

Our Finite World

Exploring how oil limits affect the economy

Scientific Models and Myths: What Is the Difference?

Posted on December 17, 2019 by Gail Tverberg

Most people seem to think, “The difference between models and myths is that models are scientific, and myths are the conjectures of primitive people who do not have access to scientific thinking and computers. With scientific models, we have moved far beyond myths.” It seems to me that the truth is quite different from this.

History shows a repeated pattern of overshoot and collapse. William Catton wrote about this issue in his highly acclaimed 1980 book, [Overshoot](#).

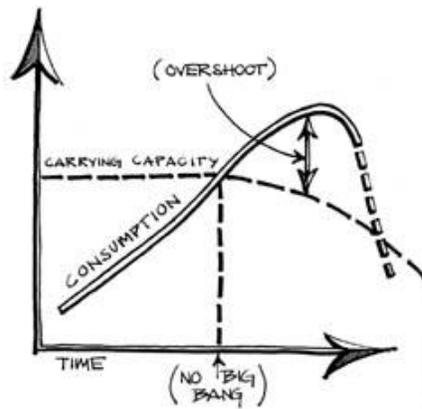


Figure 1. Depiction of Overshoot and Collapse by [Paul Chefurka](#)

What politicians, economists, and academic book publishers would like us to believe is that the world is full of limitless possibilities. World population can continue to rise. World leaders are in charge. Our big problem, if we believe today’s models, is that humans are consuming fossil fuel at too high a rate. If we cannot quickly transition to a low carbon economy, perhaps based on wind, solar and hydroelectric, the climate will change uncontrollably. The problem will then be *all our fault*. The story, supposedly based on scientific models, has almost become a new religion.

Recent Attempted Shifts to Wind, Solar and Hydroelectric Are Working Poorly

Of course, if we check to see what has happened when economies have actually attempted to switch to wind, water and hydroelectric, we see one bad outcome after another.

[1] Australia’s attempt to put renewable electricity on the grid has sent electricity prices skyrocketing and resulted in increased blackouts. It has been said that intermittent electricity has “wrecked the grid” in Australia.

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[2] California, with all of its renewables, has badly neglected its grid, leading to many **damaging wildfires**. Renewables need disproportionately more long distance transmission, partly because they tend to be located away from population centers and partly because transmission must be scaled for peak use. It is evident that California has not been collecting a high enough price for electricity to cover the full cost of grid maintenance and upgrades.

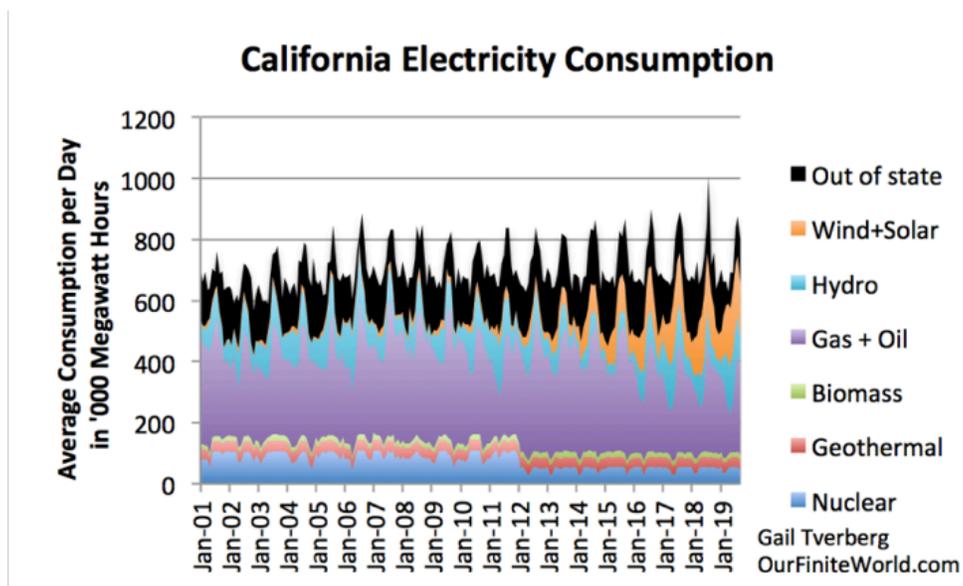


Figure 2. California electricity consumption including amounts imported from out of state, based on EIA data. Amounts shown are average daily amounts, by month.

[3] The International Rivers Organization writes that [Large Dams Just Aren't Worth the Cost](#). Part of the problem is the huge number of people who must be moved from their ancestral homeland and their inability to adapt well to their new location. Part of the problem is the environmental damage caused by the dams. To make matters worse, a [study of 245 large dams](#) built between 1934 and 2007 showed that without even taking into account social and environmental impacts, the actual construction costs were too high to yield a positive return.

Developed economies have made hydroelectric power work adequately in areas with significant snow melt. At

this point, evidence is lacking that large hydroelectric dams work well elsewhere. Significant variation in rainfall (year-to-year or seasonally) seems to be particularly problematic, because without fossil fuel backup, businesses cannot rely on year-around electricity supply.

