

The Oil Crisis

—Or The Cheap Energy Crisis—

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1 Short Run versus Long Run Supply (and Demand): The OPEC embargoes.

In 1960 the major oil producing countries formed OPEC (the Organization of Petroleum Exporting Countries). They formed this organization to fight back against coordination among the Multi-National Corporations (MNC) that were extracting the oil from their countries. The MNC's were agreeing on a fixed posted price and offering that to the countries. This sort of price fixing would be illegal in most nations, but since this was international trade there was no oversight.

Their primary goal has been to manage the price of oil, but to be frank they have not been very successful. The *nominal* price for a barrel of oil in 1955 was \$1.93 and in 1970 was \$1.30—in real terms that is a drop of 53%. This is despite a failed attempt at an embargo of the United States and other western nations in 1967 in response to the first Arab-Israeli war (Piotrowski, 2015). At that time the United States had sufficient reserves to just sharply expand production, and received cooperation from oil companies and non-Arab producers.

1.1 The 1970's oil shocks

However in the 1970s global demand for oil was increasing, United States production was on the decline and the second Arab-Israeli war started. Because of this OPEC embargoed the United States and other western nations in 1973 and 1974. I still remember the shock. Long lines to get gas, the nightly news couldn't talk about anything else. And then in 1979 the Iranian revolution happened, resulting in gas prices peaking at around \$40 a barrel in 1980—in real terms that is a 1349% increase in over 1970 (Piotrowski, 2015). Can you imagine? Yeah, it was like that. (I should mention that this was a peak, not the average. Iran produced about 4% of the world's oil, but markets sometimes freak out.)

1.2 The Medium and Long Run Response

When the oil crisis hit naturally most Americans had large, gas guzzling cars. Face it, unlike Europe most of our infrastructure was built for cars and the input was cheap—with its price falling in real terms. Why not have big cars? Why would you ever care about fuel efficiency?

Fortunately my family had a small (or should I say *cheap*) car, so I could feel happily superior to all my friends. So what happened? In this case there was a

combination of demand side and supply side adjustments. First of all fuel efficiency became important for the first time. All of a sudden the Miles per Gallon (Liters per 100 Kilometers in Europe) of every new car was vitally important. The automobile supply shifted to more fuel efficient cars. Second, the western nations developed strategic stockpiles of petroleum and formed the International Energy Agency (IEA) as a consumer watchdog organization (Piotrowski, 2015).

But more importantly for our analysis the North Sea and other stocks of oil were developed. It had been known for a while that there was a lot of oil in the North Sea (between Great Britain and Norway). However in the 1960s and 1970s with the price of a barrel of oil at historic lows the high cost of off-shore drilling (which is mostly an up front expense) meant there was no profit in developing it. Now with OPEC flexing their muscles and the Iranian revolution it had both economic and strategic value—indeed Norway still gets so much oil revenue that politicians get votes by promising to increase taxes. This is only the most dramatic example, however, non-OPEC supply grew all over the world because of the increase in the price of oil. This made the OPEC supply less important, essentially reducing their market power.

Indeed in the middle of the 1980s they basically were unable to control the price anymore. With a global recession depressing price, the OPEC nations had become accustomed to the wealth they had reaped during the 1970s. This led to cheating on quotas, etcetera, and basically all OPEC has been able to do since is keep the price of oil more or less stable.

