

Russia's attack on Ukraine represents a demand for a new world order

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Russia's attack on Ukraine represents a demand for a new world order that, over the long term, will support higher prices for fossil fuels, especially oil. Such an economy would probably be centered on Russia and China. The rest of the world economy, to the extent that it continues to exist, will largely have to get along without fossil fuels, other than the fossil fuels that countries continue to produce for themselves. Population and living standards will fall in most of the world.

If a Russia-and-China-centric economy can be developed, the US dollar will no longer be the world's reserve currency. Trade will be in the currency of the new Russia-China block. Outside of this block, local currencies will play a dominant role. Most of today's debt will ultimately be defaulted upon; to the extent that this debt is replaced, it will be replaced with debt in local currencies.

As I see the situation, the underlying problem is the fact that, on a world basis, energy consumption per capita is shrinking. Energy consumption is *essential* for creating goods and services.

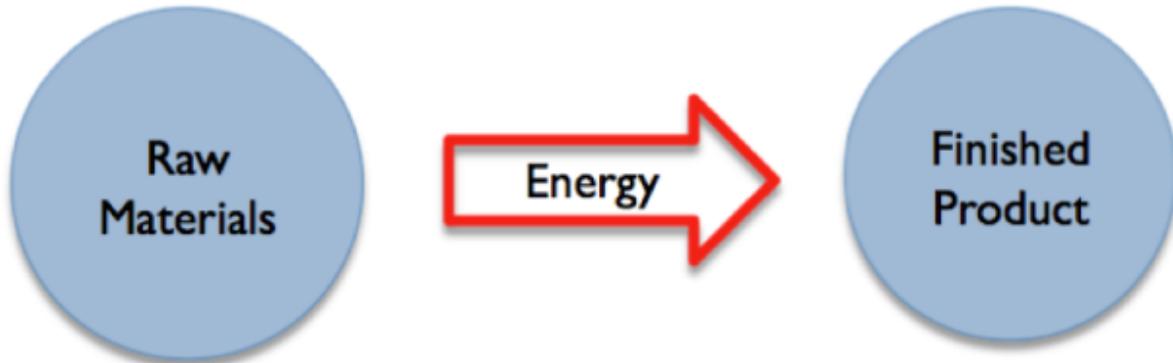


Figure 1. Energy of various types is used to transform raw materials (that is resources) into finished products.

The shrinking amount of energy per person means that, on average, fewer and fewer finished goods and services can be produced for each person. Some countries do better than average; others do worse. With low fossil fuel prices, Russia has been faring worse than average; it wants to remedy the situation with long-term higher energy prices. If Russia can start transferring its energy exports to China, perhaps the new Russia-China economy, with limited support from the rest of the world, can afford to pay Russia the high prices for fossil fuels that Russia requires to maintain its economy.

In this post, I will try to explain what I see is happening.

[1] It appears that Russia now fears that it is near collapse, not too different from the collapse of the central government of the Soviet Union in 1991. Such a collapse would lead to a huge drop in Russia's living standards, even from today's relatively low level.

If we look back at the Soviet Union's energy consumption, we see a strange pattern. The Soviet Union's energy consumption rose rapidly in the period after World War II. It became a military rival of the US, as its energy consumption grew in the 1965 to 1985 period. Its energy consumption leveled off before the central government collapsed in 1991. In fact, energy consumption has never gotten back to its level in the late 1980s.

