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First up this month is an article looking at President-Elect Donald Trump's big promise to power the US on 'clean coal'. Next is a piece I wrote shortly before the election which looks at the crisis of political legitimacy. For something different I've also included a recent article investigating cuts in reported oil reserves on oil company balance sheets.

Trump's Coal Delusions

During the second presidential debate on October 9, Republican presidential nominee (now President-Elect) Donald Trump claimed that "clean coal" could meet the energy needs of the United States for the next 1,000 years. Now that Mr. Trump will be in the position of making national energy policy, it's worth examining that assertion.

First, does our nation really have 1,000 years' worth of coal? No official agency thinks so. The U.S. Energy Information Administration estimates United States coal reserves at 477 billion short tons, a little over 500 years' worth. But this calculation is probably highly misleading. A 2007 study by the National Academy of Sciences criticized the history of systematically inflated national coal reserves figures, while still allowing that, "there is probably sufficient coal to meet the nation's coal needs for more than 100 years." Still other studies ratchet that "100 years" down much further.

In 2009 I spent several months reviewing the available data and studies; the results were published as the book *Blackout*, which concluded that there is a strong "likelihood of [global coal] supply limits appearing relatively soon—within the next two decades."

The U.S., China, Britain, and Germany have all already mined their best coal resources; what remains will be difficult and expensive to extract. Coal production from eastern states (West Virginia, Tennessee, Ohio, Pennsylvania) has been on the skids for decades as a result of the depletion of economically minable reserves. The focus of the industry's efforts has therefore largely shifted to Wyoming, but production there is now waning as well. A 2009 study by Clean Energy Action, a citizen group in Boulder, Colorado, confirmed that Wyoming and Montana hold a large portion of remaining U.S. coal reserves, but also concluded that 94 percent of reserves claimed by the mining industry and the U.S. Energy Information Agency are too expensive to extract. It's probably safe to say that there are sufficient

supplies of coal there and in the rest of the U.S. to permit mining to continue for decades into the future—but only at a declining rate.

In short, from a supply standpoint alone, the idea of 1,000 years of coal—enough to supply all of our energy needs for a millennium—is so exaggerated as to be laughable.

Does attaching the word “clean” to the word “coal” somehow change that picture? Hardly. For years, Americans have seen billboards and TV commercials touting “clean coal,” while politicians on both sides of the aisle have extolled its promise. The technology to capture carbon emissions from coal-fired power plants has been tried and tested. Yet today almost none of the nation’s coal-fueled electricity-generating plants are “clean.”

Why the delay? The biggest problem for “clean coal” is that the economics don’t work. Carbon capture and storage (CCS) is extremely expensive. That gives the power industry little incentive to implement it in the absence of a substantial carbon tax.

Why would implementing CCS be so expensive? To start, capturing and storing the carbon from coal combustion is estimated to consume 25 percent to 45 percent of the power produced, depending on the approach taken. That translates to not only higher prices for coal-generated electricity but also the need for more power plants to serve the same customer base. Other technologies designed to make carbon capture more efficient aren’t commercial at this point, and their full costs are unknown.

And there’s more. Capturing and burying just 38 percent of the carbon released from current U.S. coal combustion would entail pipelines, compressors and pumps on a scale equivalent to the size of the nation’s oil industry. And while bolting CCS technology onto existing power plants is possible, it is inefficient. A new generation of plants would do the job much better—but that means replacing roughly 600 current-generation power plants.

Altogether, the Energy Department estimates that wholesale electricity prices with the initial generation of CCS technology would be 70 percent to 80 percent higher than current coal-based power—which is already uncompetitive with natural gas, wind, or even new solar PV installations.

The price per kilowatt-hour of electricity produced from solar and wind power is steadily dropping, with no bottom in sight. The only thing that keeps coal-based electricity even in the ballpark of prices for renewable energy sources is the industry’s ability to shift coal’s hidden costs—environmental and health damage—onto society at large. If climate regulations eventually kick in and the coal power industry adopts CCS as a survival strategy, the task of hiding from the market the real and mounting costs of coal can only grow more daunting.

The problem is that coal just isn’t “clean.” CCS won’t banish high rates of lung disease, because it doesn’t eliminate all the pollutants from the combustion process or deal with the coal dust from mining and transport. It also doesn’t address the environmental devastation

of “mountaintop removal” mining.

