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The US Presidential election campaign served up much in the way of promises but worryingly little in the way of energy and climate reality. For this month's Museletter I've included three pieces I wrote as the campaign wrapped up — the last of the three is intended as tongue in cheek humor. I would also invite you to read an op-ed which I co-authored with Tom Butler that appeared in the [Christian Science Monitor](#).

Gas Bubble Leaking, About to Burst

For the past three or four years media sources in the U.S. trumpeted the “game-changing” new stream of natural gas coming from tight shale deposits produced with the technologies of horizontal drilling and hydrofracturing. So much gas surged from wells in Texas, Oklahoma, Louisiana, Arkansas, and Pennsylvania that the U.S. Department of Energy, presidential candidates, and the companies working in these plays all agreed: America can look forward to a hundred years of cheap, abundant gas!

Some environmental organizations declared this means utilities can now stop using polluting coal—and indeed coal consumption has plummeted as power plants switch to cheaper gas. Energy pundits even promised that Americans will soon be running their cars and trucks on natural gas, and the U.S. will be exporting the fuel to Europe via LNG tankers.

Early on in the fracking boom, oil and gas geologist Art Berman began sounding an alarm ([see example](#)). Soon geologist David Hughes joined him, authoring an extensive critical report for Post Carbon Institute (“[Will Natural Gas Fuel America in the 21st Century?](#)”), whose Foreword I was happy to contribute.

Here, one more time, is the contrarian story Berman and Hughes have been telling: The glut of recent gas production was initially driven not by new technologies or discoveries, but by high prices. In the years from 2005 through 2008, as conventional gas supplies dried up due to depletion, prices for natural gas soared to \$13 per million BTU (prices had been in \$2 range during the 1990s). It was these high prices that provided an incentive for using expensive technology to drill problematic reservoirs. Companies flocked to the Haynesville shale formation in Texas, bought up mineral rights, and drilled thousands of wells in short order. High per-well decline rates and high production costs were hidden behind a torrent of production—

and hype. With new supplies coming on line quickly, gas prices fell below \$3 MBTU, less than the actual cost of production in most cases. From this point on, gas producers had to attract ever more investment capital in order to maintain their cash flow. It was, in effect, a Ponzi scheme.

In those early days almost no one wanted to hear about problems with the shale gas boom—the need for enormous amounts of water for fracking, the high climate impacts from fugitive methane, the threats to groundwater from bad well casings or leaking containment ponds, as well as the unrealistic supply and price forecasts being issued by the industry. I recall attempting to describe the situation at the 2010 Aspen Environment Forum, in a session on the future of natural gas. I might as well have been claiming that Martians speak to me via my tooth fillings. After all, the Authorities were all in agreement: The game has changed! Natural gas will be cheap and abundant from now on! Gas is better than coal! End of story!

These truisms were echoed in numberless press articles—none more emblematic than Clifford Krauss's *New York Times* piece, "[There Will Be Fuel](#)," published November 16, 2010.

Now Krauss and the *Times* are singing a somewhat different tune. "[After the Boom in Natural Gas](#)," co-authored with Eric Lipton and published October 21, notes that ". . . the gas rush has . . . been a money loser so far for many of the gas exploration companies and their tens of thousands of investors." Krauss and Lipton go on to quote Rex Tillerson, CEO of ExxonMobil: "We are all losing our shirts today. . . . We're making no money. It's all in the red." It seems gas producers drilled too many wells too quickly, causing gas prices to fall below the actual cost of production. Sound familiar?

The obvious implication is that one way or another the market will balance itself out. Drilling and production will decline (drilling rates have already started doing so) and prices will rise until production is once again profitable. So we will have *less* gas than we currently do, and gas will be *more expensive*. Gosh, whoda thunk?

The current *Times* article doesn't drill very far into the data that make Berman and Hughes pessimistic about future unconventional gas production prospects—the high per-well decline rates, and the tendency of the drillers to go after "sweet spots" first so that future production will come from ever-lower quality sites. For recent analysis that does look beyond the cash flow problems of Chesapeake and the other frackers, see "[Gas Boom Goes Bust](#)" by Jonathan Callahan, and Gail Tverberg's latest essay, "[Why Natural Gas isn't Likely to be the World's Energy Savior](#)".