The Pattern of Overshoot and Collapse Is Well-Established

Back in 1974, Henry Kissinger [said in an interview](#):

*I think of myself as a historian more than as a statesman. As a historian, you have to be conscious of the fact that **every civilization that has ever existed has ultimately collapsed.** [Emphasis added.]*

History is a tale of efforts that failed, of aspirations that weren't realized, of wishes that were fulfilled and then turned out to be different from what one expected. So, as a historian, one has to live with a sense of the inevitability of tragedy. As a statesman, one has to act on the assumption that problems must be solved.

Historians tend to define collapse more broadly than “the top level of government disappearing.” Collapse includes many ways of an economy failing. It includes losing at war, population decline because of epidemics, governments overthrown by internal dissent, and governments that cannot repay debt with interest, and failing for this reason.

A basic issue that often underlies collapse is **falling average resources per person**. These falling average resources per person can take several forms:

- Population rises, but land available for farming doesn't rise.
- Mines and wells deplete, requiring more effort for extraction.
- Soil erodes or becomes polluted with salt, reducing crop yields.

One of the other issues is that as resources per capita become stretched, it becomes harder and harder to set aside a margin for a “rainy day” or a drought. Thus, weather or climate variations may push an economy over the edge, as resources per person become more stretched.

Scientific Models Too Often Prove Whatever the Grant Provider Wants Proven

It is incredibly difficult to figure out what the future will hold. Our experience is almost entirely with a growing economy. It is easy to accidentally build this past experience into a model of the future, even when we are trying to make realistic assumptions. For example, when making pension models in the early 1980s, actuaries would see interest rates of 10% and assume that interest rates could remain this high indefinitely.

The question of whether prices will rise to allow future energy extraction is another problematic area. If we believe standard economic theory, prices can be expected to rise when resources are in short supply. But if we look at [Revelation 18: 11-17](#), we find that when Babylon collapsed, the problem was low prices and lack of demand. There were not even buyers for slaves, and these were the energy product of the day. The Great

Depression of the 1930s showed a similar low-price pattern. Today's economic model seems to need refinement, if it is to account for how prices really seem to behave in collapses.

If there is an issue that is difficult to evaluate in making a forecast, the easiest approach for researchers to take is to omit it. For example, the intermittency of wind and solar can effectively be left out by assuming that (a) the different types of intermittency will cancel out, or (b) intermittency will be inexpensive to fix or (c) intermittency will be handled by a different part of the research project.

To further complicate matters, researchers often find that their compensation is tied to their ability to get grants to fund their research. These research grants have been put together by organizations that are concerned about the future. These organizations are looking for research that will match their understanding of today's problems and their proposed solutions for the future.

A person can guess how this arrangement tends to work out. Any researcher who points out endless problems, or says that the proposed solution is impossible, won't get funding. To get funding, at least some partial solution must be provided along the lines outlined in the Request for Proposal, regardless of how unlikely the proposed solution is. Research showing that the grant-writer's view of the future is not really correct is left to retired researchers and others willing to work for little compensation. All too often, published research tends to say whatever the groups funding the research studies want the studies to say.

Myths Are of Many Types; Many Are Aimed at Giving Good Advice

The fact that myths have survived through the ages lets us know that at least some people found the insights that they provided were worthwhile.

If an ancient people did not know how the earth and the people on it came into being, they would likely come up with a myth explaining the situation. Most of us today would not believe myths about [Thor](#), for example, but (as far as we know) no one was being paid to put together stories about Thor and how powerful he was. The myths were stories that people found sufficiently useful and entertaining to pass along. In some sense, this background gives these stories more value than a paper written in order to obtain funds provided by a research grant.

Some myths relate to what types of activities by humans were desirable or undesirable. For example, the people in Uganda have traditional folklore [about a moral monster](#) that is used to teach children the dangers of craftiness and deceit. My sister who visited Uganda reported that where she visited, people believed that people who stole someone else's crops were likely to get sick. Most of us wouldn't think that this story was really right, but it has a moral purpose behind it. There are no doubt many myths of this type. They have been passed on because passing them on seemed to serve a purpose.

Clearly, which actions are desirable or undesirable changes over time. For example, Leviticus 19:19 and Deuteronomy 22:11 seem to condemn wearing fabrics that are a mix of linen and wool. Today, we use many fabrics that are mixes of two types of yarns. Perhaps there was a problem with different amounts of shrinkage. Today, our issues are different. Perhaps myths associated with issues such as these need to be discarded, because they are not relevant anymore.

How about myths of an afterlife? Things on earth don't necessarily go well. The promise of a favorable afterlife has a definite appeal. Some people would even like a story in which people who don't act in the desired manner are punished. Some religions seem to provide such an ending as well.

Follow a Religion Based on Scientific Models, or Based on Myth, or Neither?

Nature's solutions and mankind's solutions in a finite world both involve complexity, but the two types of complexity are very different.

