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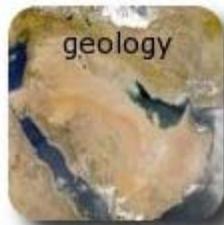
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Alice Friedemann: overview of peak oil, coal, and natural gas



Alice Friedemann

www.energyskeptic.com author of
*"When Trucks Stop Running:
Energy and the Future of
Transportation"*, 2015, Springer
and *"Crunch! Whole Grain Artisan
Chips and Crackers"*]

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Peak Oil

Of all the resources in the world, oil is top dog. All other resources depend on oil. You can get every fish in the sea, drain every drop out of non-renewable aquifers, make enough concrete to pave the planet, and convert every square mile of land to grow crops and feed barnyard animals cutting down the remaining forests. Which we are well on our way to doing. But only oil can do it, because the heavy-duty diesel engines that do the essential work of civilization run on diesel fuel. Locomotives, ships and trucks (i.e. logging, mining, construction, long-haul, garbage, cranes, fork-lifts, tractors, harvesters) all burn oil.

Peak oil doesn't mean "running out of oil", it happens when global oil production inevitably declines which will clearly happen some day since oil is finite. Since the 1960s the world has been consuming more oil than has been discovered. Most of the world's 500 largest oil fields were discovered over fifty years ago, and are still the source of 60 % of our oil.

Decline could start sooner than most people think. Conventional oil peaked in 2005, and provides 90% of our

oil supplies. Oil fields past their peak are declining on average 6% a year. But every year that increases slightly, by 2030 they may be declining at 9% or more a year. This means that by 2030 half to two-thirds of our oil will need to be replaced. I don't see how unconventional oil can make up the difference. Even if a crash program to ramp up tar sands production occurred, peak would be reached about 2040 at a quarter of what America consumes today. Arctic oil, if we ever figure out how to get it, will take decades of development before a single drop is produced. And tight fracked oil is expected to peak by 2020 after which it will decline rapidly.

Ever since oil prices dropped, people have forgotten and even denied peak oil. But perhaps they'd think differently if they'd heard former Secretary of Defense James at a senate hearing in 2006 where he said that **"By about 2010, we should see a significant increase in oil production as result of investment activity now under way. There is a danger that any easing of the price of crude oil will, once again, dispel the recognition that there is a finite limit to conventional oil."**

There can be no transition to alternative energy without oil because that's what heavy-duty transportation runs on. Wind turbines depend on the delivery of 8,000 parts from dozens of countries and trucks to dig a giant hole and fill it with 1300 tons of concrete for a platform to put the turbine on after it's delivered.

Oil shocks can happen any time there's a financial crash, exporters keep their oil for their own growing populations, war or terrorists destroy refineries, oil tankers, or block chokepoints.

Peak Coal

There are scientists who believe coal has already peaked globally or will soon. Estimates of global peak production range from 2015 to 2034, and U.S. peak from 2002 to 2015.

Brad Patzek, at the University of Texas, thinks that energy-wise, coal peaked in 2011, since we mined the higher energy coal first. Patzek thinks the remaining coal will provide only half the energy by 2050 that it does today.

The United States is often said to have 250 years of coal reserves. But that estimate was made in 1974 when the USGS last did a survey. A national academy of sciences report in 2007 said they thought the number might be closer to 100 years and recommended the USGS do another survey.

Little new development since "when trucks stop running": Last year the USGS reassessed America's most important coal reserve, the Powder River Basin in Wyoming and Montana,



where 42% of our coal is produced. The USGS found that most, 40 years of reserves were left. Not 250 years. This is coal that keeps the lights on in much of America. But the only major news media that reported this were U.S. News and World Report and the Pittsburgh post gazette.

Nearly other coal reserves need to be re-evaluated again too. It's a good bet the reserves in Illinois will go down, since even though coal production is half of what it was 20 years ago, it's still credited with reserves nearly the size of Montana.

Liquefied coal, also known as CTL, is seen as a way to cope with diesel shortages in the future, since we know this can be done because Sasol has been making CTL for 50 years in South Africa.