By the time we transitioned the nation’s fleet of coal-burning power plants to CCS (which would take three or four decades), the nation’s coal production would be supply-constrained as a result of ongoing depletion. Let’s face it: the coal industry is dying. If Mr. Trump wants to put the industry on life support by subsidizing it somehow, he will only delay the inevitable, while spending money uselessly to do so.

In all likelihood, our real future lies elsewhere—with distributed renewable energy and a planned substantial reduction in overall energy usage through efficiency measures and a redesign of the economy. The inevitable transition away from fossil fuels will constitute a big job, and it only gets bigger, harder, and more costly the longer we delay it. Claiming that it makes sense to return to coal at this late date is delusional for economic as well as environmental reasons.

An Order of Chaos, Please

According to polls and innumerable published interviews and anecdotes, Americans of all political persuasions just can’t wait for the nightmare of the current presidential election to end. It’s too ugly and demeaning. Wake us when it’s over!

Unfortunately, it’s not that simple. George Packer explains why in an article in the current *New Yorker*, “[Hillary Clinton and the Populist Revolt](#)”; Terry Gross interviewed Packer on the [November 3 edition](#) of “Fresh Air,” and the podcast is worth listening to. To summarize just a little of Packer’s article and interview: Our current scorched-earth politics have historical roots, some of which have to do with economic and demographic trends, some with the personalities and tactics of significant players, of whom Packer singles out three sowers of discord on the political right: Newt Gingrich, Andrew Breitbart, and Donald Trump.

Gingrich (who will forever be remembered as having led the impeachment of then-President Bill Clinton for lying about an extramarital affair, while he himself was having an affair about which he lied repeatedly) introduced take-no-prisoners tactics to Congress, twice shutting down the government and raising partisan demonization to a dark art form. Breitbart upended traditional journalism with his eponymous alt-right website, helping create a political discourse in which facts and arguments no longer matter. Trump has more recently built on these dubious achievements, capitalizing on the disappointments and resentments of white wage-class Americans who were on the losing end of Washington’s and Wall Street’s giddy flings with globalization and financialization. Gingrich and Breitbart birthed a politics of destruction; now Trump stands Samson-like between the pillars of the temple.

The Trump phenomenon couldn’t have taken off if it weren’t for the fact that millions of Americans are already living a nightmare—at least, compared to how life was for them and their parents a few decades ago. Packer wrote revealingly of the declining prospects of wage-class Americans in his 2013 book *The Unwinding*, describing through observation, interview, and analysis the experiences of

people caught up in cultural and economic decay. Starting in the 1980s, the Democratic Party—which previously represented the interests of labor unions and the wage-earning class—deserted that constituency in favor of urban professionals and various identity groups (African Americans, Latinos, liberated women, and gays). Meanwhile the Republican Party adopted a southern strategy, playing on white resentments lingering since the Civil War, cultivating the support of evangelical Christians, and making inroads among the languishing working class.

Packer doesn't mention that American civilization was destined to unravel anyway. To understand why, we need an education in history and archaeology (read Joseph Tainter's *The Collapse of Complex Societies*), an understanding of the implications of fossil fuel depletion (my own book *The Party's Over* is not a bad place to start), and a little background in boom-bust economic cycles (try Turchin and Nefedov's *Secular Cycles*, or David Graeber's *Debt*). A small library of books has been written since the turn of the millennium describing the inevitability of civilizational decline or collapse due both to social pressures from unsustainable debt levels, increasing inequality, and rampant corruption; and to deeper infrastructural issues having to do with resource depletion, pollution (in the form of climate change), and the essential unsustainability of economic growth. Several authors, myself among them, have been warning that America risks coming apart. The current election cycle enables, or forces, us to watch the spectacle as it unfolds.

Of course, events will transpire differently depending on who wins. If Hillary Clinton is the victor, then we can anticipate a crisis of legitimacy, along with various manifestations of simmering rebellion. If Democrats fail to take the Senate, Washington will enter a (probably short) era of continual and complete gridlock, with full-time hearings and investigations. Republicans have already [promised to block Clinton's Supreme Court nominees](#), and [Trump has warned of a constitutional crisis](#) if Clinton is elected. In the best-case scenario (from the standpoint of maintaining the status quo), the Democrats do take the Senate, in which case there is at least the possibility of two more years of some increasingly bizarre and dysfunctional version of business-as-usual, until the mid-term election—when the Senate could very well flip back to Republican hands, particularly if there's an economic recession (there will be an unusually large number of Democratic senate seats up for grabs then). If that happens, gridlock and witch-hunting would begin in earnest.