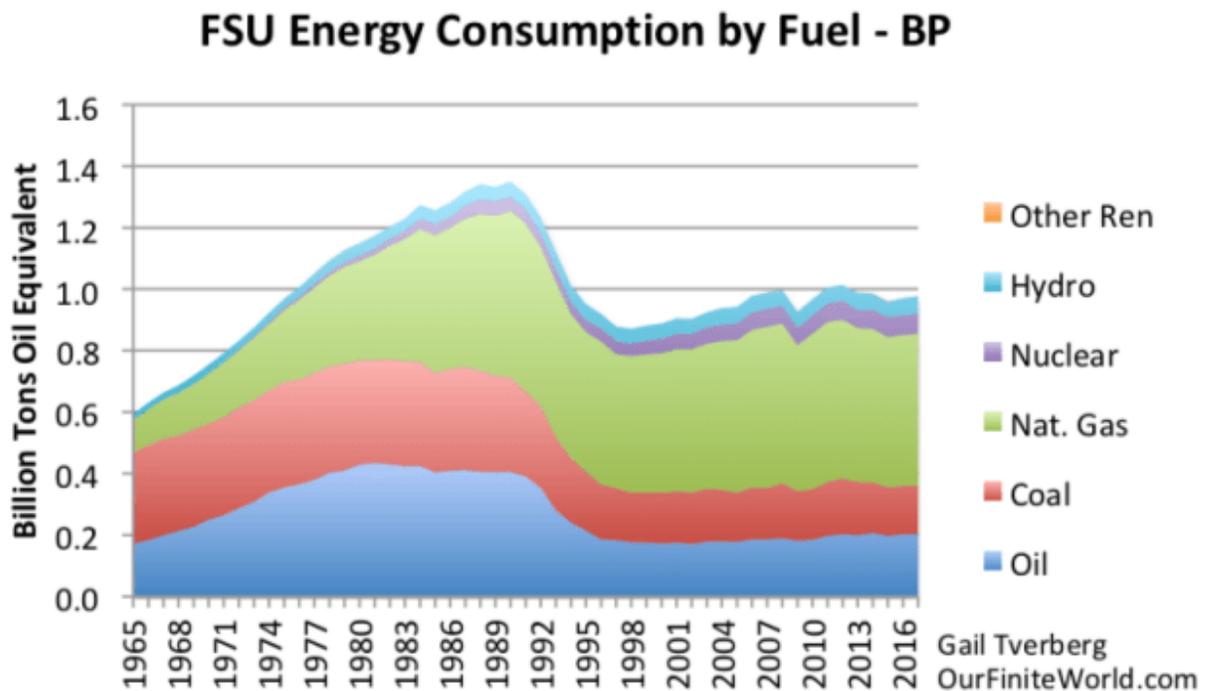


Figure 2. Former Soviet Union (FSU) energy consumption by fuel, based on data of BP's *Statistical Review of World Energy 2018*.

[2] The thing that seems to have been behind the 1991 collapse is the same thing that seems to be behind Russia's current fear of collapse: continued low oil prices.

When we look back at inflation-adjusted oil prices, we see that a long period of low prices preceded this collapse. These low prices were harmful in many ways. They reduced funds for reinvestment, which led to the collapse in oil supply. They reduced the funds available to pay wages. They also reduced the tax revenue that the Soviet Union could collect.

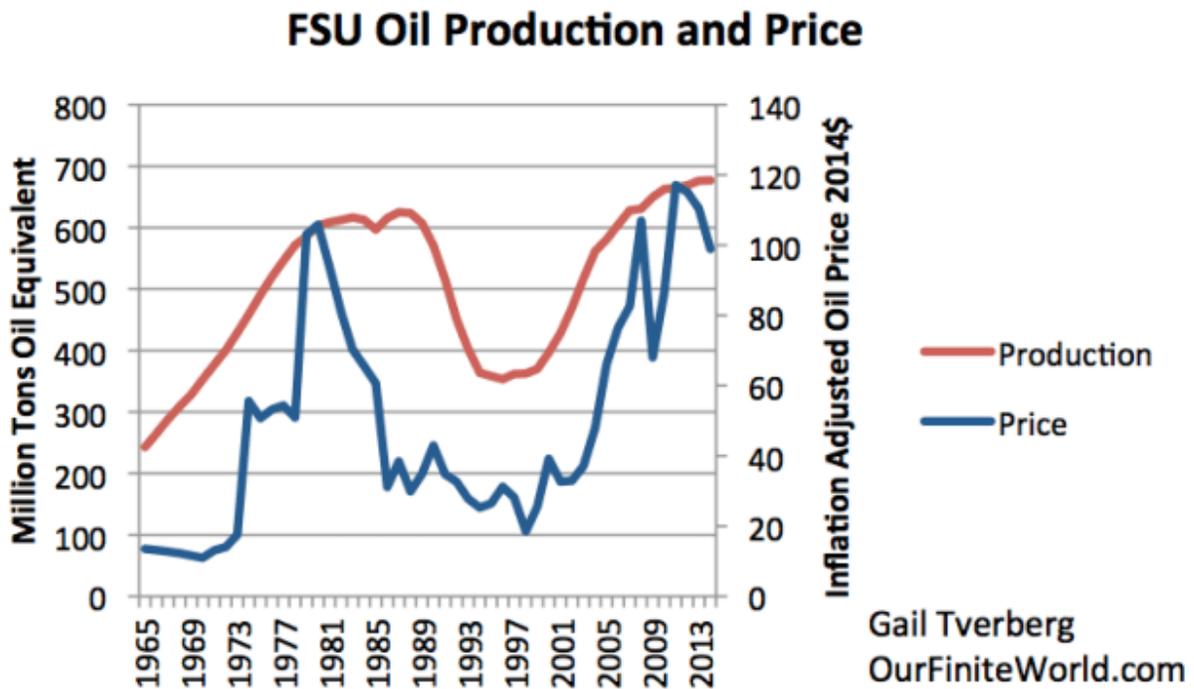


Figure 3. Oil production and price of the former Soviet Union (FSU), based on BP's *Statistical Review of World Energy 2015*.

I believe that these chronically low oil prices ultimately brought down the top layer of the government of the Soviet Union. This is because of the physics of the situation. It takes energy to provide the services of the top level of the government. As the total energy that could be purchased by the system fell because of low prices received for exports, it became impossible to support this top level of governmental services. This top layer was less essential than the lower levels of government, so it fell away.

