



C6 INFRASTRUCTURE PARTNERS FOLLOW-UP: April 2024

AI power drain is descending on the grid faster than anticipated.

“Nine of the top 10 U.S. electric utilities said data centers were a main source of customer growth, leading many to revise up capital expenditure plans and demand forecasts, according to a Reuters analysis of company earnings reports from the first three months of the year.”¹

This headline isn't a surprise to anyone, but the sheer magnitude has been coming to light over the last few months. Grid operators are always assessing their projected sales because they have to be prepared to maintain stability. Just like with the invention of the computer, it takes time for demand or trends to pick up, but based on several laws, the speed of AI adoption will move EXPONENTIALLY faster.²

- Moore's Law has been a central driver of the digitalization era, and states that the complexity of integrated circuits doubles regularly with minimal component costs. This leads to faster and cheaper computers that anyone can use. AI is no different.
- Metcalfe's Law deals with connectivity. The effect of telecommunication networks is proportional to the square of the number of connected users of the system. Said another way: the more people interact and use AI, the faster it will learn. And if you aren't using it, your business will suffer.
- Bandwidth Law states that the bandwidth of users is growing 50% per year. This is required to enhance the quality of user experience and ways to interact and utilize data and computing power.

What do all of these have in common? They ALL drive a huge increase in power to run their underlying operations. Moore's Law means more people can afford data centers and computing power; Metcalfe's Law means this will enable more people to be connected faster; Bandwidth's Law means it will take more integrated servers, towers, satellites, and “digital connection” to make it possible.

This rapid expansion is driving utility companies to reassess their generating capacity. They're realizing that they are grossly short on new electrical capacity.

¹ <https://www.reuters.com/business/energy/us-electric-utilities-brace-surge-power-demand-data-centers-2024-04-10/>

² <https://medialist.info/en/2019/09/15/the-three-laws-of-digital-transformation/>

When we did due diligence on a package of hydroelectric assets in the Midwest, we had to get a third-party report to evaluate the long-term power price. Here is what we were told:

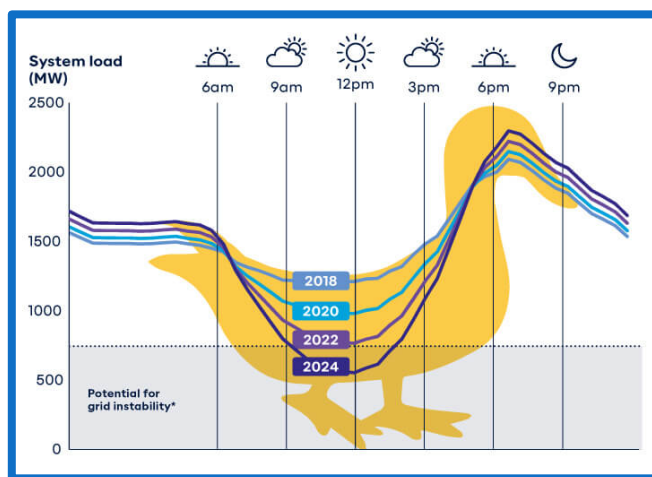
- Midcontinent Independent System Operator (MISO) had an average of 4GW–5GW of solar coming on per year over the next five years.
- These facilities would average 34% utilization factors.
- The build out of these facilities would cap prices below \$40 a MWh

You can only imagine how hard we pushed back because the market was already changing in real time.

- Bond yields were already gapping higher and many of these facilities were based on a Fed Funds Rate of 2%. Our math said that if we went over 4% Fed Funds Rate, 80% of the solar build out would be indefinitely paused due to weak returns.
- SVB (Silicon Valley Bank) was one of the largest underwriters of solar farms throughout the U.S., and their collapse meant many of the loans/guarantees disappeared. Any new financing would be “re-rated” much higher, stopping projects dead in their tracks.
 - As we said in our last update, offshore wind farms and solar projects are trying to “cancel and rebid” their projects at much higher rates.

- Solar farms in Nevada get about 28% utilization rates. How can you travel 1k miles farther north of the Equator with four seasons and at least nine months of reduced solar exposure and outperform the sands of Nevada?

- The “Duck Curve” would crush these grids if they installed this much solar because the operators would require generation to replace solar from 4pm onwards. This made their estimate of \$38 a MWh absolutely impossible (we finally had them agree to \$43). The only way to get that kind of baseload power is through onsite short cycle gas turbines.



