy production industry.

And nuclear power generation is only getting safer.

### **A Delayed Renaissance**

The nuclear power industry fully expected a renaissance at the turn of the millennium spurred by calls for lower carbon dioxide emissions and rising fuels costs. That rekindling of the industry ran into difficulties because the exacting methods of construction for so-called generation III reactors could not be easily met as knowledgeable technicians, and specific parts, were in short supply. This may have actually worked to the industry's advantage.

Several start-up companies have begun working on so-called Generation IV reactors. Designs for these include using molten salt as a coolant, and there is a movement to produce small modular reactors that could fit on the back of a semi and easily deployed anywhere in the world. One of these startups, Transatomic, backed by PayPal founder Peter Thiel closed up shop last year citing their inability to scale up quickly enough and deliver as promised. However, they've made their research available to other companies and individuals working on similar issues. There are plenty: Matteson and Zaitz state there are currently over 50 startups working on nuclear power in the United States. Open sourcing is not the only thing the modern nuclear industry shares with the computer industry. A number of these startups are based in Silicon Valley and, similarly to Transatomic, have the backing of computer industry financiers and luminaries, including Terra Power, where Bill Gates is Chairman of the Board.

Small, safe and easily deployed is the direction of the start-ups. Zaitz points out that the US Navy has deployed small reactors on ships for years and the Army, having looked at the idea years ago, is revisiting the idea for forward bases. She adds that the Russians recently deployed a floating reactor to the far north. Zaitz, like Bill Gates, believes that the government needs to increase its commitment to funding nuclear power.

"If the US doesn't get back in the game," she says, "China, South Korea and Russia are going to bypass us." That would damage an industry that has, from its inception, been the global leader and put more economic power in the hands of countries that don't necessarily share American interests.

The new designs can produce far less waste than earlier generations and, in the case of so called "breeder reactors," they are able to use what was formerly considered waste as fuel.

Nuclear power generation is already pretty thrifty: According to the EPA and NEI, the entire amount of waste generated from used fuel from nuclear power plants over the last 40 years would fill a football field approximately 8 yards deep. For comparison, the amount of solid waste generated in *one year* from coal fired power plants in the U.S. would fill a football field to about 37,000 feet high.

### **A Game of Numbers**

The Bureau of Land Management recently approved the Palen Solar Project on 3,600 acres in California. The project will produce enough power to supply approximately 130,000 homes with clean energy. Matteson has visited Ivanpah, a concentrated solar thermal generating facility near Vegas, and says its demonstrative of what can go wrong with large-scale solar and wind projects. That facility sits on 3,500 acres and was intended to function by reflecting the sun's light to heat molten salt, but it uses far more natural gas than anticipated. In addition, building it required the removal of endangered desert tortoises. "Nearly all of which died," she adds with some frustration.

Compare either of these solar projects to Diablo Canyon which, from a footprint of 12 acres, generates enough power to supply 3 million people.

"You'd need 17 Ivanpahs to produce the same amount of power Diablo Canyon produces, and 67 times the amount of land." And even then, Ivanpah only operates during the day, using backup natural gas to start up each day and maintain temperatures when the sky is cloudy.

Of course, nuclear's footprint isn't limited to its generating facilities. In addition to the waste discussed above, there is also the need to extract fissionable material from the ground.

Matteson grew up near Globe, AZ and remembers dust from the nearby copper mine filling the air on certain days. "All mining is dangerous," she says. "We have to mine less uranium to get more energy," Zaitz adds.

The pair are currently reading [Yellow Dirt](#) by Judy Pasternak which details the mistreatment of the Navajo during the uranium mining boom of the mid-20th Century. The mistreatment of marginalized communities by extractive industries is an ongoing theme throughout modern history, be it the nuclear industry in Navajo country, the coal industry in Appalachia, or the oil industry in poor neighborhoods of Houston. The question is not one of nuclear or fossil fuel, but of environmental justice.

### **The Kids are Alright**

“What do the kids think about all this?” I ask the Mothers for Nuclear about their children.

“Zoe is all in for nuclear,” Matteson beams. “She’s designed stickers ‘Nuclear rules, fossil fuel drools.’”

Zaitz’s eldest is equally enthusiastic. At pro-nuclear power rallies, the two kids will frequently disappear only to be found filming each other discussing the positive aspects of nuclear power.

If all of this sounds more positive than not having children due to fear of climate change, which 38% of millennials consider a major factor, it’s because it is.

Heather Matteson, Kristin Zaitz, and Mothers for Nuclear challenge us to imagine a future that fairly well resembles the present without climate change, but with even more clean energy and less people trapped in poverty. Speaking with them and reading about their work, one arrives at the conclusion that we must, at least for the time being, consider nuclear.

Here’s the thing that’s been gnawing at me most since I began this project: I was brought up believing in thrift and simplicity. It is not a large step to go from this to accepting the tenets of Deep Ecology and it is not a major jump from there to accept certain premises of anarcho-primitivism: Civilization is the problem, let it die, we’ll construct a new world within the bounds of Nature. I no longer believe that Nature can be saved through the collapse of Civilization. In fact, I am now utterly convinced that the demise of modern Civilization will lead to the demise of all life on Earth - we have crawled too far out on the branch to not take the whole tree with us when it breaks.

There is no panacea. There is no amount of legislation, as ambitious as the “Green New Deal” might be, that will convert the infrastructure of the United States to clean electricity using wind, solar and batteries within the timeframe necessary. We’ve arrived at a point where we have less than a generation to respond to a self-inflicted existential crisis. Nuclear power may or may not be part of that response. We have nothing to lose anything by seriously considering it. We have everything to lose by not exploring every possible solution to humanity’s current predicament.

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Jonathan was born in Colorado and grew up in Vail, working in his father’s inn. He studied writing at Bennington College. He has been involved in wildlands activism since he was very



young and was engaged with Colorado Wild! (now Rocky Mountain Wild) from its inception. Along with his wife, he started the Vail Farmers' Market and together they own Vail's premier wine shop. Much of his non-fiction writing of late has been associated with his activism. His fiction is currently concerned with what Dr. Martin Shaw calls "a great, powerful, tremulous falling back in love with our old, ancient, primordial Beloved, which is the Earth herself." He is deeply in love with his four year old daughter, and shares with her his love of wild places and the creatures that inhabit them.

The [MAHB Blog](#) is a venture of the Millennium Alliance for Humanity and the Biosphere. Questions should be directed to [joan@mahbonline.org](mailto:joan@mahbonline.org)