

## Our Finite World

Exploring how oil limits affect the economy

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### Increased Violence Reflects an Energy Problem

Posted on [June 3, 2020](#) by [Gail Tverberg](#)

Why are we seeing so much violence recently? One explanation is that people are sympathizing with those in the Minneapolis area who are upset at the death of George Floyd. They believe that a white cop used excessive force in subduing Floyd, leading to his death.

I believe that there is a much deeper story involved. As I wrote in my recent post, [Understanding Our Pandemic – Economy Predicament](#), ***the problem we are facing is too many people relative to resources, particularly energy resources.*** This leads to a condition sometimes referred to as “overshoot and collapse.” The economy grows for a while, may stabilize for a time, and then heads in a downward direction, essentially because energy consumption per capita falls too low.

Strangely enough, ***this energy crisis looks like a crisis of affordability.*** The young and the poor, especially, cannot afford to buy goods and services that they need, such as a home in which to raise their children and a vehicle to drive. Trying to do so leaves them with excessive debt. ***If the affordability problem changes for the worse, the young and the poor are likely to protest. In fact, these protests may become violent.***

The pandemic tends to make the affordability problem worse for minorities and young people because they are disproportionately affected by job losses associated with lockdowns. In many cases, the poor catch COVID-19 more frequently because they live and/or work in crowded conditions where the disease spreads easily. In the US, blacks seem to be especially hard hit, both by COVID-19 and through the loss of jobs. These issues, plus the availability of guns, makes the situation particularly explosive in the US.

Let me explain these issues further.

#### **[1] Energy is required for all aspects of the economy.**

Energy is required by governments. Energy is required to operate police cars. Energy is required to build schools and to operate their heating and lighting. Energy is needed to build and maintain roads. Tax revenue represents available funds to buy energy products and goods and services made with energy products.

Energy is needed for any type of business. Operating a computer requires electricity, which is a form of energy. Heating or cooling a building requires energy. Growing food requires solar energy from the sun; liquid fuel is used to operate farm machinery and trucks that transport food to the locations where it is sold. Human energy is used for some of these processes. For example, human energy is used to operate computers and farm machinery. Human energy is sometimes used to pick the crops, as well.

Wages paid by governments and businesses indirectly go to buy energy products of many kinds. Food is, of course, an energy product. The heat to cook or bake the food is also an energy product. Metals of all kinds are made using energy products, and lumber is cut and transported using energy products. With sufficient wages, it is possible to buy or rent a home, and to purchase or lease an automobile.

Interest rates indirectly reflect the portion of goods and services produced by energy products that can be transferred to parts of the system that depend on interest earnings. For example, banks, insurance companies and those on pensions depend on interest earnings. If interest rates are high, benefits to pensioners can easily be paid and insurance companies can charge low rates for their products, because their interest earnings will help offset claim costs.

Interest rates are now about as low as they can go, indicating a likely shortage of energy for funding these interest rates. The last time interest rates were close to current levels was during the Great Depression of the 1930s.

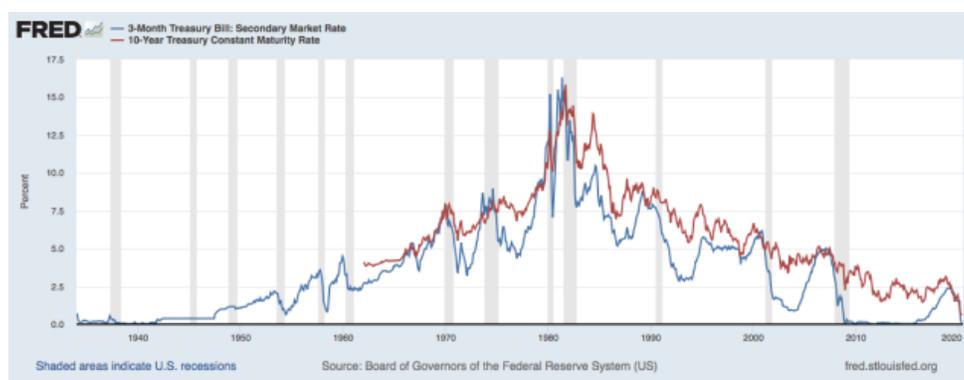


Figure 1. Ten-year and three-month US Treasury interest rates, in chart made by FRED.