David Hughes is working on a follow-up report, due to be published in January 2013, which looks at unconventional oil and gas of all types in North America. As part of this effort, he has undertaken an exhaustive analysis of 30 different shale gas plays and 21 shale/tight oil plays—over 65,000 wells altogether. It appears that the pattern of rapid declines and the over-stated ability of shale to radically grow production is true across the U.S., for both gas and oil. In the effort to maintain and grow oil and gas supply, Americans will effectively be chained to drilling rigs to offset production declines and meet

demand growth, and will have to endure collateral environmental impacts of escalating drilling and fracking.

No, shale gas won't entirely go away anytime soon. But expectations of continuing low prices (which drive business plans in the power generation industry and climate strategies in mainstream environmental organizations) are about to be dashed. And notions that the U.S. will become a major gas exporter, or that we will convert millions of cars and trucks to run on gas, now ring hollow.

One matter remains unclear: what's the energy return on the energy invested (EROEI) in producing "fracked" shale gas? There's still no reliable study. If the figure turns out to be anything like that of tight "fracked" oil from the North Dakota Bakken (6:1 or less, according to one estimate), then shale gas production will continue only as long as it can be subsidized by higher-EROEI conventional gas and oil.

In any case, it's already plain that the "resource pessimists" have once again gotten the big picture just about right. And once again we suffer the curse of Cassandra—though we're correct, no one listens. I keep hoping that if we're right often enough the curse will lift. We'll see.

The Race to Become Scapegoat-in-Chief

The first two U.S. presidential debates have been painful to watch. Both candidates are running on platforms constructed from verbal hallucinations about the nation's past, present, and future. And the American people are being asked to choose between those hallucinations in order to select the best available scapegoat for the next four years of national economic decline. The race is burning up billions of dollars in advertising money, yet few citizens seem genuinely excited about either candidate, with households evidently viewing the proceedings as a prime-time ritual combat in which it is the winner, rather than the loser, who will ultimately receive the fatal thumbs-down.

Most of the delusions and fantasies that pervade the debates can be grouped into three baskets:

Energy. In the second debate, a questioner from the audience asked president Obama if there is something the latter can do to lower gasoline prices. The ensuing fiction-laced candidate dialogue featured assertions like the following:

- America has a century's worth of cheap natural gas. (It doesn't, and production levels will probably begin declining within the next couple of years.)
- Oil drilling in North Dakota will soon free the U.S. of the need to import oil. (It won't, and production there will similarly peak and start to wane in the next 2-5 years.)
- The president of the United States should be held accountable for high gasoline prices. (In fact, aside from temporary gestures like opening the Strategic Petroleum Reserve, there's almost nothing a president can do to reduce gas prices, which mostly

track the global price of crude oil.)

The reality is that America faces profound energy challenges. The “Beverly Hillbillies” era of cheap oil is over, and with it the decades-long spate of economic expansion that both candidates appear to believe is the birthright of all citizens. Oil production costs have skyrocketed in recent years, and out of desperation drilling companies are using costly techniques like hydrofracturing to wring crude from low-grade reservoirs. The energy world portrayed in the debates—in which coal is “clean” and oil and gas companies will lead the U.S. to a new era of energy abundance if only they are unleashed or regulated properly—is a stage set carefully crafted by fossil fuel industry PR professionals and political consultants. Once viewers have dutifully mistaken this painted scenery for reality, it’s the actors’ job to raise the audience’s adrenaline levels with taunts and sneers. Meanwhile, outside the theater, the real world is hurtling toward an energy supply crisis for which no one is being prepared and whose impact will not be blunted by sensible policy.

Summon the scapegoat.

The economy. Why hasn’t the American economy recovered? Why are so many people still unemployed? What policies will re-start the nation’s engines of growth? Anyone who watched either debate will know that these questions provoked lengthy and heated exchanges between Obama and Romney, precisely because they are the matters of greatest concern to voters. Probably only a few viewers bothered to examine the assumptions on which both candidates appear to agree: that ongoing economic stagnation is a temporary glitch that can be fixed, and that growth is normal and can continue perpetually.

Here president Obama is fighting with one hand tied behind him. As long as he feeds the delusion that the economic crisis is a solvable problem, he must find some way to deflect the demanding query: “Well, then, why haven’t you fixed it?”