In recent times, there has also been a long period of low prices, since about 2013:

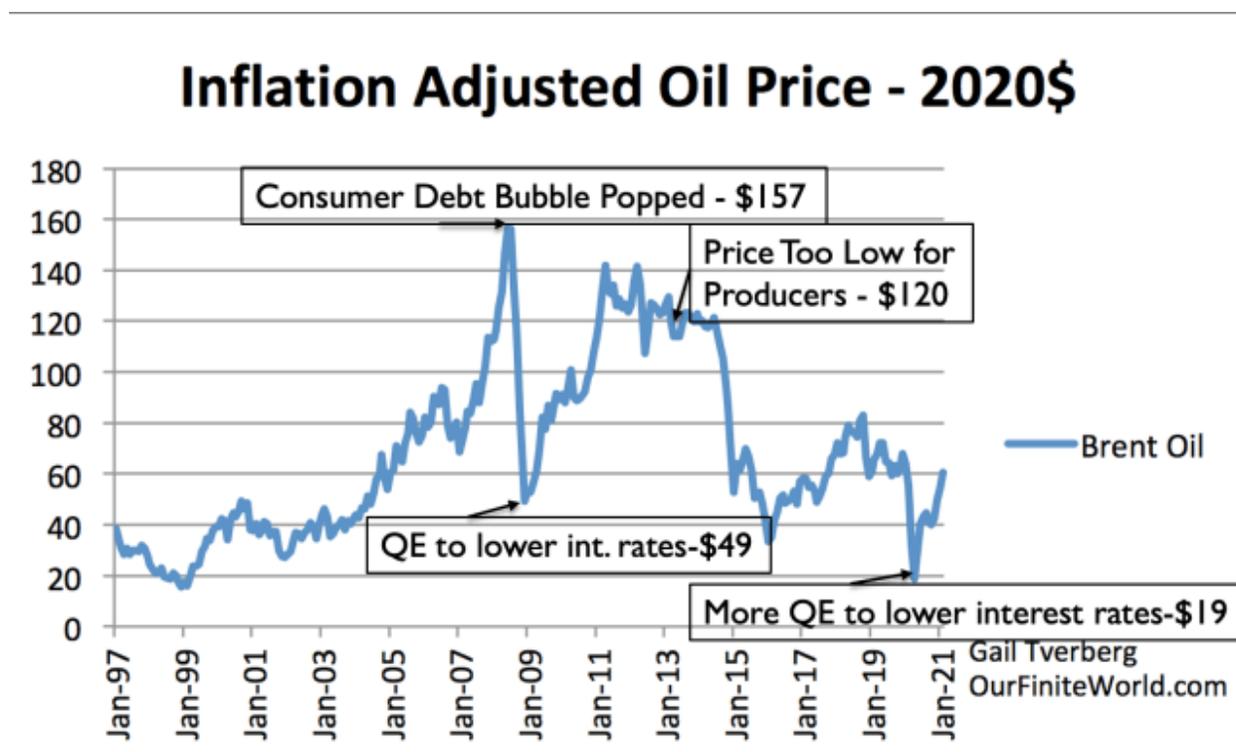


Figure 4. Inflation adjusted Brent Oil prices in 2020\$, based on data of the US Energy Information Administration.

Unless this pattern of low prices can be reversed quickly, Russia as a political entity could collapse. Exports of all of the goods it now produces would likely fall.

[3] While oil prices depend on “supply and demand,” as a practical matter, demand is very dependent on interest rates and debt levels. The *higher* the debt level and the *lower* the interest rate, the higher the price of oil can rise.

If we look back at Figure 4, we can see that before the US subprime housing bubble popped in 2008, inflation-adjusted oil prices were able to rise to \$157 per barrel, adjusted to the 2020 price level. Once the debt bubble popped, inflation-adjusted oil prices fell to \$49 per barrel. It was at this low point (and correspondingly low prices for many other commodities) that the US started its program of Quantitative Easing (QE) to lower interest rates.

After two years of QE, oil prices were back above \$140 per barrel, in inflation-adjusted prices, but these soon started sliding down. By the time oil prices dropped to \$120 per barrel, oil companies started to complain that prices were falling too low to meet all of their needs, including the need to drill in ever less productive areas. Now we are at a point where interest rates are about as low as they can go. Short-term interest rates are near zero, which is where they were in the late 1930s.

