

Apocalypse Not Now

"The only wisdom we can hope to acquire is the wisdom of humility. Humility is endless."

– T.S. Eliot

"Anyone who isn't confused really doesn't understand the situation."

– Edward R. Murrow, the American broadcast journalist who stood up to McCarthyism

Central amongst the host of issues currently crowding the global forum is an escalating conflict in the Middle East. Aside from Turkey's military incursion in Syria over the past week, heightened tensions between Saudi Arabia and Iran continue to cast uncertainty over the region. Despite its decline in price and popularity over the past several years, oil continues to be as vital as ever for almost all of the countries situated between Europe, Asia and Africa.

This week, we are taking a slight detour from our "Bubble 3.0" series to present a very topical special edition EVA on energy and climate change. While to some the subject might seem binary, like many other issues these days we contend that it is anything but, and that the whole ecosystem is much more complex and interconnected than most understand. Please enjoy this week's newsletter and, as always, leave your comments below!

- Despite an excess of negative climate news, US carbon emissions have declined substantially over the last 15 years.
- The biggest factor in the reduction of America's carbon output has been the shift away from coal to natural gas for electricity generation.
- This case offers hope for a similar global reduction, which has either seen emissions roughly flat or, in the case of China and India, increase dramatically over the same time period.
- Asia continues to be one of the worst offenders and is a primary reason why global CO₂ levels continue to soar; its carbon emissions have risen 400% over the last 30 years, largely due to its coal addiction.
- Thus, even if the US does reduce its carbon footprint by 40% cumulatively from 2005 to 2035, the gains will be overwhelmed by a carbon tsunami from Asia.
- Despite this, there is hope in Asia, as well; China is taking decisive action and has 11 nuclear power plants under construction.
- Also, starting next year, China will begin a national carbon credit trading system.
- But neither natural gas, nor nuclear power, nor renewable energy is a perfect fuel source and the truth is - there really isn't one.
- The energy ecosystem is very complex, and so is the data surrounding short- and long-term environmental impacts.
- Frankly, data from both "alarmists" and "deniers" is hard to trust.
- However, there is simply no question the earth needs to reduce the emission of pollutants, particularly those that are most harmful to humans, the atmosphere, and the oceans.
- It will be essential to focus on solutions that won't destroy the economy along the way.

Wouldn't it be great to get some positive news on climate change? Well, how about this for

starters—US carbon emissions have fallen 20% over the last 15 years. It's a fairly safe bet that very few Americans are aware of that considering the constant bombardment of negative climate news. This is not to downplay the serious environmental problems in the world today but, rather, to point out there are encouraging developments happening, as well.

Would you like another up-beat factoid? The appropriately dark green state of Washington—after all, it is the Evergreen State, a nickname we are extremely fond of—is closing all of its auto emissions testing facilities at the end of this year. The reason? Because today's cars don't produce much in the way of emissions. (Fortunately, the US never embraced diesel cars the way Europe did.) This same frontpage *Seattle Times* article also went on to note that, additionally, the area's air quality is much better today than it was in 1982.

As someone who came of age in Seattle in the 1960s and 1970s, I can personally attest to how much less smoggy the air is today in the summer when we get periodic temperature inversions versus those earlier decades. That is, unless there are forest fires raging in British Columbia or east of the Cascade Mountains. Thankfully, there were almost none of those this year, allowing Seattleites to experience a pristine, if somewhat rainier, summer than we've had in recent years.

While much cleaner internal combustion engines are behind the emission improvement in the Seattle area, the national drop in carbon emissions has a different cause—actually, causes. Undoubtedly, the rapid growth in renewable energy, particularly wind and solar, have played a major role. The continuing good news is that from almost all research I read, these will be the fastest growing sources of additional energy production. By 2050, the International Energy Agency (IEA) estimates renewable energy output to increase by 166%. Personally, I suspect the increase will be even greater.

However, over the past 15 years, the biggest factor in the reduction of America's carbon output has been the shift away from coal to natural gas for electricity generation. (The IEA also projects natural gas usage will surge by 44% over the next three decades, though its "market share" should only rise moderately.)