## [2] When there is not enough energy to go around, the result can be low commodity prices, low wages and layoffs.

This is not an intuitive result. Most people assume (low energy = high prices), but this is the opposite of what actually happens. The problem is that *the amount workers can afford to pay for finished goods and services needs to be high enough to make production of the commodities used in making the finished products profitable*. When affordability falls too low, the system tends to collapse.

We are really dealing with a two-sided problem. The prices of commodities such as oil, wholesale electricity, steel, copper and food tend to fluctuate widely. *Consumers need these prices to be low*, in order for the price of finished goods made with these commodities to be affordable; *producers need the prices of these commodities to rise ever-higher*, to cover the cost of deeper wells and more batteries, to try to partially offset the intermittency of solar and wind electricity.

Most people assume that the situation will be resolved in the direction of commodity prices rising ever higher. In fact, commodity prices did rise higher, until mid 2008. Then, something snapped; commodity prices have been falling ever-lower since mid 2008. In fact, ever-lower commodity prices have been a world-wide problem,

causing huge problems for countries trying to support their economies with export revenues based on commodity production.



Figure 2. CRB Commodity Price Index from 1995 to June 2, 2020. Chart prepared by [Trading Economics](#). Composition is 39% energy, 41% agriculture, 7% precious metals and 13% industrial metals.

Even before the lockdowns, low commodity prices were leading to low wages of those working in commodity industries around the world. These low prices also led to low tax revenue, and this low tax revenue led to an inability of governments to afford the services that citizens expect, such as bus service and subsidized prices for certain essential goods/services. For example, South Africa (an exporter of coal and minerals) was experiencing [public protests](#) in September 2019, for reasons such as these. Chile is a major exporter of copper and lithium. Low prices of those commodities led to [violent protests](#) in 2019 for similar reasons.

Now, in 2020, lockdowns have led to even lower commodity prices. At times, farmers have been [plowing their crops under](#). Oil companies are laying off [workers](#). The trend toward lower commodity prices had been occurring for a long time; the recent drop in prices was “the straw that broke the camel’s back.” If prices stay this low, there is a danger of falling production of commodities that we depend on, including food, metals, electricity, and oil. Businesses producing these items will fail, and governments with falling tax revenue will be unable to support them.

**[3] Historical energy consumption data shows that violence often accompanies periods when energy production is not growing fast enough to meet the needs of the growing population.**

Figure 3 shows average annual growth in world energy consumption, for 10-year periods:

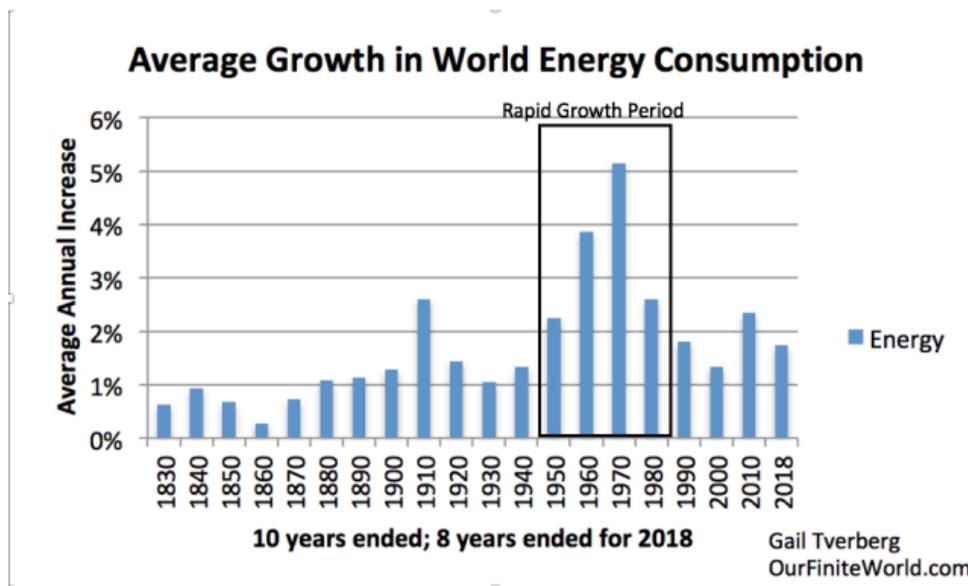


Figure 3. Average growth in energy consumption for 10 year periods, based on Vaclav Smil estimates from Energy Transitions: History, Requirements and Prospects (Appendix) together with BP Statistical Data for 1965 and subsequent.