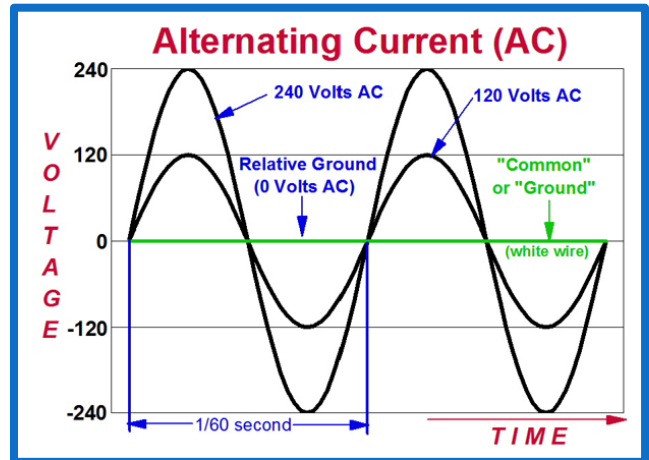
Here's how MISO/PJM Solar has actually played out to date:

- None of the solar farms for vintage (coming online) '24/'25 are getting developed. All of them are trying to restrike prices, which isn't going well with the operators.
- Funding has all but disappeared with a concern about cost overruns and broader failures to reach expected utilization factors.

- Interconnections went from 18 months to 2–3 years. This just means that even if you built the facility, there is no way to connect your power to the grid.

So what is happening with interconnects?

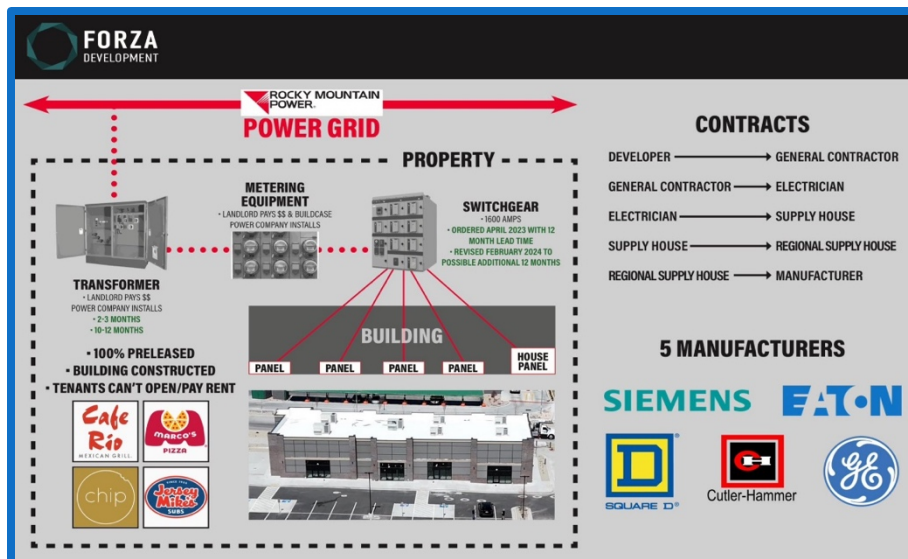
The U.S. utilizes alternating current (A/C) electricity, which is the more efficient way to move electricity throughout a system (Thanks Tesla!). The wires need a consistent voltage to generate between 50 and 60 hertz (Hz). The current of electricity flips from positive to negative in a set distance to create the charge. This allows for minimal loss over distance and makes it much easier to “step-down” for consumption at the home.



Grids have to maintain a constant charge to keep the power “flipping” in a set distance, and when you have solar/wind suddenly dropping off, grids have to rush to fill the void to avoid loss of power. The more intermittent the power source, the harder it is for the grid to manage a stable charge across the system. This is forcing them to slow interconnections of green power, and on the flip side, slow connections of new demand centers—especially data center power pigt.

The other VERY important issue is the lack of equipment in the system. There is a shortage of switchgears, transformers, and other vital equipment to connect these plants to the grid.

I thought this was a great chart highlighting what goes into connecting new capacity and demand to the grid.



As more power is pushed into or out of the grid, bigger equipment is required, which increases the underlying lead time.

The growing demand for residential and industrial capacity is rising, but the biggest driver remains data centers. These centers require so much power that the size of the equipment needed is triple that of what you see in the strip mall image.