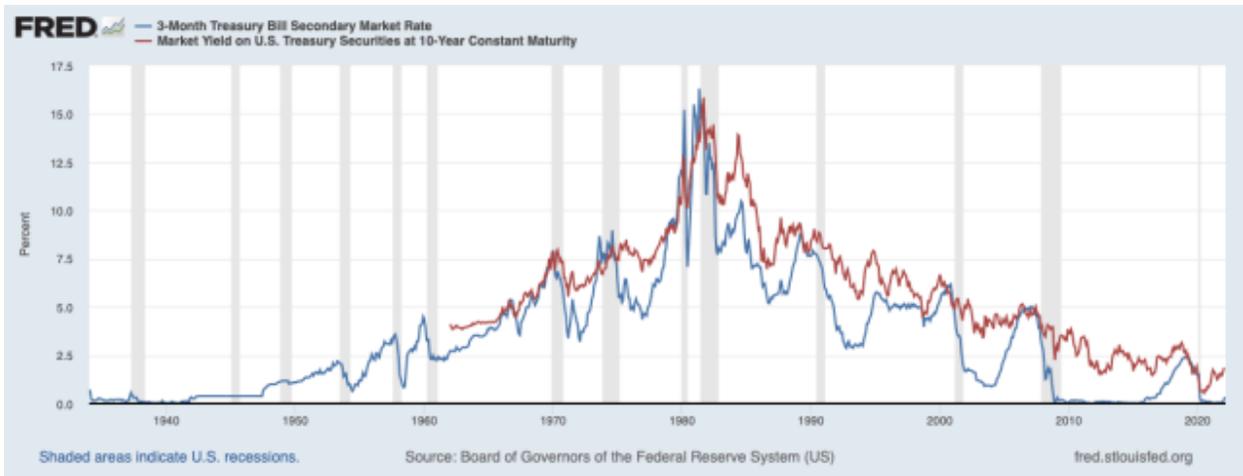


Figure 5. 3-month and 10-year US Treasury interest rates, through February 28, 2022. Chart by FRED of the St. Louis Federal Reserve.

The quantity of funds in people’s checking and savings accounts is at an extraordinarily high level, as well. This is partly because of the availability of debt at these low interest rates.

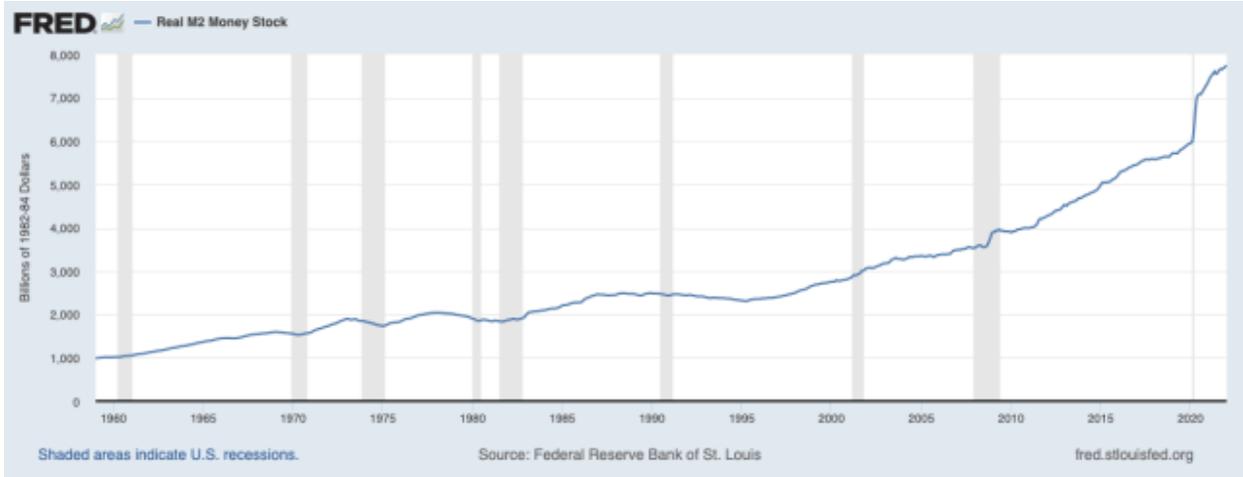


Figure 6. M2 Real (Inflation-Adjusted) Money Stock in chart by FRED of the St. Louis Federal Reserve.

Thus, even before the Ukrainian invasion, oil prices were raised about as high as they could go, through low interest rates and generous debt availability. With all this stimulus, Brent Spot Oil prices averaged \$86.51 in January 2022. Even now, with all the disruption of the attack by Russia against Ukraine, oil prices are below the \$120 threshold that producers seem to need. This price issue, plus the corresponding low-price issues for natural gas and coal, is the problem that Russia is concerned about.

Prices for imported coal and natural gas have bounced very high in the last few months, but no one expects these high prices to last. For one thing, they are too high for the European manufacturers that use imported coal or natural gas to stay in business. For example, producers that create urea fertilizer using natural gas find that the price of fertilizer produced in this way is

way too high for farmers to afford. For another, the electricity produced by burning the high-priced natural gas or coal tends to be too expensive for European households to afford.

[4] The fundamental problem behind recent low oil prices is the fact that the current mix of consumers cannot *afford* goods and services produced using the high oil prices that producers, such as Russia, need to operate, pay high enough wages, and do adequate reinvestment.

When the price of oil was very low, back before 1970 (see Figure 3), it was relatively easy for consumers to afford goods and services made with oil. This was the period when the world economy was growing rapidly, and many people could afford to purchase automobiles and buy the oil products needed to operate them.