Power generated by coal

Power generation overall produces about 38% of global CO₂ emissions, double what comes from transportation (and only around half the latter is due to cars, partially because they usually sit idle). Going forward, 75% of global energy demand growth is projected to come from power generation with electricity demand estimated to double over the next 30 years or so.

Clearly, cleaner electricity is absolutely essential if we are going to avoid atmospheric carbon overload. This is particularly true should electric vehicles grow as rapidly as is expected by many automotive industry experts and insiders. (More on this intriguing topic later in this EVA.) That's why America's carbon reduction history in recent years offers such great hope to the rest of the world which has either seen emissions roughly flat or, in the case of China and India, increase dramatically.

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In America, coal's electricity production market share has fallen from roughly 50% down to around 30% over the last 15 years. Thus, if it were to fall another 20% by 2035, to just 10%, it's entirely plausible that the US could lower its aggregate carbon emissions from 2005 to 2035 by 40%. In fact, given the increasing market share gains by renewables, the improvement could be even more significant.

Indicating there is much more that can be done in the US in this regard, Great Britain was once the world's biggest coal glutton. If you watched the outstanding Netflix series "The Crown", you saw how a toxic fog of coal-related pollution helped bring a sad conclusion to Winston Churchill's storied political career. Recently, coal's share of electricity in the UK shrank to less than 1%. A big part of that has been the introduction of a carbon tax which made coal much less attractive as an energy source, another subject to explore in a few pages. Should the US adopt a carbon tax, it's highly likely coal-fired electricity generation market share would contract to a very low percentage, possibly well below 10%.

As in the US, natural gas has been behind most of Great Britain's improvement in CO₂ emissions, not to mention the far more harmful nitrous oxide (NO₂ or NO_x). This is despite the fact that the UK lacks America's abundant and inexpensive domestic natural gas resources.

Obviously, what the UK and the US have done is highly encouraging. Now for the not so happy part.

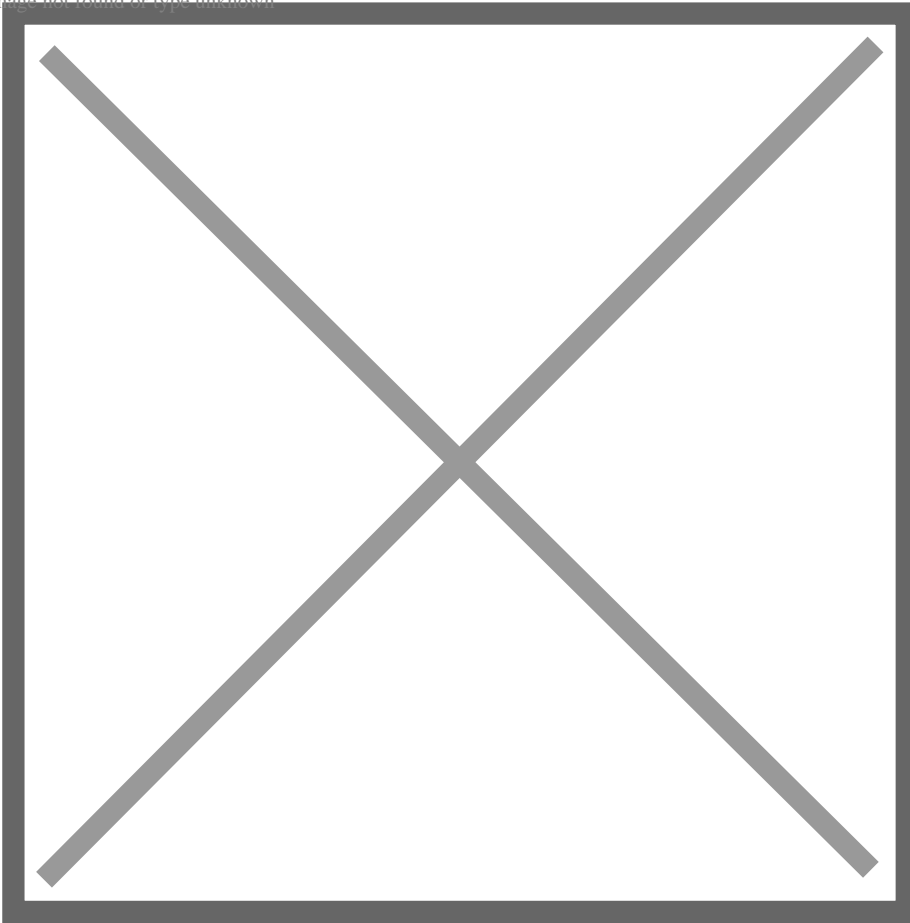
Asia has a serious coal addiction. This is the primary reason why CO₂ emissions have risen immensely over the past decade and are up 400% over the last 30 years. Even worse, there are over 2,000 new coal plants either under construction or in the planning stages, primarily in Asia right now. Indonesia alone plans to double its coal-based generation over the next 25 years. Thus, even if the US does reduce its carbon footprint by 40% cumulatively from 2005 to 2035, our improvement will be overwhelmed by the carbon tsunami from Asia.