Baseload power is pivotal to keep a stable alternating current for these demand centers to operate. There are always peaks and valleys, which have been filled with “Peaker Plants” to “peak shave” during the times of

highest demand. As the “Duck Curve” becomes more pronounced, grids need “valley boosting,” which is also being filled by short cycle gas turbines. Historical Peakers are now being asked to operate in multiple periods, which is exhausting all of the spare capacity an operator has to support power generation.

Independent System Operators (ISOs) are addressing these issues in several ways:

- Exploring additional baseload power generation
- Slowing down the decommissioning of coal facilities
- Extending the life of nuclear
- Purchasing storage capacity
 - Michigan and New England are trying to do this aggressively.
 - Storage sellers are offering wraps if you operate within certain parameters, which can limit the effectiveness in extreme conditions.

The market needs more capacity to meet the growing demand and help stabilize the grid. C6’s strategy of purchasing hydroelectric assets answers the call.

- We already have established interconnects, so we don’t have to worry about timing delays.
- Grid operators are desperate for consistent power, and our hydro assets meet the demand perfectly in the Midwest and Southeast.
 - This enables us to create strong PPAs and net metering deals.
 - We can negotiate from a point of strength to bring capacity “behind the meter” onto our site. This means we bring power consumers onto our site and provide them with power and labor.
 - Grid operators want this because it reduces the load they have to carry.
- Our facilities marry well with solar capacity. Hydro facilities outperform in the winter, fall, and spring months when solar is at its lowest utilization factor. River runs are reduced in the summer (when we do our maintenance), which is when solar is at its peak capacity.
- Several of the packages we are exploring come with distribution capacity, which increases our revenue significantly as we sell our own power.

I had a great question from a potential LP: *How long can this opportunity last?*

There are thousands of small and medium-sized hydroelectric assets in the U.S. The Army Corp of Engineers have also been asked to identify current dams that are ideal for a powerhouse to be built. They have selected hundreds of additional sites in key growth areas across the Southeast, but they will only accept bids from companies that have a history and rank in the top 5% of compliance with FERC. C6’s hydro company,

Artesian, falls in that category, and this provides us with fantastic opportunities. We deal with the Army Corp at one of our Connecticut facilities and already have a great working relationship with them.

The opportunity also expands abroad. C6 Infrastructure Fund 1 is focused purely in the North American market, but we have the opportunity to expand our footprint in Follow-on Funds. “The electricity grid in two Dutch provinces is full: new companies are no longer connected. In the Netherlands, new companies in the provinces of North Brabant and Limburg will no longer be connected to the electricity grid for the time being. The measure also affects existing companies that want to expand. According to the grid operator, the high-voltage grid in those two provinces is full due to the rapidly growing demand for electricity.”³ The shortages exist across Europe, U.K, Latin America, and broad swathes of Africa and Asia.

There are several great opportunities in Africa and Asia, but that is for a future fund! In short, there is no end in sight for this opportunity. We see this roll-up of assets and expansion of generation, distribution, and storage as a multi-decade opportunity.

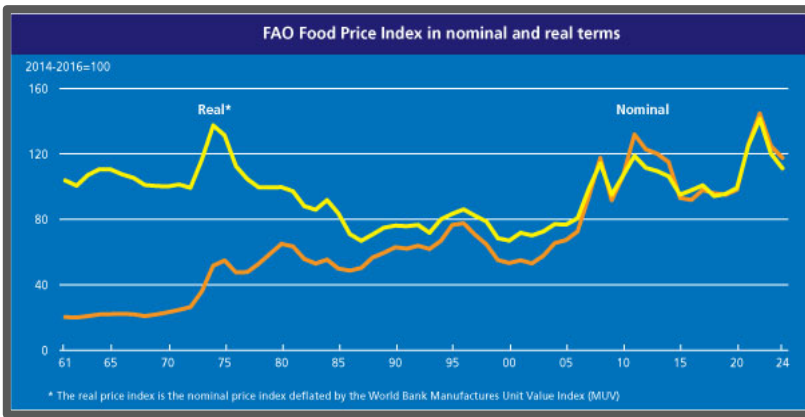
The world is finally waking up to its massive agriculture crisis.

The inflation (CPI) data came out very strong and shows the re-acceleration we expected to see. The WSJ put out a great chart highlighting the increase in supermarket prices: “A WSJ analysis found that a commonly purchased basket of supermarket goods increased in price by 36.5% over the past 4 years (+8.1% per year), much higher than US Government CPI figures which show food price inflation of 24.9% (+5.7%/year).”

