

Energy Switch

Studying state of the art technology for the disposal of obsolete and derelict nuclear power plants; unless we spend a lot of time and money, it seems likely that a high percentage of them will end up spilling their guts one way or another. You can learn all the basic plans for their cleanup just by watching a cat take a crap. Unless we separate the plutonium, the fuel rods will need to be contained just about forever, and we'll still need to babysit the plutonium far beyond the life of this civilization. All of them rely on the grid with diesel backup to avoid catastrophe, both of which are vulnerable to a variety of disasters, both natural and man made. We don't need to hear any more bullshit about how contemporary nuclear energy is cheap, safe, and clean. Short term, it's statistically safe and clean, but it sure ain't cheap, and when you factor in all the time, energy, resources, and pollution that all that money bought, and will need to be bought into the distant future, it's not a bit clean. Costs for the disaster at Fukushima are already around \$1,500,000 per customer.

Vitrification and deep burial can be safe waste disposal, but it's a bit expensive and it's potentially wasteful, as new technology is about ready to mitigate some of the problems with spent fuel rods and provide us with clean energy for a few generations as we learn to get another round of energy from spent fuel rods. They still contain a lot of usable energy.

Building any more primary nuclear power plants can be extremely reckless. Only the best of plans for the next generation of nuclear power seem safe and affordable. It's not about abandoning nuclear energy. We need it. It's about learning from our mistakes and proceeding with caution.

Just as it is with nuclear energy, our initial attempts at renewable energy sources have been quite environmentally messy, but the next generation can be much cleaner.

The emerging technology of very clean and simple, large scale, stationary iron-air batteries can solve the problem of non-constant wind and solar.

Currently, lithium and rare earth mining is an environmental and political mess. New closed circuit refining techniques are solving the environmental problems, but the political problems surrounding China's control of the rare earths will continue. As they start failing in large quantities in about 40 years, the cost of solar panel and battery recycling will likely substantially reduce. If we've got any foresight, we'll design the next generation of solar panels and batteries to be more easily recycled.

As electric car batteries eventually need replacement, they'll run a solar powered house for another 10 years and are quite recyclable. They can be a huge source of dispersed energy storage. With a bit of design foresight this could be efficient and sustainable.

They cost more up front and have higher maintenance, but solar thermal generation doesn't need lithium and rare earths and is much more durable. They're well suited to the hot deserts, although they'll need to be taken offline when the sand blows.

Solar thermal generation can also be used directly as a heat source in a number of industries; plastic recycle in particular, where we can sandwich it between metal roofing and bake it into modular wall panels. This would long term contain much of the zillions of tons of already existing plastics that are too contaminated and degraded for use in extrusion or 3D printers, and would go a long way to solving our rapidly increasing housing shortage..

Enzyme digestion of plastics all the way back to monomers is an obvious choice for the plastic in the oceans and the most contaminated and degraded plastics. There's already a plant in operation in France.

New research on thermal contrast electric generation at the water-air boundary avoids most of the problems associated with photovoltaics.

We can invest in insulated underground winter ice storage for summer air conditioning. There will be a few places where mines and quarries will be close enough to where we need the cold. This is a huge energy savings.

We can stop lighting up the sky. This can be another huge energy savings. All that electrical energy is

wasted and it's why we can't see the stars. Life on this planet evolved over billions of years with a dark sky, and a great many species rely on the cycle of light and dark. Light pollution has many negative side effects throughout the spectrum of life on this planet. The solution is absurdly simple. A reflective shield is almost as cheap as the lite bulb, and cuts energy consumption by a bit less than half.

Carbon fiber wind turbine blades are toxic ticking time bombs. As the resins that bond the carbon fibers eventually degrade they'll release the very toxic carbon fibers into the environment. Unlike contact with fiberglass, which itches for a week or two until your skin sluffs the fibers off, if you come in contact with carbon fibers, you'll likely itch till the day you die. Our current use of carbon fiber composites is becoming widespread and it's gonna bite us in the butt as the resins that bind the carbon fibers eventually decay, releasing all that toxic carbon fiber into the environment. It's gonna be an itchy world some day. There are other materials that are almost as strong and much less toxic.

Many years ago I figured out a cheap, efficient, dependable way to harness wave energy, but before I went any further I computed the amount of mass in motion over time and found there wasn't nearly enough energy to bother with, so I dropped it. Waves are just a minor derivative of the wind. Now I'm watching someone spending millions on a system that looks like it's not nearly as efficient and cheap as what I had in mind who never stopped long enough to research how much energy was there, or maybe he just got the math wrong.

Carbon capture is much the same. It's a fools errand. It's not carbon; it's CO₂, which is several times the mass and many times the volume of the coal and oil that it came from. Separating the carbon from the oxygen takes as much energy as we got when we burned it. The idea that we can refill the coal mines and oil wells is an absurdity. It's unlikely that it could even offset the energy, resources, and pollution that it takes to put it back in the ground. Even in places where energy is cheap and abundant, that energy could be better used in other more efficient ways.

All of this is way too little too late. The massive industrial potential after WWII allowed the baby boomers to get us into the mess we're in, but even with all the talk about dealing with climate change, the next generation is still doubling down on our consumption addiction, and the shit's hitting the fan as we speak. Look out for the fan blades on the way through and start planning about what to do with all the fertilizer on the other side.

You know how Wile E. Coyote never falls till he looks down? It's becoming obvious that we're gonna crash. Unlike Wile E. Coyote, we don't have to give up, but we won't get a second chance. Now it's about our glide path on the way down. We need to stretch it out as much as we can, look for a good place to land, and hope for the best.