Economic growth encompasses both population growth and rising standards of living. Figure 4 below takes the same information used in Figure 3 and divides it into (a) the portion underlying population growth, and (b) the portion of the energy supply growth available for improved standards of living. During most periods, increased population absorbs over half of increased energy consumption.

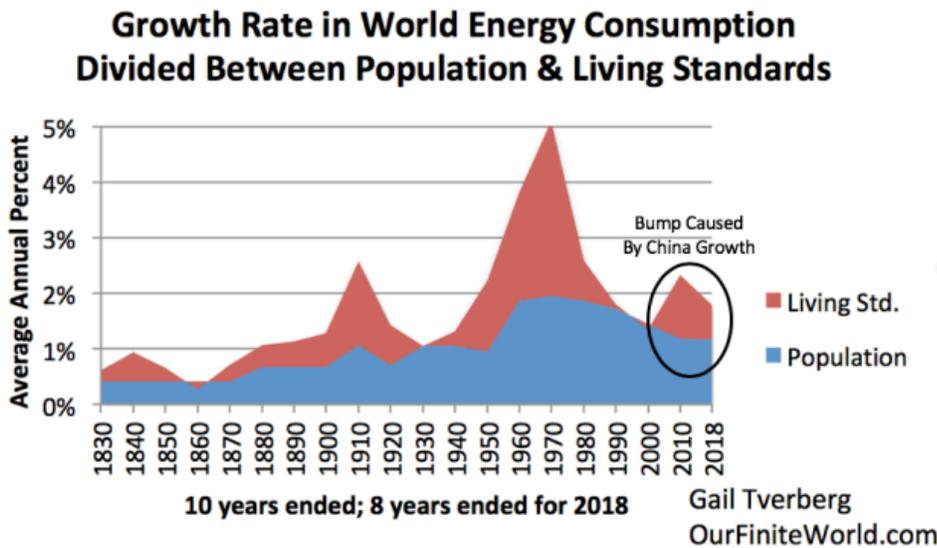


Figure 4. Figure similar to Figure 3, except that energy devoted to population growth and growth in living standards are separated. A circle is also added showing the recent growth in energy is primarily the result of China's temporary growth in coal supplies.

There are three dips in the Living Standards portion of Figure 4. The first one came in the 10 years ended 1860, just before the US Civil War. Most of us would say that was a period of violence.

The second one occurred in the 10 years ended 1930. This is the period when the Great Depression began. It

came between World War I and World War II. This was another violent period of our history.

The third dip came in the 10-year period ended 2000. This was not a particularly violent period; instead, it reflects the collapse of the central government of the Soviet Union, leaving the member republics to continue on their own. There was a huge loss of demand (really, affordability) on the part of countries that were part of the Soviet Union or depended on the Soviet Union.