Global food prices have slowed their decline and started to turn higher once again. The year/year chart gives you an idea of the pressure, but when you consider the shifts around the world: we expect pressure to the upside.

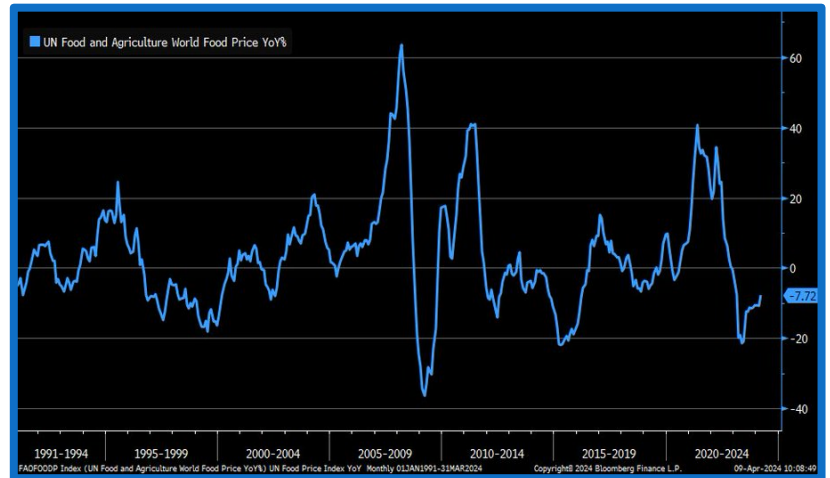


³ <https://www.vrt.be/vrtnws/nl/2022/06/09/elektriciteitsnet-nederland/#:~:text=Milieu%20%26%20Klimaat%20Energie-,Elektriciteitsnet%20in%20twee%20Nederlandse%20provincies%20zit%20vol%3A%20nieuwe%20bedrijven%20krijgen,be staande%20bedrijven%20die%20willen%20uitbreiden>



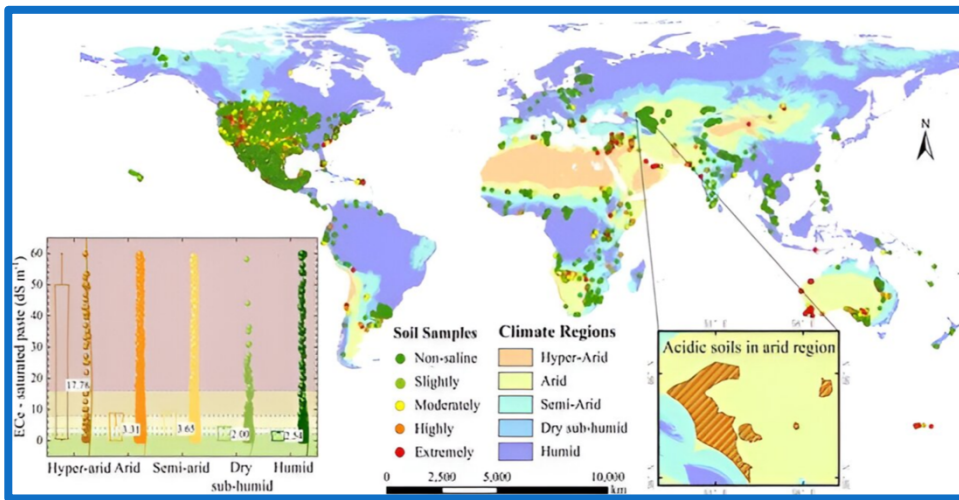
There is already some pick up in the year-over-year data, and as the easier comps fall away, the consumer level will soon feel the full pain. “Year/year change in UN Food and Agriculture World Food Price Index stayed negative in March (-7.7%) but trend has been reversing higher.”

Scientists are starting to focus on the importance of arability, and they are finding ways to evaluate “salted soils” and pH issues. “A team of researchers has developed an approach that maps the soil salt content around the world with an exceptional detail of 10 meters. This advance tackle the pressing need for accurate assessments of soil salinity, a formidable challenge that jeopardizes agricultural productivity and soil vitality on a global scale.”⁴



Sultech has been working with BYU, University of Montana, and other premier scientists to evaluate how to address this issue. Sultech has several third-party white papers that detail how effective their soil amendment properties are at correcting this problem. The below chart helps to show the sheer size of the opportunity, which is only getting worse over time.