2 But the oil crisis is coming! Or is it?

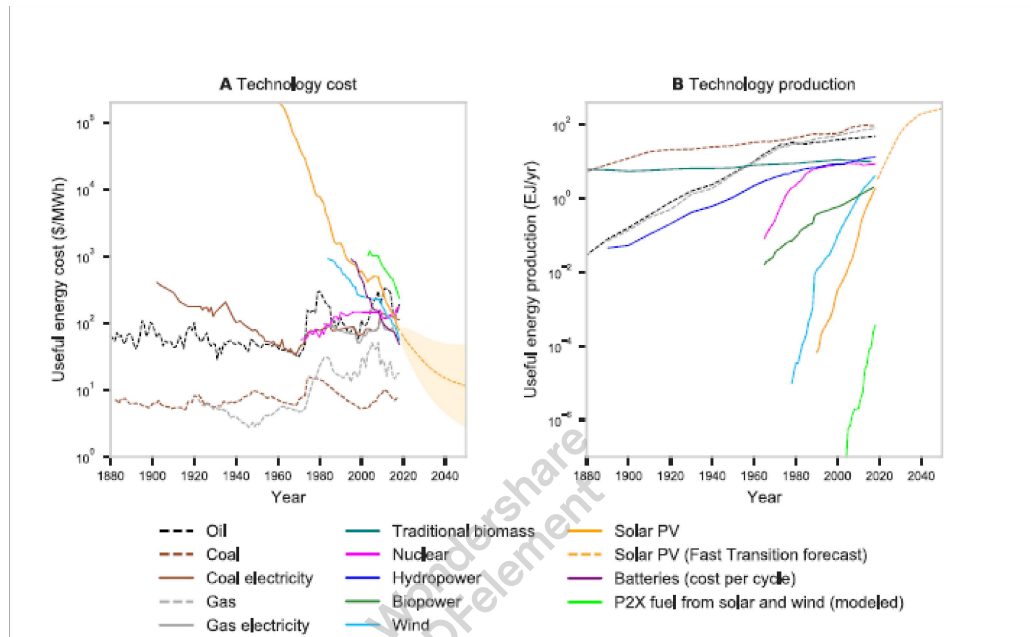
Let me give you a simple analogy. Say that I give you a glass of water (a large glass) and tell you that is the only water you can have today. When I give it to you it is, say, 80% full (I don't want to spill on you) and each time you take a drink it goes down by 3-5%. Sooner or later it will run out, right? I mean, it's obvious. And further more after each drink you will wait a little longer for the next one, because the "price" of the next sip will be higher and higher.

Now imagine that I gave that one glass to the entire glass. Man, are we talking about a disaster or what? Everyone would race to the glass to drink as much as possible as soon as possible (using one use straws, let's be hygienic) and it would be gone within a half hour. Even if it was a full water bottle, 19.5 liters.

And the latter is exactly what is happening to our oil supply. Oil takes millions of years under high pressure to develop naturally, so there is only one glass of it. When that oil runs out its gone, and our society will collapse. Simple, obvious, end of story. Or at least this is what I thought during the oil crisis in the 1970s. Sure, I knew these were man made disasters, but it makes you think does it not?

2.1 The empirical evidence:

The best way to compare different forms of energy is the \$/MWH—or how much producing one mega-watt for one hour costs. The following graphs is from Way, Mealy, and Farmer (2020):



From Way, Mealy, and Farmer (2020)

at the current moment we want to focus on the black dotted line in the left hand graph—the cost of oil per MWH. We can see that for most of its history the price has been surprisingly stable. There is, of course, the crazy peak in the 1970s. Of more concern is the way from about 1997 to 2015 it seemed to be steadily increasing. We know the reason for the peak in the 1970s, but perhaps the recent peak is a sign the crisis is coming!

Well, not really, or—to be more specific—this is not what the oil experts think. According to Reuters (Browning, 2021) British Petroleum (BP) has a range of predictions, the most optimistic say we have already hit peak demand and the most pessimistic says that it should occur by 2030. Shell refuses to commit, but their CEO says that the peak demand may have already occurred. The International Energy Association (IEA) says in "about ten years" or by 2031. OPEC? The organization most dependent on oil products? They say the peak demand should be about 2040. Please notice all of these dates are within *my* lifetime, it will happen before your kids go to University.

2.2 Rising Tech meets Falling Supply

So what happened? My glass of water analogy wasn't wrong, was it? No, not at all, it is undeniable that each given oil field will run out of oil, and that there is a limit to the number of new oil fields we can find, so if we continue at the current pace of usage we will run out.