Once the cost of oil extraction started rising because of **depletion**, it became more and more difficult to keep prices both:

1. High enough for oil producers, such as Russia, and
2. Low enough to make affordable goods for consumers, as was possible prior to 1970

To try to hide the increasingly difficult problem of keeping prices both high enough for producers and low enough for consumers, central banks have lowered interest rates and encouraged the use of more debt. The idea is that if a person can buy a fuel-efficient car at a low enough interest rate and over a long enough term, perhaps this will make the vehicle more affordable. Similarly, interest rates on home mortgages have fallen to very low levels. All of this, plus the fact that debt is used to finance new factories and mines, leads to the relationship we saw in Figure 4 between oil prices and debt availability, related to interest rates.

[5] No one knows precisely how much oil, coal and natural gas can be extracted because the quantity that can be extracted depends on the extent of the price rise that can be tolerated without plunging the economy into recession.

If prices of these fossil fuels can rise very high (say, \$300 per barrel for oil, and correspondingly high prices for other fossil fuels), a huge amount of fossil fuel can be extracted. Conversely, if energy prices cannot stay above the equivalent of \$80 per barrel oil for very long without a serious recession, then we may *already* be very close to the end of available fossil fuel extraction. Both oil and gas producers and coal producers can be expected to go out of business because prices do not leave a sufficient margin for the required investment in new fields to offset the depletion of existing fields. Renewables will falter, as well, because both building and maintaining renewables requires fossil fuels.

The amount of resources of any kind (fossil fuels and minerals such as lithium, uranium, copper and zinc) that can be extracted depends upon the extent of depletion that the economy can tolerate. Depletion of any kind of resource means that a bigger effort (more workers, more machinery, more energy products) is required to extract a given quantity of each resource. It is clear that the entire economy cannot be transferred to the extraction of fossil fuels and mineral

resources. For example, some workers and resources are needed for growing and transporting food. This puts a limit on how much depletion can be tolerated.

What Russia (as well as every other oil producer) would like is a way to get the tolerable oil price up significantly higher, for example, to \$150 per barrel, so that more oil can be extracted. The hope is that a Russia-and-China-centric economy might be able to do this. Ideally, the tolerable maximum price for coal and natural gas would rise, as well.

[6] Europe, in particular, cannot afford high oil prices. If interest rates are increased soon, this will make the problem even worse. China seems to have definite advantages as an economic partner.

Europe is already having difficulty tolerating very high prices of imported natural gas and coal. Rising oil prices will add even more stress. Central banks are planning to raise interest rates. These higher interest rates will make loan payments more expensive. These higher interest rates will tend to push Europe's economy further toward recession.

Given the problems with Europe as an energy importer, China would seem to have the possibility of being a better customer that can perhaps tolerate higher prices. For one thing, China is more efficient in its use of energy products than Europe. For example, many homes in the southern half of China are not heated in winter. People instead dress warmly inside their homes in winter. Also, homes and businesses in northern China are sometimes heated with waste heat from nearby coal-fired electricity plants. This is a very efficient approach to heating.

China also uses more coal in its energy mix than Europe. Historically, coal has been much less expensive than oil. What is needed is a low *average* price of energy. A small amount of high-priced oil can be tolerated in an economy that uses mostly coal in its energy mix. When all costs are counted, wind and solar are very high-priced energy sources, which contributes to Europe's problems.

In recent years, China's consumption of energy products has been growing very rapidly. Perhaps, in the view of Russia, China can use high-priced fossil fuel better than other parts of the world.