⁴ <https://phys.org/news/2024-04-world-salted-soils-combating-degradation.html>



The sodic nature of the soils is driven by irrigated land utilizing aquifer, or desalinated water, and years of synthetic fertilizers. The applications and effectiveness of Sultech’s products continue to impress and outperform all of the scientific expectations.

Sultech achieves these results

while being 65% cheaper than the alternative. Their products also increase yield and the amount of farmland used, which allows the farmer to spread cost across a larger harvest. This bumps up their margin while reducing broader costs that are filtering down to the consumer.

The company also has several whitepapers highlighting its effectiveness in weathering phosphate rock and increasing available phosphate to crops throughout the growing season. This directly increases yield, which was again proven by Newcastle University.⁵ Sultech is already working with two offtakers to provide product for their phosphate offering.

There are also several initiatives to utilize manure in chickens and cows. Sultech is already working with several entities within the U.S. and Brazil to turn chicken litter into a nutrient dense organic fertilizer. Humans and livestock absorb sulphur, so it has to be added when creating the final product. By utilizing the livestock product, Sultech is optimizing the farmer’s ability to create a circular economy with waste products.⁶

Sultech continues to outperform the competition with a successful potato trial. Several scientists we've been working with completed a test utilizing Sultech’s product on potatoes. It was an absolute success where they meaningfully increased the value of the yield by producing more "USDA Table" potatoes versus "Processing" potatoes. This increases the margin for the farmer significantly, as well as the total value of the harvest.

The world needs new solutions and alternatives to the current fertilizer offering. By taking a by-product of oil and gas, Sultech helps to de-carbonize energy while providing a meaningful solution to the agriculture community.

⁵ <https://phys.org/news/2024-04-weathering-results-higher-crop-yields.html>

⁶ <https://www.foodformzansi.co.za/transforming-chicken-manure-into-farming-treasure/>

More large firms are getting serious about Infrastructure.

The events unfolding in the Middle East highlight the importance of having more industrial processing: especially refining capacity in the local markets. SustainAgro enables a country to produce renewable diesel by utilizing forestry and agriculture waste. By creating a product molecularly identical to petroleum diesel, the local supply chain can utilize all pre-existing equipment and infrastructure. We need long-term solutions in a world that is facing more geopolitical risk, which was always part of our base case:

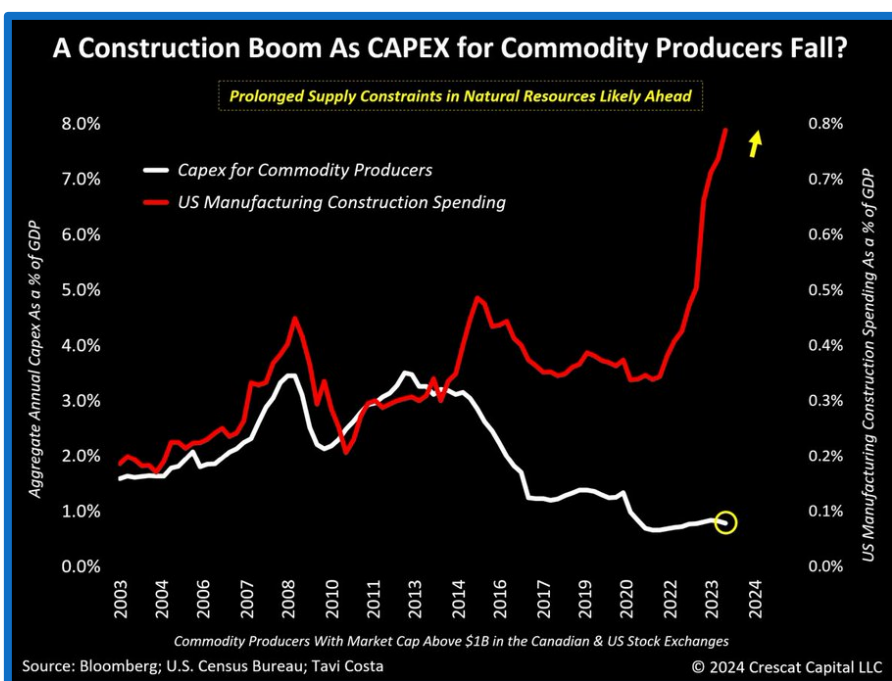
<https://primaryvision.co/2022/01/05/what-comes-on-the-other-side-of-covid19/>