However what I failed to factor in was the rise in technology. Like with the North Sea as technology develops new sources of oil will be exploited. For example did you know that the United States might have become a net exporter of oil in late 2019 (Cohen, 2019)? This is a first since 1949! How did they do it? Fracking, injecting water and chemicals into the ground to push the oil out of shale rocks. In the 1980s I saw a news piece about how much "oil shale" there was in the United States, but they lamented it was just too expensive to extract. In other words, in the face of falling global supply technology improved enough so that the United States could exploit this natural resource.

This is just a specific example of a general trend. While the world supply of oil is finite our cleverness is not, and we can always find a new way to exploit a new source of oil. What I didn't think about was that if my glass of water ran out I could always go eat grass for moisture, and these guys have almost unlimited resources to figure out how to get the water out of grass—and trees, and the stream running in front of my Lojman, and gosh, there's a water reservoir on campus... What is the next big source of un-exploited oil? Well have you heard of the oil sands of Canada? Canada's Oil & Natural Gas Producers (link below) say they are the largest deposit of crude oil on the planet, and are already beginning to extract oil from them.

Supply is falling, but tech is rising to meet the demand, resulting in more or less a stable price for oil over time.

3 Standing on the Edge of the Green Revolution

I want to take you back to the 1970s for a moment. You can not imagine how dependent we were on gasoline back then, especially in the United States. To put this in perspective please realize that the population density of the United States is so low that in the countryside outside of many small towns—like my home town (Huntington, Indiana) there was no public transport. It just was not economically viable, in contrast in Turkey most dolmuş's are privately owned and everywhere you go there is a dolmuş—even if it only comes once or twice a day.

If the United States didn't have oil what could we do? At the time the only possibly viable alternative was alcohol, and frankly that is not too good. Oil is amazingly powerful, the amount of energy stored in one liter of gasoline is astonishing—its even better than hydrogen. According to the Alternative Fuels Data Center gasoline is 2.8 times better than hydrogen.

But of course now you would shrug, even an American would shrug—and then complain about limited range and long recharge times—because electric

vehicles are now economically viable. No more oil? All of Turkey could switch over to electric vehicles within 5 years.

Obviously the rise of technology has not only created a "brown revolution" (increased supply of fossil fuels) but has also created a "green revolution," making alternative fuel sources more economically viable than ever before. Indeed this is the key point of Way, Mealy, and Farmer (2020). In that working paper they carefully estimate the \$/MWH of various renewable energy sources—water, wind, solar. As you know a critical issue with these power sources is that they can not be turned on when you need it. For example solar power can only be gathered during the day but is needed at night. To account for this they include the cost of storing the energy for when it is needed—batteries for the short term and converting it to hydrogen for the long term—and yet if you look at the graph above both solar and wind power are now cheaper per MWH than oil (note hydropower's cost is resource dependent.)

Have you noticed all the wind turbines in Turkey? Almost getting to be too many in some places, no? But if that is the cost of energy independence for your country, aren't you willing to make the sacrifice? Do you think they are being built because the government has become strongly environmentally conscious? As nice as that would be to believe, I am sorry, I trust the bottom line. And the bottom line is that Turkey is a major producer of wind turbines—a high tech product that has a great economic future. Turkey is making money off of those wind turbines. The International Energy Agency notes that Turkey has the fifth highest level in Europe and the 15th in the world of additions to renewable energy, and its capacity has expanded 50% between 2016 and 2021. Turkey is not alone, both of the richest men in India (Mukesh Ambani and Gautam Adani) have announced massive investments in green energy—do you think they are doing it out of the goodness of their hearts? China is investing massively in green energy as well, and of course they are doing it because they are such nice people.

Way, Mealy, and Farmer (2020) argue exactly for what Turkey and so many other nations are doing, and further argue that this process should be accelerated even more with government investments and commitments. Why? Well yes, the reduction of greenhouse gases will be nice but more importantly based on their predictions *the cost of energy could fall to historic lows*. By 2030 they could be at historical averages, and be considerably lower by 2050. They estimate this could save the world 5.6 *trillion* dollars (in net present value, or discounted back to the current time.)