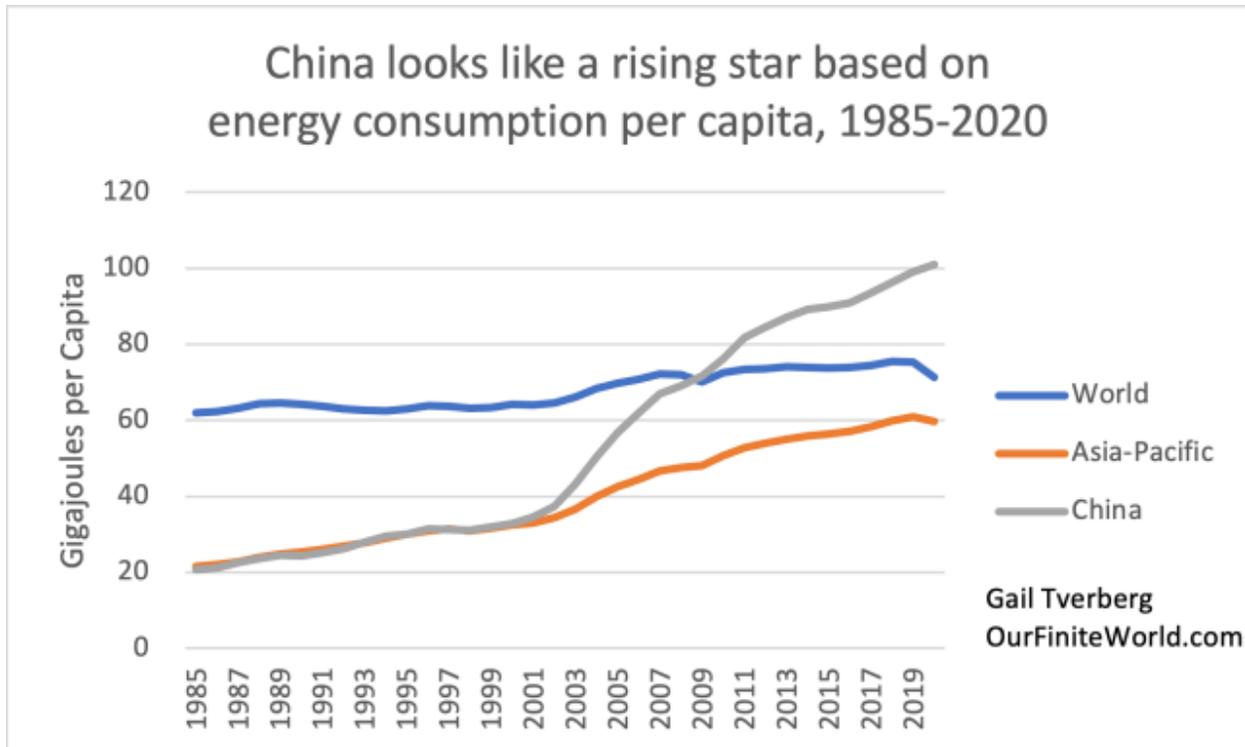


Figure 7. Energy consumption per capita for the world, the Asia-Pacific Region, and China based on data from BP's 2021 Statistical Review of World Energy.

[7] Russia realized that the rest of the world is utterly dependent upon its fossil fuel exports. Because of this dependency, as well as the physics-based connection between the burning of fossil fuels and the making of finished goods and services, Russia holds huge power over the world economy.

The world economy should have known about the importance of fossil fuels and the likelihood that the world economy would face depletion issues in the first half of the 21st century, ever since [a speech by Rear Admiral Hyman Rickover](#) in 1957. In this speech, Rickover said,

We live in what historians may someday call the Fossil Fuel Age. . . With high energy consumption goes a high standard of living. . . A reduction of per capita energy consumption has always in the past led to a decline in civilization and a reversion to a more primitive way of life.

Current estimates of fossil fuel reserves vary to an astonishing degree. In part this is because the results differ greatly if cost of extraction is disregarded or if in calculating how long reserves will last, population growth is not taken into consideration; or, equally important, not enough weight is given to increased fuel consumption required to process inferior or substitute metals. We are rapidly approaching the time when exhaustion of better grade metals will force us to turn to poorer grades requiring in most cases greater expenditure of energy per unit of metal.

. . . it is an unpleasant fact that according to our best estimates, total fossil fuel reserves recoverable at not over twice today's unit cost are likely to run out at sometime between the

years 2000 and 2050, if present standards of living and population growth rates are taken into account.

I suggest that this is a good time to think soberly about our responsibilities to our descendants – those who will ring out the Fossil Fuel Age. Our greatest responsibility, as parents and as citizens, is to give America's youngsters the best possible education [including the energy problem of a world with finite resources].

Many people today would conclude that world leaders have done their best to ignore this advice. The likely problem with fossil fuels has been hidden behind an imaginative, but false, narrative that our biggest problem is climate change caused primarily by fossil fuel extraction that can be expected to extend until at least 2100, unless positive steps are made to hold back this extraction.

In this false narrative, all the world needs to do is to move to wind and solar for its energy needs. As I discussed in my most recent post, titled [Limits to Green Energy Are Becoming Much Clearer](#), this narrative of success is completely false. Instead, we seem to be hitting energy limits in the near term because of chronically low prices. Wind and solar are doing very little to help because they cannot be depended upon when needed. Furthermore, the quantity of wind and solar available is far too low to replace fossil fuels.

Few people in America and Europe realize that the world economy is entirely dependent upon Russia's exports of oil, coal and natural gas. This dependency can be seen in many ways. For example, in 2020, 41% of world natural gas exports came from Russia. Natural gas is especially important for balancing electricity from wind and solar.

North America has historically played only a very small role in natural gas exports; it is questionable whether North America can ramp up its total natural gas production in the future, given the depletion problems being experienced with respect to the extraction of oil and the associated natural gas from shale formations. Continuously high oil prices are necessary to justify ramping up production outside of sweet spots. If drillers consider long-term prospects for oil prices to be too low, the associated natural gas will not be collected.