Coal is also one of the few substances that might scale up to replace oil, though whether it would be worth doing depends on a more realistic assessment of our reserves. Some geologists estimate America has as little as 60 years of coal left. If that's correct and it was all converted CTL, then it would only last 30 years, since half the energy of coal is needed to make CTL. With Carbon Capture and Storage, another 40% of the energy would be used.

CTL has other limits too. Each ton of liquid coal requires 6 to 15 tons of water, so very little if any could be produced in dry states like Wyoming and Montana where there simply isn't enough water.

Peak Natural Gas

It's hard to predict world peak natural gas, because there are huge amounts still. But many of these gas reservoirs are stranded because it would cost too much to build pipelines to get it to markets, and 20 to 40% is too expensive to process since they contain corrosive "sour" gas with toxic hydrogen sulfide or carbon dioxide.

The Energy Information Administration estimates 57 years of global natural gas are left **at current consumption rates**. If we increased consumption by 7% a year, it would last 28.5 years, half as long.

Natural gas is not traded like oil world-wide because Liquefied natural gas import terminals cost billions and each LNG carrier \$2 to 3 hundred million dollars. But in 2004, the U.S. was trying to build dozens after prices skyrocketed and shortages loomed.

Conventional gas production peaked in 1973 and is declining at a rate of 5% a year. Fortunately, in 2005 fracked natural gas came to the rescue by yet another Wall Street scam that fleeced the middle class again like the mortgage bubble. Millions of Americans who invested in high-yield bond and stock funds were unwittingly lending money to shale companies that were losing money, who kept on drilling as long as Wall Street kept lending them money. Now shale companies are over \$300 billion in debt

and many have gone bankrupt. Even without the shale bubble popping, but both fracked natural gas and oil would have geologically peaked by 2020.

In order to keep trucks running our congressional leaders had hoped that by now 20% of trucks would be using compressed or liquefied natural gas to take advantage of what they've been told is 100 to 250 years of fracked natural gas and American Energy Independence.

But only 3.5% of trucks run on natural gas, mainly private fleets of delivery trucks and buses.

Truckers haven't bought into natural gas because they have to refuel 2 to 4 times more often, natural gas trucks cost 50 to 100 thousand dollars more than diesel trucks, and any price advantage natural gas has is undercut by continual efficiency improvements in diesel engines.

There are very few trucks burning Liquefied natural gas, but not many since there are only 73 public LNG stations in the U.S., mainly in California.

Railroads don't want to have to build a completely new gas distribution system and replace their 25,000 \$2 million locomotives plus add a giant tank car of natural gas fuel that might explode in a derailment.

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20 Comments on "Alice Friedemann: overview of peak oil, coal, and natural gas"

paulo1 on Sun, 21st Aug 2016 9:04 am



Good article. Well cited with respectable references. Now is the time to que the f>>ktard comments from some of our more agenda-driven commentators.

Cloggie on Sun, 21st Aug 2016 9:11 am



Old school Heinbergian peak oil story, still stuck in ASPO-2000 data and grudgingly accepting the reality of fracking. Technology does not exist as a dynamic factor, providing a ladder to get acces to higher hanging fruit as well create possibilities for energy saving.

"There can be no transition to alternative energy without oil

because that's what heavy-duty transportation runs on. Wind turbines depend on the delivery of 8,000 parts from dozens of countries and trucks to dig a giant hole and fill it with 1300 tons of concrete for a platform to put the turbine on after it's delivered."

This assumes that society will not be able to prioritize between using oil for the public or oil for setting up a new energy base.

There will always be fossil fuel for these priority activities.

Steady implementation of renewable energy sources further eat away from fossil fuel consumption.

dave thompson on Sun, 21st Aug 2016 1:40 pm



Great thorough, concise, to the point, there is NOTHING, that will replace the power of liquid transport fuels. No gasoline, diesel, jet fuel, heavy bunker fuels for ships, no civilization, end of story, have a nice day.

shortonoil on Sun, 21st Aug 2016 1:42 pm



"Good article. Well cited with respectable references. "

Yes a good article, but the author is still concentrating on the mass bases of reserves, and not on their energy bases. The two are not equivalent.