3.1 The Green Revolution in Turkey

Did you know that 52.5% of Turkey's electricity production capacity is from renewable resources? Of course 61.5% of this is hydro-power (dams), but 18.7% is wind power, 13.8% solar, and 3.1% is geothermal (Kaya, 2021). According to Wind Europe that figure was a bit out of date, they state there is 10GW of wind energy installed (as opposed to 9.3 in Kaya 2021). Wind Europe says the Turkish government intends to double this capacity (to 20GW) by 2030,

however Hurriyet (2021) says the goal is now 25GW. The president of TUREB (Ebru Arici) expects both goals will be easily met and passed. Investing in wind turbines is profitable. Daily Sabah celebrates that on Nov. 28, 2021 wind produced the most electricity in Turkey for one day (22.6% versus 22% from natural gas).

Most of these wind turbines were produced in Turkey (albeit a lot for foreign owned firms) but from Turkey these firms export to 45 countries and six continents (Antarctica has limited demand.) Turkey is the fifth largest wind turbine producer in Europe (Wind Europe, 2021). As Way, Mealy, and Farmer (2020) argue, technological development will certainly reduce the cost of wind turbines in the future, making this an excellent high tech, high growth industry for Turkey.

4 Conclusion: The always present "Cheap Energy Crisis."

I have to laugh at myself, seriously, long drawn out hearty chuckles. I was so naive, so over reacting. There **never** was and never **will be** an "Oil crisis." Don't be ridiculous, oil is just one energy source, right? One among many. I mean an extremely potent one, but just being powerful does not make you the best. What makes you the best is being the cheapest. Oil is nothing special. There always has been, and always will be, a *cheap energy crisis*.

We have an unsatiated demand for cheap energy. The way to satisfy this demand in your lifetimes will be through renewable energy. And that means that you are living at a potentially very exciting time. By working and investing in green energy, you will not only be protecting your nation's future but also lowering the cost of energy both in Turkey and around the globe.

5 Appendix: The Greenhouse Gas Crisis, A Predictable Crisis?

The most embarrassing thing about my concerns over running out of oil was my failure to trust the market. The price of oil is determined by market conditions, and as it slowly runs out the value of innovations and fuel efficiency will slowly rise. Of course someone will step in and fill this need, and the problem will be overcome. The laughable, and very sad, thing is at approximately the same time (in 1986) Shell scientists discovered the real problem—the challenge that will define your generation—the greenhouse gas crisis (Franta, 2021).

This is, of course, an externality—pollution. In other words there is no market mechanism that will spur innovation. This is a real problem and one that was hidden by oil producers for too many years. If left purely to the market, we would slowly heat up the globe until it was unlivable for our current population.

However this is one of the reasons we have a political system. Unfortunately this is a global problem and we do not have a government for the world, instead we have many small governments that need to cooperate to overcome this problem. Technological solutions are already available. Bill Gates has financed developing carbon capture plants that suck the carbon directly out of the air, it would only take 40,000 of these plants to make us carbon neutral (CNBC, 2019). Will that be our solution? Is it the best solution? Probably not and almost certainly not, but the point is that the problem can already be contained at a reasonable cost. What is missing is the political will to implement these solutions. Less developed countries complain because developed countries (with the United States in the lead) produced most of the greenhouse gas in the 20th century. Why should China, India or Russia reduce their emissions now? The current top five producers are China, United States, India, Russia, and Japan (Tiseo, 2021).

But this is not a crisis but rather a challenge. We know the problem, we know the solution, the only question when we will actually solve the problem. As usual it will probably be solved too late, costing much too much in both loss of property and expense to protect property. Turkey is a leading producer of renewable energy. In 2016 Turkey was 51st in the world in terms of the share of their energy produced by renewable energy—and capacity has grown 50% since then. This is only one part of the solution, but it is a significant part. It will be a great day when fossil fuels are only used as a backup energy source in Turkey. This day is coming, and I will be immensely proud if you help bring that day closer.

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