Mankind's solutions seem to involve more and more devices using an increased amount of resources and debt. The overhead of the system becomes greater and greater as the economy increasingly shifts toward robots and owners/overseers of the robots. The big problem that can be expected to develop comes from not having enough purchasers who can afford to purchase the end products created by this system. In fact, we seem to already be reaching an era of too much wage disparity and too much wealth disparity. Eventually, such a system can be expected to collapse under its own weight.

We can already see signs that wind and solar are not scalable to the extent that people would like them to be. Together, they currently comprise only 3% of the world's energy supply. We need very large supplies of energy to provide food, housing, and transportation for 7.7 billion people.

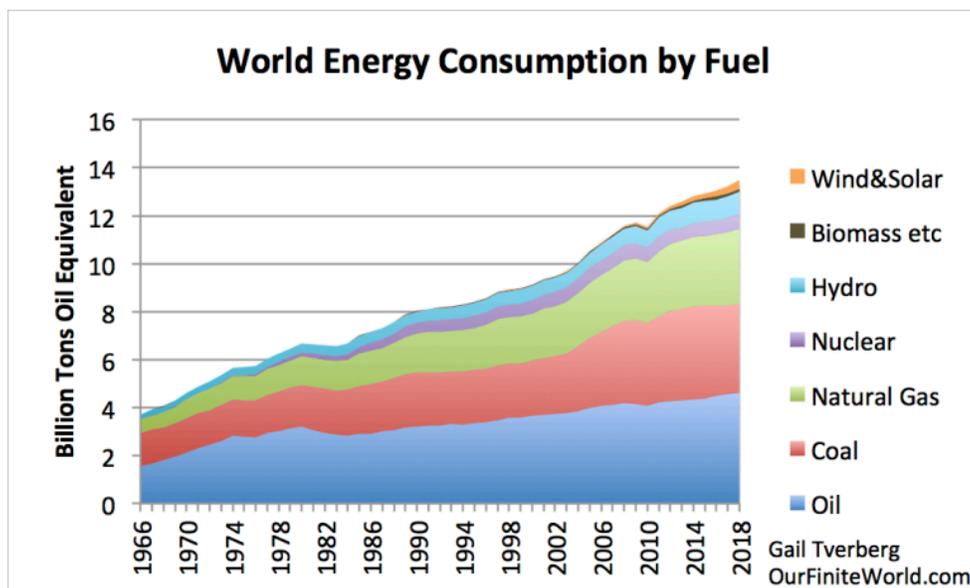


Figure 3. World Energy Consumption by Fuel, based on data of 2019 BP Statistical Review of World Energy.

Regardless of what politicians would like proven, nature doesn't move in a constant path upward. Instead, nature provides a self-organizing system of individual parts, none of which is permanent. Humans are temporary residents of this earth. Businesses are temporary, and the products they sell are constantly changing and adapting. Governments are temporary. Weather patterns are also temporary. Religions are constantly changing and adapting, and new ones are formed.

Nature's way doesn't seem to require much overhead. Over the long run, it seems to be much more permanent than mankind's attempts at solutions. As the system changes, each replacement differs in random ways from

previous systems of a particular type. The best adapted replacements survive, without the need for excessive overhead to the system.

We may or may not agree with the religions that have formed over the years in the self-organizing way that nature provides. The fact that religions have stayed around indicates that at least for some people, they continue to play a significant role. If nothing else, religious groups often provide social gatherings with others in the area. This provides an opportunity for friendship. In some cases, it will allow people to find potential marriage partners who are not closely related.

One of the roles of religions is to pass down “best practices.” These will change over time so some will need to be discarded and changed. For example, in some eras, it will be optimal for women to have several children. In others, it will make sense to have only one or two.

The book, [Oneness: Great Principles Shared by All Religions](#) by Jeffrey Moses, lists 64 principles shared by several religions. Of course, not all religions agree on all of these 64 principles. Instead, there seems to be a great deal of overlap in what religions of the world teach. Some sample truths include “The Golden Rule,” it is “Blessed to Forgive,” “Seek and Ye Shall Find,” and “There Are Many Paths to God.” This type of advice can be helpful for people.

People will differ on whether it makes sense to believe that there really is an afterlife. There may very well be; we can’t know for certain. At least this is better odds than the knowledge that all earthly civilizations have eventually failed.

I personally have found belonging to and attending an ELCA Lutheran Church to be helpful. I find its earthly benefits to be sufficient, whether or not there is an afterlife. I will, of course, be attending around Christmas time. I will also be getting together with family.

I recognize, too, that not everyone is interested in one of the traditional religions. Some would even like to believe that with our advanced science, we can now find a way around every problem that confronts us. Perhaps this time is different. Perhaps this time, world leaders, with their love for overhead-heavy solutions, will finally discover a solution that can produce long-term growth on a finite earth. Perhaps energy from fusion is around the corner. Wish! Wish!

My wish to you is that you have Happy Holidays, of whatever types you choose to celebrate!

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