However, even in this regard there are positive developments. Because of the heavy reliance on coal, deadly air pollution, mostly the aforementioned NO_x, has increasingly plagued China in recent years. You've seen the photos of Beijing during an inversion where almost nothing is discernible and when residents are forced to wear face masks (and not to hide their identity, like in Hong Kong right now!). As a result, China is taking decisive action. Coal's market share of total energy output has fallen by 10% over the past decade, though to a still far-too-high 60%. To accelerate the transition away from coal, China has 11 nuclear power plants under construction and starting next year it will begin a national carbon credit trading system.

One of the many downsides of the current trade war is that it has frozen (pun intended) the flow of super-cooled natural gas, known as Liquefied Natural Gas (LNG) from the US to China. Frankly, it's an astounding development that America is in a position to be a low-cost and prolific supplier of energy to the rest of the world. In just ten short years, we have moved from voracious importer to increasingly dynamic exporter. Remarkably, there is now too much natural gas in America. As with our new-found oil independence, this has been a striking success story that gets very little press—at least of the positive variety. Of course, there are environmental downsides to fracking and utilizing oil and gas even if they are far less carbon-intensive than coal. Shortly, we'll see that this is true of virtually all energy sources.

Re-gassification plants (i.e., to convert LNG back to a gaseous state for consumption in the US) that were built down on our Gulf Coast have been repurposed as gas liquification facilities so that the gas can be greatly compressed and placed on specialized ships for export to Latin America, Europe and, especially, Asia. The recent widening of the Panama Canal has materially reduced the transportation costs of getting LNG to Asia. What used to cost \$15 per million British Thermal Units (BTUs) delivered to China now is down to around \$5. The Chinese want our gas and we've got a lot to sell! It's not a stretch to believe that any comprehensive resolution of the trade war with China will include large-scale purchases of US energy products, perhaps primarily LNG. India wants to double its natural gas usage by 2030 and it's a key market for US LNG. America's exports of it are already doing a moon-shot.

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Shifting to Europe, I saw a recent Bloomberg story of a man who moved to London from Seattle. He was shocked by the poor air quality in the city itself due to the proliferation of diesel vehicles. This is despite the progress the UK has made by almost totally eliminating coal-fired electricity generation. When this man formerly lived in England 20 years ago, there were only 1 million diesel vehicles on the roads. Today, there are 12 million diesel-spewers choking the UK and about 50 million throughout Europe. This individual, whose asthma was a basically a non-event in Seattle, developed a severe respiratory disorder in London. It has become a serious health problem for the venerable city.

As touched on above, Europe's policymakers made a big mistake by encouraging wide-spread use of "clean diesel". As you have likely read, thanks to cheating on emissions testing by some European automakers, the vehicles were nowhere near as clean as they were purported to be. (Please click on this link to the [Bloomberg story](#) on the truly toxic air in many large European cities because of this.)

Popular frustration with failed energy policies is unquestionably flaring on the Continent. This was the main cause of last year's violent nationwide "Yellow Vest" protests in France. The trigger was an added fuel charge on top of that country's already shockingly expensive (by US standards) pump prices.