If Donald Trump wins, America won't be great again—not by a long shot. Instead we will be treated to a different crisis of legitimacy: over half the country (including powerful members of the Republican party) will continue to regard the new leader with utter contempt, as they already do, and he will be nagged and hobbled by the Trump University fraud lawsuit and possibly other, [more devastating legal challenges](#). It would be a non-stop train wreck with horrifying casualties, but the TV ratings would be fabulous. Trump has demonstrated a tendency to mow his critics aside and grab attention and power in any way possible; if he becomes president we'll see how those tendencies play out on the world stage.

The government of the United States of America has developed

increasing numbers of tics, limps, and embarrassing cognitive lapses during the past ten or 15 years, but it has managed to go on with the show. Yet as dysfunction snowballs, a maintenance crisis becomes inevitable at some point. When the crunch comes (most likely as a result of the next cyclical economic downturn, which is already overdue and could be much worse than that of 2008), we will reap the fruits of a system that is simply no longer capable of acting cooperatively to solve problems. The trials of legitimacy that both Clinton and Trump face mean that—regardless which is elected—the country will be less able to address existing threats (e.g., climate change) let alone new ones that may arise, such as a serious recession or a major natural disaster. Crisis will demand action, but how can action be mobilized with the country so politically polarized and the government itself in paralysis? The details of what emerges from here on will depend on all sorts of current unknowables. But those who think life in America can't get any worse may have a few surprises in store. And we probably won't have long to wait before that chain of surprises begins unreeling.

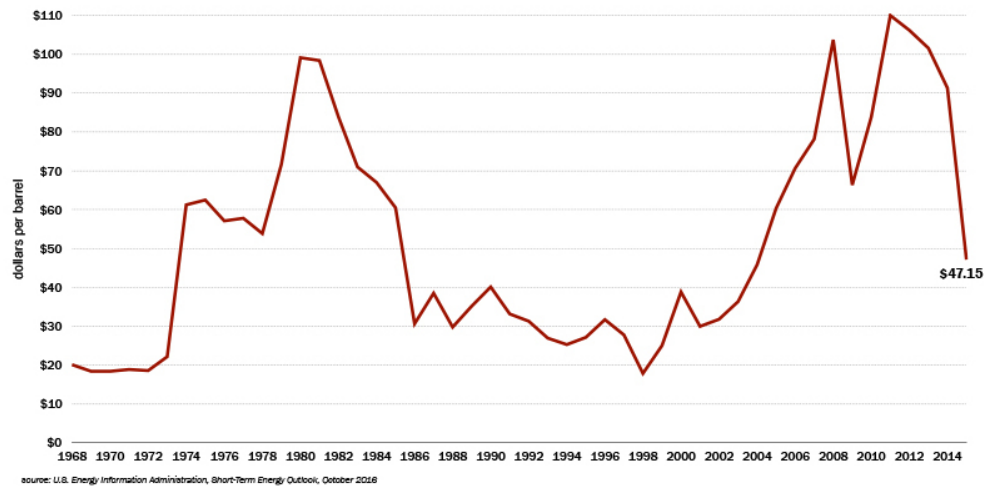
The nightmare of the election itself will end soon. But we may not like what we wake up to. Increasingly, it's up to communities to build resilience—not just to climate change, but to the whole cascading chain of social, economic, and political impacts from the bursting of the fossil-fueled growth bubble.

The Case of the Vanishing Oil Reserves

Where are Philip Marlowe and Sam Spade when we need them? A crime is in progress, and only a detective who's unafraid of stepping on powerful people's toes is likely to get to the bottom of it.

Here's what we know. Someone is stealing the world's valuable petroleum reserves right from under our feet—and getting away with it. Politicians and the news media are barely mentioning the heist; maybe they don't understand what's happening, or more likely they have something to hide. But this is big. It could be the caper of the century.