In reality, the crash of 2008 resulted from the bursting of history’s biggest credit bubble, together with the simultaneous rupture of the decades-old regime of cheap oil. These are not “problems” that can be “fixed.” The global economy will inevitably contract during the remainder of this century, and success will be measured by the ability of nations, communities, and households to adapt to the new reality of declining mobility, expensive energy, and scarce credit.

If Obama were to even begin explaining this situation to voters, he would immediately be tarred as a pessimist, even a doomster. The best he can do is to argue that it was a Republican who got us into this mess, so it would be a mistake to choose a Republican using similar policies to get us out. Both candidates conspire to mislead their audience as to the cause and nature of the crisis, and both stoke unrealistic expectations of recovery and growth once they are elected. Since recovery is not in the cards, that just means that whoever wins will reap the blame.

Who wants to be the scapegoat?

Climate change. In this case, delusion is a species of blindness. In

the real world, impacts from global climate change are showing up faster than forecast in even the most "alarmist" scenarios published just a few years ago. Most of the U.S. is still suffering from a devastating drought that has already ruined billions of dollars' worth of crops. Altogether, weather anomalies are increasing in frequency and severity—exactly as the climate models predict, only faster. The north polar ice cap is disappearing before our eyes. This is potentially a crisis of truly apocalyptic dimensions. Yet, during the debates, president Obama has offered only one brief mention of climate change while governor Romney has avoided the subject altogether.

At some point in the not-distant future—quite likely, during the next four years—the mushrooming impacts of climate change will rudely demolish the complacent edifice of denial that characterizes current political discourse. At that point, Americans will be asking questions like, "Why haven't you done anything about this?" or, "Why is God punishing us?"

Send in the scapegoat.

Under the circumstances, picking a favorite in this race is a sucker's game—even if one of the political parties is in some ways more delusional and opportunistic than the other, and even if one of the candidates seems more intelligent and public-spirited than his opponent. Choosing the better president won't prevent further economic decline. Nor will blaming the scapegoat-in-chief offer any tangible relief when prosperity doesn't return. The only way we can make things go better is to acknowledge reality and adapt to it. Since we're not likely to get much help along those lines from our political leaders, it's really up to us.

President Declares 'War on Entropy'

CDN News, October 25

(Washington, DC) At a hastily organized news conference, president Obama this morning called for a new national effort to restore America's greatness by combating "entropy." Mr. Obama described entropy as "a self-defeating ideology of failure" and called on Congress to replace the Law of Diminishing Returns with a new legislative agenda geared to reversing a range of trends in resource depletion and economic stagnation. "I have directed the Attorney General to identify loopholes in the Second Law of Thermodynamics," the president said, "that would allow our nation's prosperity to advance indefinitely."

President Obama's comments come in response to increasing public skepticism about the potential for further economic growth. Interviewed on last Thursday's broadcast of Good Morning America, Caltech physicist Kelvin Vereisen observed that, "Unless they're maintained by a steady stream of energy, systems gradually decline into disorder. We pour extraordinary amounts of energy into the global industrial system annually, but the cost of that energy is rising while its quality is declining. We should therefore expect to see an increase of entropy in civilization." GMA was immediately

overwhelmed by viewer calls and emails.

In recent months, a small west-coast think tank, Post Carbon Institute, has raised questions about the possibility of endless growth of population and consumption on a finite planet. "There are limits to growth, and humanity is colliding with them," according to Executive Director Asher Miller. The organization alleges that high oil and food prices and extreme weather are all symptomatic of growth limits.

As if this weren't enough, legendary Harvard economist Justin Haymaker announced last week the conclusions of a blue-ribbon panel set up to analyze the causes of the current global economic crisis. "We found that money is not a substitute for energy," he said, "and that making debt grow faster than GDP in order to stimulate the economy just leads to a situation where nobody can afford to make payments and the whole financial system implodes." Asked whether further infusions of cash by central banks could prevent that implosion, Haymaker replied, "Yeah, for a while maybe. But real growth? Forget it. That's sooooo twentieth century."

Republican presidential candidate Mitt Romney immediately criticized president Obama's new policy offensive as being too weak. "If elected, I will make water flow uphill so that we can double our national hydroelectric capacity. With a Republican Congress, old oil wells will gush once again. And we will outlaw global warming. Everyone will be rich. Unimaginably rich! There's no limit. Anywhere. To anything. We won't just combat entropy, we will obliterate it!"