Germany has not been as convulsed, but voters are livid that, after paying high energy prices to subsidize renewables, their nation has seen such a miniscule drop in carbon emissions. (All those diesels couldn't have helped!). Because Germany has taken its nuclear plants off-line, it has resorted to some questionable renewable sources such as burning wood pellets, typically

imported from the US, to fire its electricity plant fleet (bizarrely they consider this a form of green energy). It also remains heavily coal-reliant. It burns more lignite, the cheapest and dirtiest coal grade, than any other country. Meanwhile, natural gas has tumbled from 14% of power generation in 2010 to under 10% today. Along with Danes, Germans pay the highest household electricity prices. Essentially, there have been massive sums spent, often borne by consumers, typically in the form of renewable subsidies, for scant benefit. Hence, the rising tempers among the German people.

Spain, on the other hand, has seen far better results due to aggressive wind and solar deployments. Carbon emissions in Spain are down in line with the US, about 20% since 2007. However, they have been rising in recent years for some reason (perhaps diesel cars and trucks?).

Natural gas is not a perfect fuel source. There really isn't one. Windmills kill birds, hydro dams kill fish, nuclear power has daunting spent fuel disposal issues, solar farms displace desert fauna, lithium and cobalt mining for electric vehicle (EV) batteries creates serious environmental problems, and burning oil releases considerable CO₂. The primary problem in the case of natural gas is methane emissions. Fortunately, it is one of the cheapest and easiest climate problems to deal with (putting aside cows which are the largest methane emitters on the planet). According to the International Energy Agency (IEA), it's feasible to cut global methane emissions by around 50% at no net cost. Per the IEA, this would be equivalent to closing every existing Chinese coal plant.

My original intent with this special edition *EVA* was to broadly discuss climate change but then two realizations hit me. The first was that I couldn't possibly do the subject justice in one letter. The second was that despite having researched the subject for years, it dawned on me that the more I studied it the more confused I became. One of my main takeaways is how humble I need to be on the topic.

There are a few other conclusions I have come to as a result of this project. One is that, contrary to popular belief, there isn't a scientific consensus on how much climate change is a function of human activity and how much is just the planet's natural warming cycle. Full stop here! Please realize I'm not saying there is no connection. Frankly, I haven't a clue how much there is, but I think it's highly unlikely it's the only factor. Many scientists I've read, and they could be wrong, contend it is not even the main factor.

Yet, there are a plethora of scientists and climatologists who are adamant man is the primary cause of the warming trend. According to the Mauna Loa Solar Observatory (MLSO) in Hawaii, CO₂ levels have increased by 30% since 1958. There's little doubt mankind is responsible for the rising CO₂. But has that been the primary cause of the warming trend we've been in since the 1970s? That highly-charged question, the answer to which many believe is an inarguable yes, is of enormous importance. Those experts could be right but there are some aspects that still baffle me.

One odd thing, for example, is that the “scientific consensus” back in the 1970s was that we were in a period of man-made global cooling (I’m sure there was considerable dissent about this conclusion back then, as well). An irregular cooling trend had been in place for around forty years leading up to the end of that decade, especially in the US where the hottest decade, even compared to recent times, was the 1930s.

Another strange aspect is the carbonate/silicate cycle which for eons has stabilized the Earth’s atmospheric carbon content. When the atmosphere warms, more carbon is released from the atmosphere. When it cools, more is retained. I’ve asked numerous people who know infinitely more than I do about science why this balancing process apparently no longer works but I haven’t received a satisfactory answer. (If you have one, please email me at your earliest convenience.)

According to some experts, several of the models being used to shape climate policy vary widely—even wildly. Some may be overstating both the atmospheric heating and rising sea levels. Again, this is very contentious and other experts argue exactly the opposite. Perhaps it’s a classic case of lies, damn lies, and statistics. But according to what seem to be credible studies by the University of Alabama, Huntsville, measuring the temperatures in the troposphere shows a less alarming—though still rising—trend. (It’s important to measure temperatures above ground to avoid distortions caused by multiple factors.) Here’s a [link to a video](#) on that study.