Energy is the purpose of extracting fossil fuels to begin with; quoting the quantity available using another property makes no sense. It is like stating that there are a lot of barrels in lake Erie, or a lot of gold in the oceans. Neither are of any value.

Most authors either do not understand energy dynamics, or are attempting to simplify them for the benefit of their readers. The world is in an energy crisis, and the world's economies are chugging to a halt because of it. Central Banks are attempting to paper over it by printing \$trillions of what they call liquidity; which is nothing more than a euphemism for more currency and less goods and services to back it up.

The agenda-divers have fertile ground to sow their message that all is well, while their employers continue to strip what remains of the world's wealth. Blissful ignorance can be very nice until you have become very, very hungry.

Unfortunately, when that day arrives there will be very few options remaining for today's blissfully happy ignoramuses!

Apneaman on Sun, 21st Aug 2016 2:10 pm



Speaking of thermodynamics.....

A Thermodynamic Critique

http://paulchefurka.ca/Thermo_Critique.html

Boat on Sun, 21st Aug 2016 3:24 pm



short,

You ignore the fact the last 1 mbpd of new oil over the last year primary is from the middle east. These countries all plan to increase production. New demand is still chugging along at over 1 mbpd. Nothing has changed much from 2015. There is still a glut. Your etp dribble is drowning in a sea of oil.

shortonoil on Sun, 21st Aug 2016 4:03 pm



Excellent article Ape, thanks.

http://paulchefurka.ca/Thermo_Critique.html

Plus, an understanding of evolutionary psychology is a must to appreciate human behavior. We are hard wired to make most of the decisions that we do. That is why technological advancements seldom solve problems. They are motivated by the same instincts that produced the problems to begin with. When all is said, and done you have is a bigger problem than what you began with.

From gun powder to nuclear weapons is a good example of humans digging themselves into an ever deeper hole.

shortonoil on Sun, 21st Aug 2016 4:17 pm



"There is still a glut. Your etp dribble is drowning in a sea of oil."

Your ever persistent bullshit is amazing! We stated almost three years ago that the world would never again be able to absorb all the petroleum produced. That is what would drive down prices until

petroleum producers could no longer make money producing oil. It is what brings about the end of the oil age. Here is the graph:

http://www.thehillsgroup.org/depletion2_022.htm

Have it stenciled on the inside of your eye lid, so that I don't have to put it up every day for next 13 years for you.

Harquebus on Sun, 21st Aug 2016 5:58 pm



13 years is a bit optimistic.

shortonoil on Sun, 21st Aug 2016 6:53 pm



13 years is the theoretical arrival of the "dead state" for the average barrel of oil. There is also good theoretical and subjective estimates that state that it won't last that long. That the petroleum industry will collapse. When you look at their debt load, and revenue stream (\$2.5 trillion, to \$1.7 trillion) they could be right. We are assuming that the world will throw everything, including the kitchen sink, into keeping the oil flowing. If they do it will cost \$39 trillion over the next decade. —"Your tax payer dollars at work"—

<http://www.thehillsgroup.org/>

Truth Has A Liberal Bias on Sun, 21st Aug 2016 8:44 pm



ETP model is the most retarded fucking bullshit I've ever heard of. Short should publish in a peer reviewed journal or shut the fuck up once and for all.

onlooker on Sun, 21st Aug 2016 9:59 pm



What is retarded truth about taking into account the properties of the resource in question, laws of physics and production history to determine for how much longer this resource will be useful to society? Seems like you refuse to

acknowledge facts of the matter

freak on Sun, 21st Aug 2016 11:26 pm



Alice Friedemann and Chris Martenson's 08/21/16 Podcast.

<https://www.youtube.com/watch?v=-EKmNgvUw3k>

freak on Mon, 22nd Aug 2016 3:01 am



I seem to think we need to look at what is happening to the global currency monetary system in the world to really get a clear understanding of the things coming that will effect all of us.

https://www.youtube.com/watch?v=P9J_V5GGU4Y

shortonoil on Mon, 22nd Aug 2016 7:46 am



"ETP model is the most retarded fucking bullshit I've ever heard of. Short should publish in a peer reviewed journal or shut the fuck up once and for all. "

Your don't keep up very well, do you?