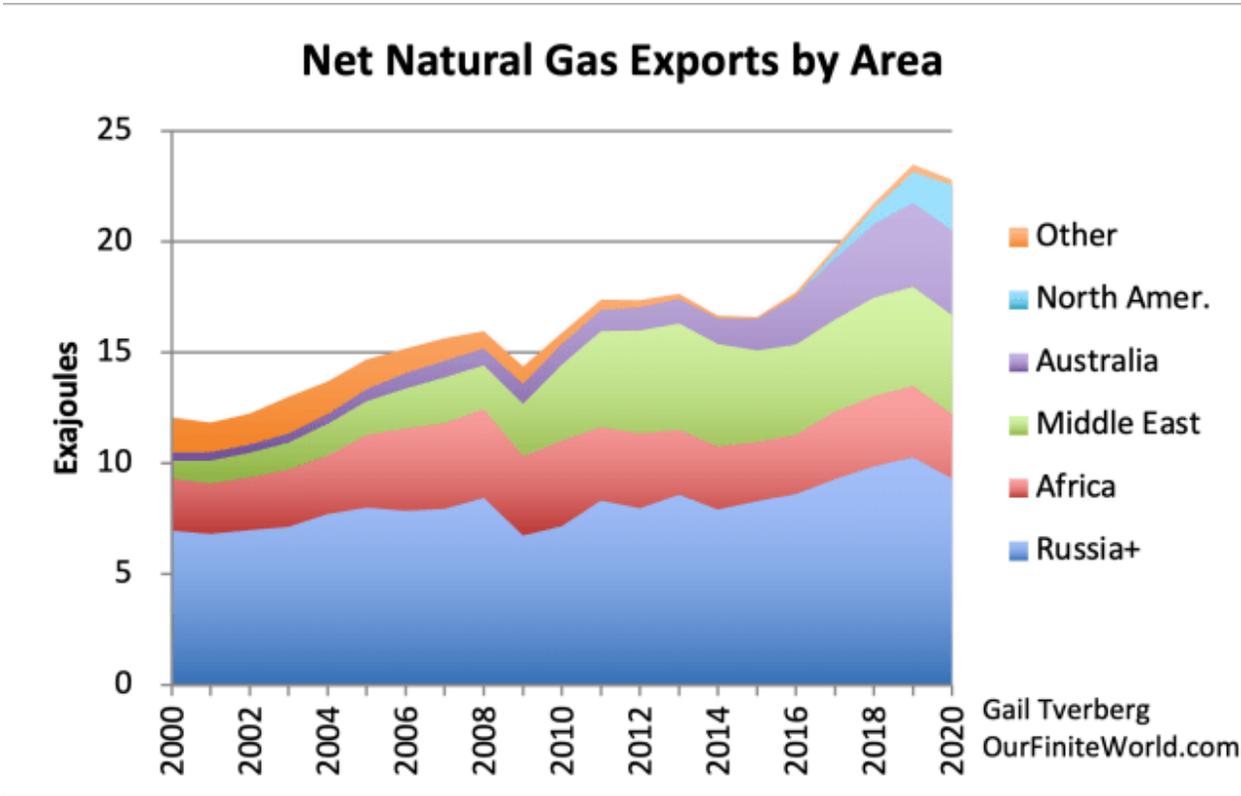


Figure 8. Natural gas exports by part of the world, considering only exports outside of a given region. Based on data of BP’s *2021 Statistical Review of World Energy*.

Europe is especially dependent upon natural gas imports (Figure 9). Its imports of natural gas exceed the exports of Russia and its affiliated countries in the Commonwealth of Independent States, referred to as Russia+ in Figures 8 and 9.