There is also a lot of variance in the estimation of how much sea levels are rising. There have been some stunning claims of multi-foot increases in the not-too-distant future, such as Al Gore’s assertion in his acclaimed 2006 film, “An Inconvenient Truth” that sea levels would rise 20 feet in the near future. However, from looking at NOAA data it appears that the rise is around 1/8 of inch per year. There is also intense debate if this rate is accelerating and, as with so many aspects of this issue, I have to admit I don’t know if it is or isn’t.

To borrow a popular catch-phrase, climate change is complicated—very, VERY complicated. Other causes of the planet’s warming and cooling are solar activity, the earth’s orbit, the planet’s tilt (obliquity) and inclination, volcanic activity, and, even, according to one persuasive lecture I listened to, plate tectonics. Trying to handicap how much of the temperature oscillations are due to these as opposed to anthropomorphic (human caused) seems to me, admittedly a total layman, an enormously difficult task. Perhaps the accelerating breakthroughs in quantum computing can help in this regard.

Frankly, I don’t trust the data being disseminated from what some call the “alarmists” or from those that are known just as derisively as the “deniers”. But what seems rational to me is to focus on the main problem which I think harks back to a term we Boomers heard so much growing up: pollution.

It may surprise many that CO₂ isn’t a pollutant. Let me emphasize I’m not saying it doesn’t cause problems. It is a greenhouse gas for sure (by the way, the most prevalent greenhouse gas is water vapor) but it doesn’t hurt humans and it’s great for plants. What is a pollutant is that noxious NO_x (among others) and what releases most of that is burning coal.

These nasty particulates are what get in peoples’ lung and cause serious respiratory ailments. Dirty air kills roughly 7 million people per year, according to the World Health Organization. Moreover, burning wood, coal, and even dung inside of developing world homes—often the only

way to provide heating and cooking since roughly one billion people still lack access to modern power sources—also causes countless deaths. (The good news here is that American propane is increasingly being exported to emerging nations to help mitigate this serious health risk; on-site solar power is also a hopeful remedy in these countries.)

The world only has so many resources to devote to improving the atmosphere. Thus, it seems rational to focus on the biggest threat and also to be realistic about solutions. It certainly seems that continued reliance on coal is the gravest peril to both carbon build-up and human health. One of the most effective ways to do that is to use natural gas – along with carbon-free solar, wind, and nuclear – to produce electricity. The digital world consumes vast amount of electricity and that trend is only going to accelerate due to developments such as the Internet of Things and electric vehicles.

What is alarming to me is the backlash against even natural gas. This seems to me a classic case of shooting at the ambulance. The city of Seattle is considering banning natural gas hook-ups for new homes. In California, which has also been hostile to natural gas, electricity prices have risen five times faster than in the rest of the country since 2011. At times recently, wholesale electricity prices spiked to \$1,000 per megawatt hour, a multiple of 30 above the average.

In the Northeast part of the US, anti-natural gas factions have blocked pipelines into several of the main metro areas, saddling residents with extremely high energy prices. Their strategy is to deny transportation of natural gas since they have been unable to block fracking, at least in Pennsylvania and Ohio (NY state, on the other hand, has).

The current reality is we simply can't run the world, or the US, totally on renewables – not now and not anytime soon. Presently, wind and solar only provide 2% of the world's total energy needs (note hydro and biomass are not included). Even in the US, that number is a mere 3%. We need to prioritize by shifting away from the most polluting energy sources while simultaneously developing renewable sources and pursuing promising carbon capture technologies. In other words, a synergistic, mutual co-existence approach is preferable versus all-out warfare between fossil fuels and renewables. It's going to be a long, challenging, and gradual process but the US has shown that significant carbon reduction can be achieved—and without crashing the economy.

The shift from coal to natural gas is certainly not the only effective solution, though it has been shown to pack a lot of bang for the buck. Carbon capture should, and almost certainly will, play a big role. Reforestation is a low-tech but effective way of doing that. The energy industry and promising starts-up (such as Carbon Engineering in Squamish, B.C., which both Bill Gates and Exxon have invested in) are working on high-tech carbon capture technologies. Some oil companies are already engaged in harvesting CO₂ and using it for enhanced oil recovery where it is sequestered underground. Supposedly, half of all the carbon the world may emit in this century could be stored in existing oil and gas wells.