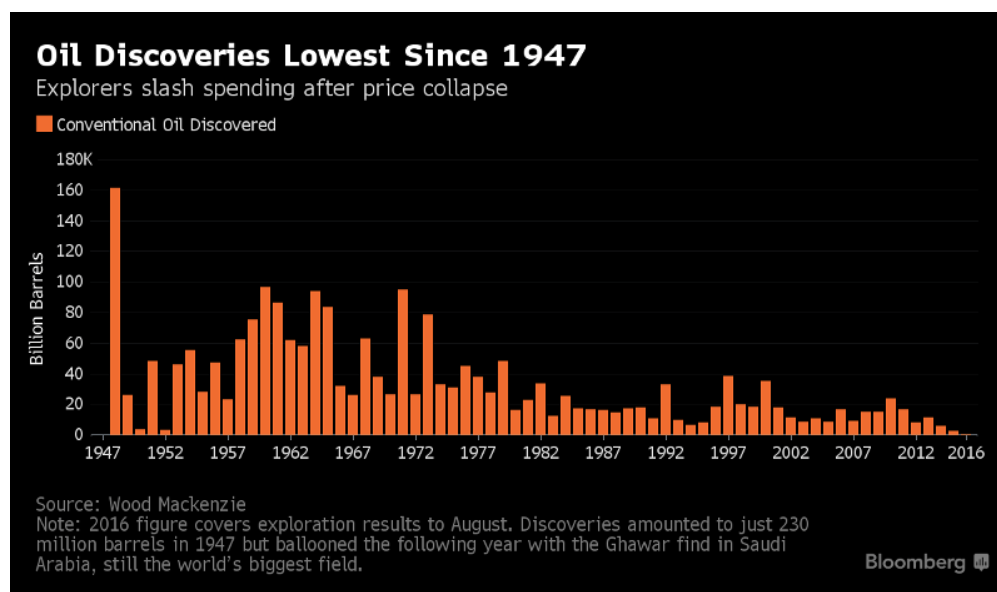
A fat clue landed on my doorstep last week hidden in the newspaper business pages. It was an article describing Exxon's announcement that [it was writing down 20 percent of its booked oil reserves](#). The article noted that Exxon blamed low oil prices. That sounded fishy. I decided to do a little sleuthing and discovered that, at \$50 a barrel, inflation-adjusted world oil prices are no lower now than they were in the 1980s and '90s, when reserves were growing every year. Why didn't Exxon mention that?

Annual Real Imported Crude Oil Price (Oct 2016 \$)

Exxon's not alone. [Other companies have been engaging in similar write-downs](#). They all point the finger at low oil prices—almost as if they're working together, trying to distract attention from the real culprit. But who? Who's stealing those reserves?

Another possible clue showed up [in a report from Carbon Tracker](#), an organization that assesses how much of the world's fossil fuels will have to stay in the ground if we're going to avert catastrophic climate change. Carbon Tracker figures that a very large portion of oil reserves is unburnable, and that oil companies' balance sheets should be adjusted to reflect that. So is climate action stealing Exxon's oil? I decided to investigate. It turns out that, while opinions about the future of fossil fuels matter, and Carbon Tracker is trying to shift those opinions, oil companies' assets probably won't actually be stranded for this reason until the nations of the world adopt a hefty carbon tax. So, for better or worse, climate action is not yet leading Exxon and other companies to write down their reserves. I'm not saying the victim of this robbery is any angel. A lot of people have reasons to hold a grudge against the oil industry. But climate action is not the culprit here.

As I was dusting my computer keyboard for fingerprints, I accidentally clicked a link and landed on a Bloomberg article [claiming that oil discoveries have been super-low the last couple of years](#). The article featured a breathtaking graph showing that the year 2015 yielded the fewest oil discoveries in decades—with 2016 on track to be even worse.