## Central government of Soviet Union collapsed in 1991 with huge impact

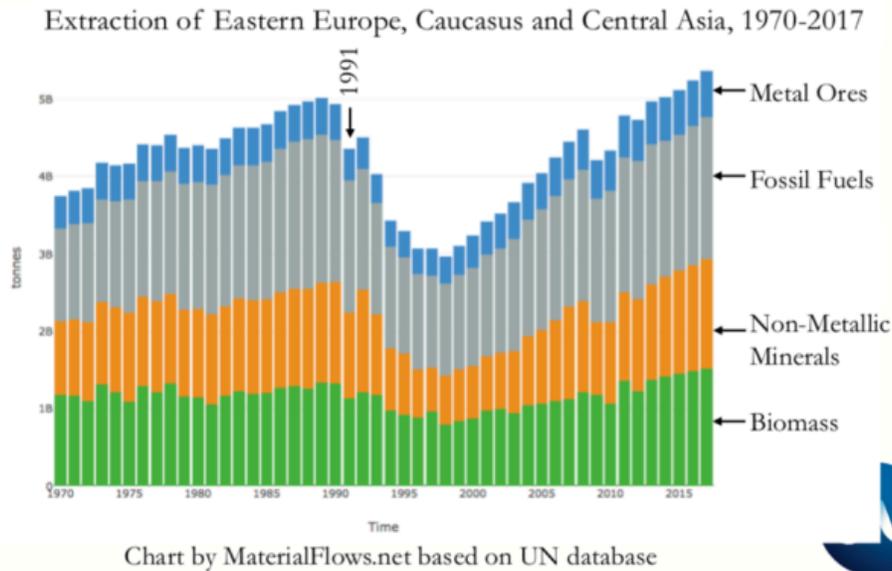


Figure 5. Chart showing the fall in Eastern Europe's materials production, after the collapse of the central government of the Soviet Union in 1991.

**[4] The world is facing a situation in which total energy consumption seems likely to drop by 5% per year, or perhaps more.**

If we look back at Figure 3, we see that even in very “bad” times economically, energy consumption was rising. In fact, in one 10-year period, the average increase was more than 5% per year.

If the world economy is reaching a point in which we consumers, in the aggregate, cannot afford the goods and services made with commodities, unless commodity prices are very low, we will likely experience a huge drop in energy consumption. I don't know exactly how much the annual change will be, but energy consumption growth and GDP growth tend to move together. We might guess that *GDP growth* is shifting to *5% GDP annual shrinkage*, and energy consumption will be shrinking by a similar percentage.

Clearly, shrinkage of 5% per year would be far worse than the world economy has experienced in the last 200 years. In fact, for the 10-year periods shown in Figure 3, there has never been a reduction in energy consumption. Even if I am wrong and the shrinkage in energy consumption is “only” 2% per year, this would be far worse than the experience over any 10-year period. In fact, during the Great Recession, world energy consumption only shrank in one year (2009) and then by 1.4%.

History doesn't give us much guidance regarding what impact a dramatic reduction in energy consumption would have on the economy, except that population reduction would likely be part of the change that takes place. If half or more of energy consumption growth goes toward rising population (Figure 4), then a shrinkage of energy consumption seems likely to reduce world population.

**[5] What the world is really facing is a competition regarding which parts of the economy can stay, and which will need to be eliminated, if there is not enough energy to go around. It should not be surprising if this competition often leads to violence.**

As I indicated in Section [1], all parts of the economy depend on energy. If there is not enough, some parts must shrink back. The big question is, "Which parts?"

(a) Do governments, and organizations that bind governments together, collapse? If countries are doing poorly, they will not want to contribute to the World Trade Organization, the United Nations or the European Union. Governments, such as the government of Saudi Arabia, could be overthrown, or may simply stop operating. In fact, any government, when it faces insurmountable problems, could simply stop operating and leave its functions to lower levels of government, such as states, provinces, or cities.

(b) Do pension plans stop operating? Are pensioners left "out in the cold"? How about Social Security recipients?

(c) Can international trade be kept operating? It is a big consumer of energy. Also, competition with low-wage countries tends to keep wages in developed nations low. Without international trade, many imported goods (including imported medicines) become unavailable.

(d) Which companies will collapse, leaving bond holders and stockholders with \$0? People who formerly had jobs with these companies will also find themselves without jobs.

(e) If the world economy cannot support as many people as before, which ones will be left out? Is it people in rich countries who find themselves without jobs? Is it people who find themselves without imported medicines? Is it the ones who catch COVID-19? Or is it mostly citizens of very poor countries, whose income will fall so low that starvation becomes a concern?

**[6] The violent demonstrations represent an effort to try to push the problems related to the shortfall in energy, and the goods and services that energy can provide, away from the protest groups, toward other segments of the economy.**

In an ideal world:

(a) Jobs that pay well would be available to all.

(b) Governments would be able to afford to provide a wide range of services to all, including free health care for all and reimbursement for time off from work for being sick. They would also be able to provide adequate pensions for the elderly and low cost public transit.