It's going to take a lot of money, of course, which is where a carbon tax could play a key role. An increasing number of large energy firms are becoming supportive of a carbon tax combined with a carbons-credit trading mechanism such as what China appears to be moving toward.

One energy expert even believes the so-called Super Majors like Chevron, Shell, and Exxon will become some of the biggest investors in future wind and solar projects. His view is that they will

use far more debt for these projects due to long-term contracts and various incentives, putting themselves in a position to return copious amounts of cash to their investors.

Unfortunately, in our now highly polarized country demonizing the other side, be they left or right, has become de rigueur. That is certainly the case with the energy industry. Some leading politicians have even suggested its senior executives should be criminally prosecuted. It will be far more productive to engage the oil and gas industry in crafting effective solutions. They are already moving that way, as support grows for a carbon tax and CO₂ offsets such as reforestation. At some energy firms compensation is being linked to reduced carbon emissions.

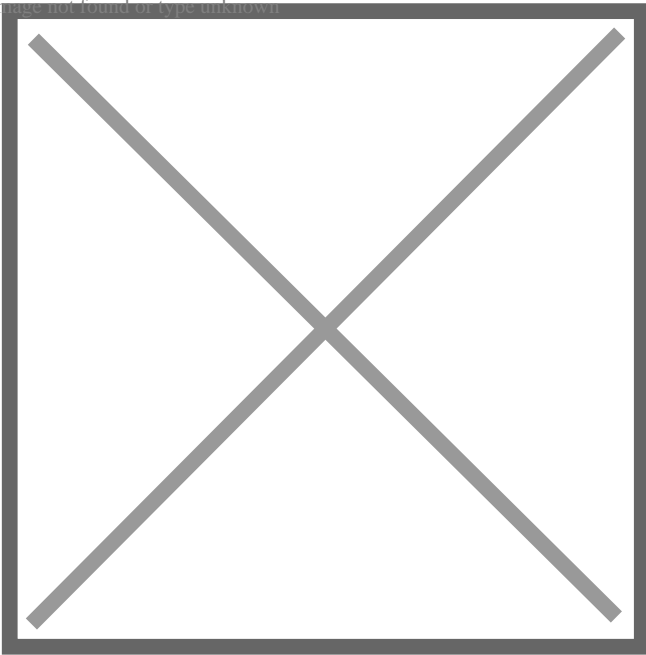
The maritime industry is also poised to help the problem. Its International Maritime Organization (IMO) 2020 program goes into effect next February. It will reduce the sulfur content in the shipping industry's bunker fuel by around 85%. This is critical since ships pump out 3% of the planet's greenhouse gases. The 15 biggest ships emit more sulfur dioxide and NO_x than all of the cars in the world combined. The pollutants released by the maritime industry cause 400,000 deaths and 14 million childhood asthma cases annually according to a study by "[Nature](#)" [magazine](#).

It's time to wind down this EVA with some brief comments on a huge risk the auto industry is taking, one that might pay off spectacularly...or lead to lead to severe financial distress.

While I could turn out to be totally wrong, my contrarian view is that EVs might end up being an environmentally kinder and gentler version of the diesel fiasco. This is because for now they are mostly charged via the electrical grid, which means in countries like China coal is the primary fuel source. Even in hydro-rich Washington State, a Seattle-area client who owns an EV told me he was surprised to learn that only 10% of the power generated by our local utility was renewable. (Heavily nuke-powered France would seem to be an ideal country for widespread EV adoption.)

The *Wall Street Journal* ran an article on exactly this topic while I was writing this issue, titled "Who Willed the Electric Car? China, and Here's Why". In addition to noting China's reliance on bituminous coal, which emits 75% more CO₂ than natural gas, it also pointed out EVs in Germany produce slightly higher carbon emissions than a diesel engine, citing a German research institute. Here's the [link to that article](#) which also included the following graphic:

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While I do appreciate the long-term vision of an EV being charged at a home which is powered by solar panels, that is, once again, a very long way off, at least for most people. (My wife and I are planning to install solar panels at our home in SoCal, something we did twelve years ago in our prior SC residence.) After all, nearly every car being sold today has an internal combustion engine (ICE) and they are typically retained for many years. Thus, just in America there are some 16 million new ICE vehicles entering the auto fleet every year (less scrappage of old units, of course.) Further, the auto industry loses money on nearly every EV sold and it is spending massive sums to tool up to make EVs. For sure quantum leap transitions are immensely difficult, as I fear the auto industry will soon learn. It will be many years before they'll achieve the scale necessary to get their costs down to where they can turn a profit on EVs.