I've posted this here, on the main page, and in the Etp Model thread.

The Hill's Group, in collaboration with Dr. Louis Arnoux of nGeni™ , and Dr. Alistor Hamilton of the Dept of Mechanical Engineering, Edinburgh are preparing two papers. One by invitation in Dr. Charles Hall's the "Journal of Physics and Quality Resources" and one for the Royal Academy of Sciences.

The papers will be intended for academics, and knowledgeable readers of the general public.

Which, obviously, leaves you out. Sorry.

But, we do hope that you continue to enjoy your comic books, and tabloids. We also hope that you continue to post your irrelevant, uninformed crap on PO News for the amusement of its readers.

<http://www.thehillsgroup.org/>

marmico on Mon, 22nd Aug 2016 8:33 am

Well, the Turdburg and I agree on only

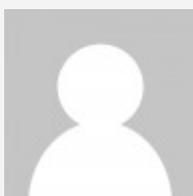


one issue. The ETP is garbage. No doubt she will be on the review committee to smack that quack Arnoux around. There will be so many revisions required that the maximum price curve will become an irrelevancy. I can hardly

wait to see the gymnastics needed to empirically prove that refineries are only 65% energy efficient.

Bedford Hill is a fucking goof. In 1960, he posits that the maximum price curve pencils out at 15% of world GDP and in 2020 it is purported to be less than 1% of GDP. Pure and plain nonsense.

shortonoil on Mon, 22nd Aug 2016 9:28 am



" I seem to think we need to look at what is happening to the global currency monetary system in the world to really get a clear understanding of the things coming that will effect all of us."

We have stated on several occasions that the depletion of the world's petroleum reserves would be reflected in the activity of the FX markets. But, because economics is a synthetic system that can be, and is manipulated by the Central Banks, and other large participates it is at best a general outline of the activity that is occurring. Economic models, unlike physical models that have unassailable boundary conditions, can and often do project situations that in the real world would be impossible to achieve. Their lack of built in restraints make them a potentially very dangerous tool in the hands of those with an agenda!

<http://www.thehillsgroup.org/>

Davy on Mon, 22nd Aug 2016 9:52 am



Short's ETP model has had profound and conformational support for my collapse narrative. While I agree that it can be discounted as any model can, it has a firm foundation in a reality that seeks to be grounded in natural and scientific law. It further follows common

sense if one looks at the rather normal ideas of depletion and the human nature of seeking the low hanging fruit of exploitation. Ideas expressed by this model are sound as are the conclusions. The model is also proving to be accurate in relation to what is actually happening with price at lease more accurate than other predictions. Where the model will likely cease to be very effective is when the turbulence and deflation of a decaying global system

becomes pronounced enough to make any models of what is happening ineffective. There is now formula for turbulence.

Marmico on the other hand has contributed little if anything to our discussion. Anyone can reference a Freddie fluff chart. Anyone can speak with profanities and mal-intent. Marmico is an example of the lowest of scum that inhabit the World Wide Web. He is a disgrace to our board. I do not mind his contrary positions in fact I welcome them. The last thing I want to do or be is absolutely sure of what I am talking about especially considering the gravity of what we talk about here. So Marmico go bite yourself and give yourself rabies.

marmico on Tue, 23rd Aug 2016 6:16 am



Short's ETP model has had profound and conformational support for my collapse narrative

Ya, carry on with your indigestible word salad bull shit, Davy Greenacres.

Global oil consumption expenditures have ranged from 2% to 6% of global income for the last 50 years. In 2016, ~2.5%. But some goof (who only 4 years ago was predicting \$407/barrel in 2020) says that the maximum expenditure/income ratio was 15% in 1960 and <1% in 2020. Ya, right, you fucking retard.

Davy on Tue, 23rd Aug 2016 7:27 am



Marmico, did you read the other part of my comment about rabies?

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