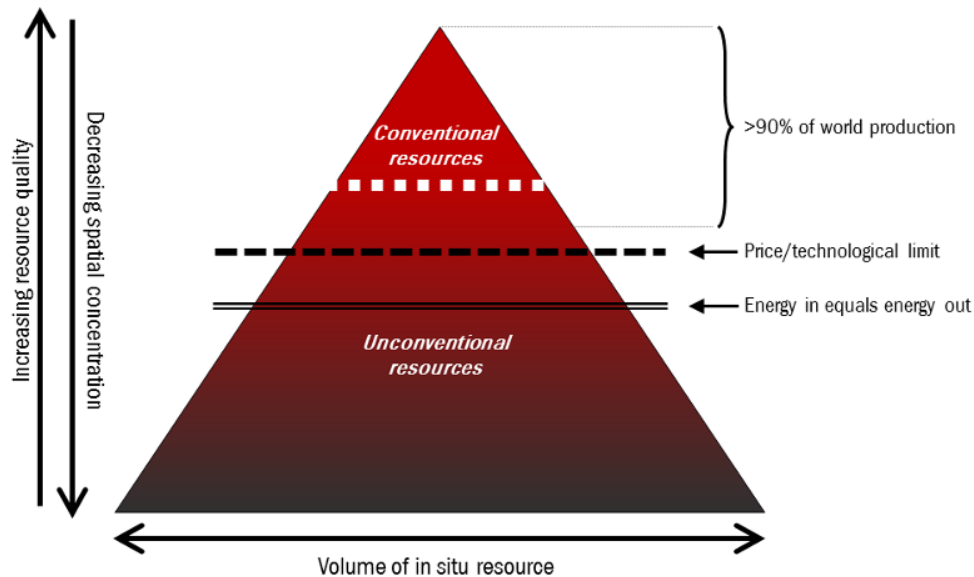


Are the petroleum companies themselves guilty? Are they stealing their own reserves by failing to look for more oil? It didn't make sense. The oil companies are in business to make money, and the only way they do that is to find oil, extract it, and sell it. Why would they be undermining their own business? Again, it looked like they were hiding something—a secret so massive that they were willing to cut their own financial throats rather than divulge it.

Now, I'm no Hercule Poirot, but I've been around the block a few times. And if there's one thing my years as a gumshoe have taught me, it's that when somebody big wants something covered up, expect a red herring, a smoke screen, a patsy. It wasn't long before a rosy-colored fish of the family *Clupeidae* showed up. And it was already starting to smell. It was called "peak demand"—an idea that a few well-placed economists were selling, which said people just don't want oil so much anymore because they're driving electric cars. That would explain low oil prices, which would explain lower investments in exploration. But that didn't make much sense: as of the end of 2015, plug-in electrics represented 0.1 percent of the world's one billion cars. And Americans were buying bigger gas-guzzling cars and trucks again. That fancy moniker "peak demand" didn't really explain anything; it just diverted attention. Sure, a generally weak economy and a few years of high production output from frackers working in tight oil deposits in the U.S. had driven petroleum prices lower. But that just brought me back to the question: Why are those prices killing oil reserves now, while the industry operated just fine at similar or lower price levels in the past?

My head was starting to hurt. I tossed back a couple of stiff shots of bourbon; then, to put myself to sleep, I picked up what I thought was going to be another boring oil report—though it did have an intriguing title: "[Drill Baby Drill](#)." It was written by a retired energy analyst who had worked for the Canadian government. Probably nothing here, I thought. But then I came across a graph on page 44, and a light bulb came on in my brain—more like a twenty thousand-watt movie marquee. That graph put all the clues together in a way that made sense for the first time.

Pyramid of Oil & Gas Resource Quality and Supply



After staring at the chart for a few minutes, I realized the real culprit in the vanishing oil reserves caper is a shady character known to his underworld contacts as "Depletion." Here's how he works his racket. We're using more oil every single year, which means that every year we're depleting what's left even faster than we were the year before. Depletion always takes his cut before anyone else, and it's bigger every time.

Also, we're always going after the best oil first (drilling down from the top of the pyramid in the graphic), leaving the poorer prospects for next year. When we get to the "energy in equals energy out" line, it will take as much energy to drill, extract, and refine a barrel of oil as the finished product will yield to society. At that point, the oil industry, and all the other industries that depend on it (and if you think about it, they all do: how do we get raw materials, spare parts, food, or even solar panels without oil-burning trucks and container ships?) are toast. History. Already the cheap conventional oil is mostly gone; most of what remains is going to cost more to produce, refine, and distribute than society can pay for, which means the oil industry won't be able to afford to deliver very much of it. Everybody loses—except Depletion.

The oil companies are writing down their reserves because at today's prices they can't afford to extract an ever-increasing fraction of their remaining oil. Depletion has already taken what's affordable. That would be less of a problem if society could pay an arbitrarily high price for oil, or if it could afford to invest more energy in obtaining oil than the finished fuel delivers. But neither is the case.

Nobody is willing to name the culprit. Not Exxon. Not the government. Not economists. They all point to the immense size of the overall oil resource pyramid and say, "There's enough for decades! Centuries!" That's how he gets away with it. Depletion is stealing our future, and nobody is talking.

That's a beautiful racket, when you think about it. It's in nearly everybody's interest to just go along and say nothing. There are only two ways to exit the oil depletion game: switch to other energy sources or just use less. A few people are doing one or the other, but as a society we are addicts through and through. So we all whistle a happy tune and make small talk.

And me? There's not much I can do but write this little detective story. Sometimes you get the bad guy, sometimes you don't. It's all part of the job, but sometimes the job stinks.