Aggravating the situation, the overseas auto industry already is in recession, with the US looking to be headed that way. My concern is that the staggering costs of electrifying the auto fleet may bring the industry to its knees. Perhaps a diversified strategy of improved ICEs (internal combustion engines), hybrids, and EVs is safer and saner?

The two countries offering a vast market for EVs are struggling mightily with the demand issue right now. The Bloomberg organization is very pro-EVs but its business magazine reported that India has 150 million drivers yet only 8,000 EVs were sold in the last six years.

In China, EVs are much more popular. In fact, 60% of the world's EV sales occurred there last year but even at an annual sales rate of 1.26 million they are a mere 5% of total sales. The Chinese government has reduced incentives and BYD, the largest EV producer in China, saw sales fall 12% in July and 23% in August. It's NYSE-listed competitor, NIO has lost \$2.6 billion over the last two years and its stock has declined 80%.

There are certainly *EVA* readers who drive and love their SUVs. My daughter-in-law is among them. For certain people they are ideal and a lot of fun to drive (it's tough to beat the acceleration of a Tesla!). However, based on both cost and convenience, they are likely to remain a niche product for the next three to five years. The longer-term picture is much brighter if superior alternatives don't emerge. Even Tesla has struggled to hit its production targets and

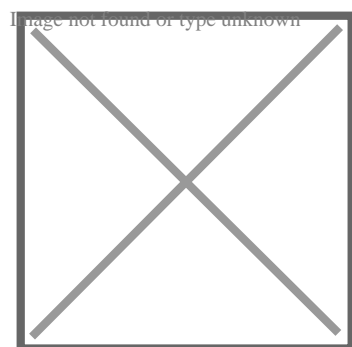
to achieve anything close to consistent profitability. It's a tough, tough business as billionaire entrepreneur James Dyson has found out. His vacuum business has been fantastically successful but after much fanfare and two years of development effort, he announced last week that he was giving up on EV development.

Therefore, the world will need oil for a long, long time in order to power the growing fleet of traditional autos. If it wasn't for the miracle of the US shale industry, oil prices would almost certainly be far higher than they are today. Along similar lines, if Elizabeth Warren is serious about banning fracking, the essence of shale oil production, it will reduce US crude output by about 3 million barrels a day. This is due to the roughly 40% annual decline rate of shale. Taking that much production off the market may cause prices to spike to over \$100 per barrel. While some might welcome the demand destruction that would cause, the economic risks are extreme. The global economy is already teetering on the edge of another recession and oil prices at or above that level would apply the coup-de-grace.

There is simply no question the earth needs to reduce the emission of pollutants, particularly those that are most harmful to humans, the atmosphere, and the oceans. Coal is the prime culprit and a global carbon tax that includes Asia may be the only way to make a major impact over the next 5 to 10 years. It would be humane if a portion of the funds from such a tax were used to help re-train and re-employ coal workers. They are innocent victims of the fortunes—or misfortunes—of their industry. Nearly every US coal company has gone bankrupt over the last decade and that already has caused severe hardship for our coal workers.

It's essential, I believe, to focus on solutions that won't destroy the economy along the way. Those politicians who are proposing extremely radical programs should observe the voter backlash that is occurring in Europe. Engaging with the fossil fuel industry on solutions such as carbon capture will be far more productive than demonizing and trying to destroy it. I'd encourage every US citizen to listen to both sides of the debate and realize how complex and, often, contradictory the scientific findings are.

Let me emphasize again that I am no expert, just an ordinary person trying to make sense of the torrent of claims and counter-claims. As I said, this has been a most humbling exercise. Don't rely on me. Form your own conclusions after carefully studying both sides--with the caveat you might wind up as humbled and confused as I am!



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