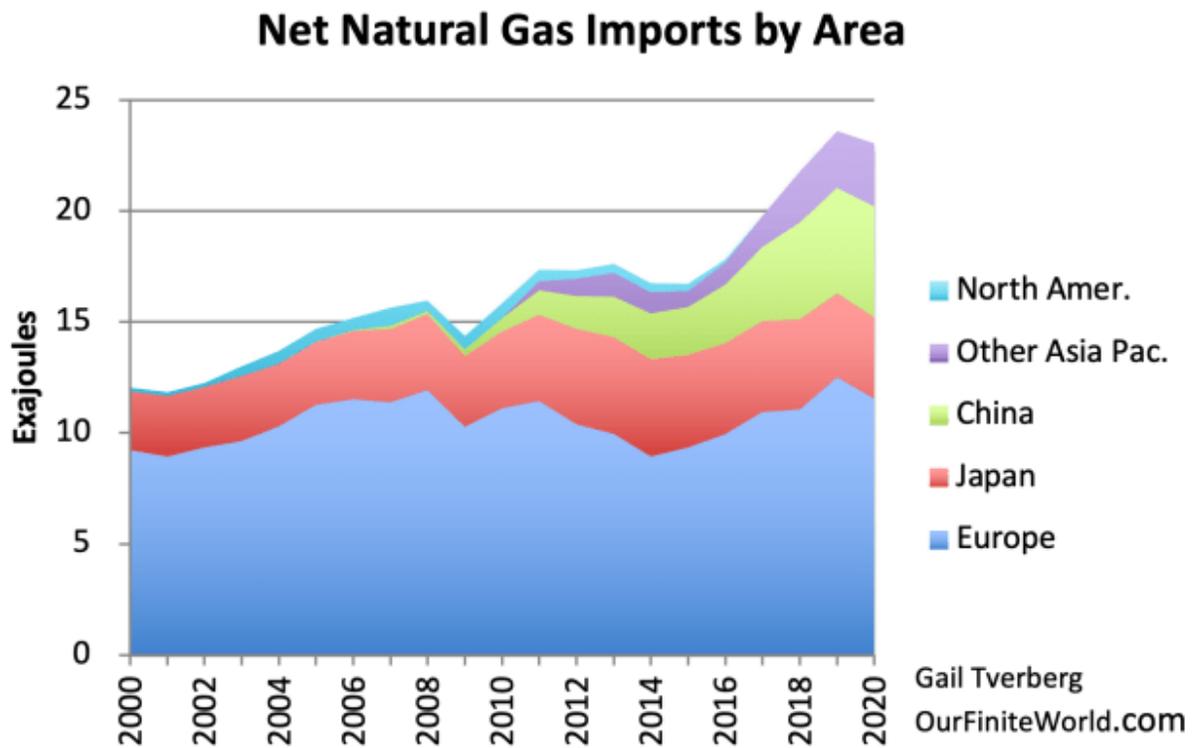


Figure 9. Natural gas imports by part of the world, considering only exports outside of a given region. Based on data of BP's *2021 Statistical Review of World Energy*.

Without the natural gas exports of Russia and its close affiliates, there is no possibility of supplying adequate natural gas exports to the rest of the world.

Diesel fuel, created by refining oil, is another energy product that is in critically short supply, especially in Europe. Diesel fuel is used to power trucks and farm tractors, as well as many European automobiles. An [Argus Media report](#) indicates that Russian supplies account for 50% to 60% of Europe's seaborne imports of diesel and other gasoil, amounting to 4 to 6 million tons of fuel per month. It likely would be impossible to replace these imports, using supplies from elsewhere, without bidding the price of these imported fuels up to a much higher price level than today. Even then, countries outside Europe would be left with inadequate diesel supplies.

[8] Russia's attack on Ukraine seems to have been made for many reasons.

Russia was clearly frustrated with the current situation, with NATO becoming increasingly assertive [within Ukraine itself](#), even though Ukraine is not itself a NATO member. Russia is also aware that in some sense, it has far more power over the world economy than most people realize because the world economy is utterly dependent on Russia's fossil fuel exports (Section 7). Sanctions against Russia will likely hurt the countries making the sanctions as much or more than they hurt Russia.

There were also several concerns that were specifically Ukrainian giving rise to the attack on Ukraine. There had been long standing conflicts about natural gas pipelines. Was Ukraine taking

too much natural gas out as a transit fee? Was it paying the correct fee for the natural gas it used? Ukraine also seems to have mistreated quite a few Russian-speaking Ukrainians over the years.

Russia has become increasingly frustrated with the small share of the world's output of goods and services that it receives. The way the economic system works today, those who provide "services" seem to receive a disproportionate share of the world's output of goods and services. Russia, with its extraction of minerals of many kinds, including fossil fuels, has not been well compensated for the great wealth that it brings to the world as a whole.

Over the years, Russia's great strength has been its military. Perhaps Ukraine would not be too large a country to do battle over. Russia might be able to eliminate some of its irritations with Ukraine. At the same time, it might be able to make changes that would help to raise what have become chronically low fossil fuel prices. The sanctions that other countries would make would tend to push the required changes along more quickly.

If the sanctions really did push Russia down, the result would tend to push the whole world economy toward collapse, because the rest of the world is extremely dependent upon Russia's fossil fuel exports. In Figure 1, the laws of physics say that there is a proportional response to the quantity of energy "dissipated"; if a greater output of goods and services is desired, more energy input is required. Efficiency changes can somewhat help, but efficiency savings tend to be offset by the higher energetic needs of the more complex system required to achieve these savings.

If energy prices do not rise high enough, we will somehow need to get along with very little or no fossil fuels. It is doubtful that renewables will last very long either because they depend upon fossil fuels for their maintenance and repair.

[9] If higher energy prices cannot be achieved, there is a significant chance that the change in the world order will be in the direction of pushing the world economy toward collapse.

We are living in a world today with shrinking energy resources per capita. We should be aware that we are reaching the limits of fossil fuels and other minerals that we can extract, unless we can somehow figure out a way to get the economy to tolerate higher prices.

The danger that we are approaching is that the top levels of governments, everywhere in the world, will either collapse or be overthrown by their unhappy citizens. The reduced amounts of energy available will push governments in this way. At the same time, programs such as government-funded pension plans and unemployment plans will disappear. Electricity is likely to become intermittent and then fail completely. International trade will shrink back; economies will become much more local.

We were warned that we would be reaching a time period with serious energy problems about now. The first time came in the 1957 Rickover speech discussed in Section 7. The second warning came from the 1972 book, *The Limits to Growth* by Donella Meadows and others, which documented a computer modeling approach to the problem of limits of a finite world. The Ukraine invasion may be a push in the direction of more serious energy problems, emerging primarily from the fact that other countries will want to punish Russia. Few people will realize

that punishing Russia is a dangerous path; a serious concern is that today's economy cannot continue in its current form without Russia's fossil fuel exports.



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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