(c) Police would treat all citizens well. No group would be so poor that a life of crime would seem to be a solution.

As indicated in Section [2], back in 2019, before COVID-19 hit, protests were already starting because of low commodity prices and the indirect impacts of low commodity prices. One reason why governments were so eager to adopt shutdowns is the fact that when people were required to stay inside because of COVID-19, the problem of protests could be stopped.

It should be no surprise, then, that the protests came back, once the lockdowns have ended. There are now more people out of work and more people who are concerned about not having full healthcare costs reimbursed. Social distancing requirements are making it more difficult for businesses to operate profitably, indirectly leading to fewer available jobs.

**[7] Violent protests seem to push problems fueled by an inadequate supply of affordable energy toward (a) governments and (b) insurance companies.**

In some cases, insurance companies will pay for damages caused by protesters. Eventually, costs could become too great for insurance companies. Most policies have exclusions for “acts of war.” If protests escalate, this exclusion might become applicable.

Governments of all kinds are already being stressed by shutdowns because when citizens are not working, there is less tax revenue. If, in addition, governments have been paying COVID-19 related costs, this creates an even bigger budget mismatch. Governments find themselves less and less able to pay their everyday expenses, such as hiring teachers, policemen, and firemen. All of these issues tend to push city governments toward bankruptcy and more layoffs.

**[8] Dark skinned people living in America tend to be Vitamin D deficient, making them more prone to getting severe cases of COVID-19. Vitamin supplements may be an inexpensive way of reducing the severity of the COVID-19 epidemic and thus lessening its diversion of energy resources.**

There are a number of reports out that suggest that having adequate Vitamin D from sunlight strengthens the immune system and [helps reduce the mortality of COVID-19](#). [Adequate Vitamin C](#) is also helpful for the immune system for people in general, not just those with dark skin.

Dark skinned people are adapted to living near the equator. If they live in the United States or Europe, their bodies make less Vitamin D from the slanted rays available in those parts of the world than they would living near the equator. As a result, studies show that [Vitamin D deficiency is more common in African Americans](#) than other Americans.

Recent data shows that the COVID-19 mortality rate for black Americans is [2.4 times that of white Americans](#). COVID-19 hospitalization rates are no doubt higher as well. Encouraging Americans with dark skin to take Vitamin D supplements would seem to be at least a partial solution to the problem of greater disease severity for Blacks. Vitamin C supplements, or more fresh fruit, might be helpful for all people, not just those with low

Vitamin D levels.

If the COVID-19 impact can be lessened in a very inexpensive way, this would seem to be helpful for the economy in general. High-cost solutions simply divert available resources toward fighting COVID-19, making the overall resource shortfall for the rest of the economy worse.

**[9] Much more equal wages would seem to be a solution for wage disparity, but this doesn't bring the wages of low earning workers up enough, in practice.**

There are a huge number of low-earning workers in many countries around the world. In order to increase commodity prices enough to make them profitable for producers, we really need wages in all countries to be much higher. For example, wages in Africa and in India need to be much higher, so that people in these parts of the world can afford goods such as cars, air conditioning and vacation travel. There is no way this can be done. Furthermore, such a change would add pollution and climate change issues.

There is a fundamental "not enough to go around" problem that we do not have an answer for. Historically, when there hasn't been enough to go around, the attempted solution was fighting wars over what was available. In a way, the violence seen in cities around the globe is a new version of this violence. Governments of various kinds may ultimately be casualties of these uprisings. Remaining lower-level governments will be left with the problem of starting over again, issuing new currency and trying to make new alliances. In total, the new economy will be very different; it will probably bear little resemblance to today's world economy.

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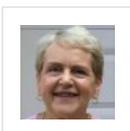
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**About Gail Tverberg**

My name is Gail Tverberg. I am an actuary interested in finite world issues - oil depletion, natural gas depletion, water shortages, and climate change. Oil limits look very different from what most expect, with high prices leading to recession, and low prices leading to financial problems for oil producers and for oil exporting countries. We are really dealing with a physics problem that affects many parts of the economy at once, including wages and the financial system. I try to look at the overall problem.

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