Major trading firms and other investors are starting to wake up to the issues facing today's infrastructure. Gunvor is just one example of a company buying up refiners and power assets to meet the growing demand. "But Törnqvist suspects a lot of Gunvor's growth will come from gas and power—areas where trading companies are already seeing rising profits. The company made its first investment in a power generation asset late in 2023, when it agreed to buy BP's 75pc stake in the 785MW Bahia de Bizkaia combined-cycle gas turbine plant in Bilbao, Spain."⁷

There is a shortage of refining capacity, power generation, and fertilizer alternatives in today's market. C6 was early to this theme, and we are looking to capitalize on it as the market shifts.

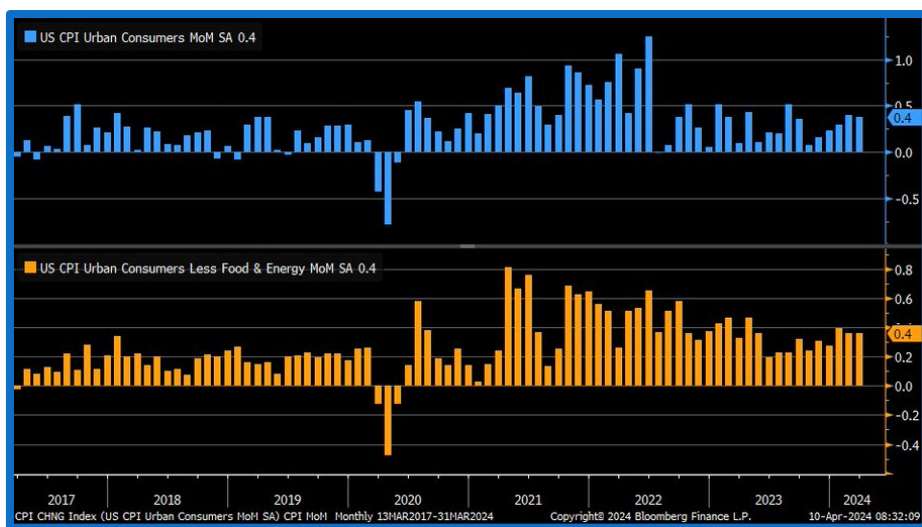
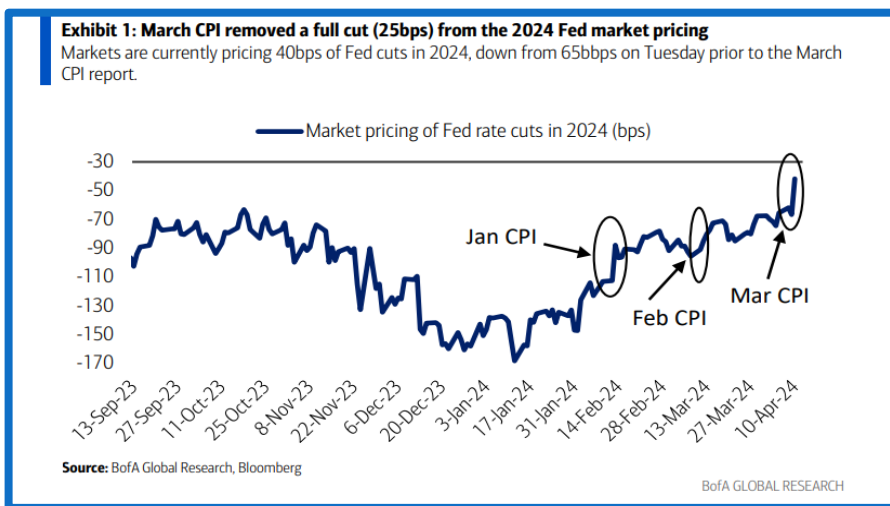
The economic data is not giving the whole picture.

CapEx for manufacturing construction and expansion continues to drive higher in the U.S. This is driven by onshoring shifts as globalization comes full circle. But CapEx for commodity producers is GROSSLY underinvested, creating a broader problem for future expansion and inflation. C6 is looking to deploy capital to address this huge disconnect through our three key areas—power, fertilizer, and industrial processes.



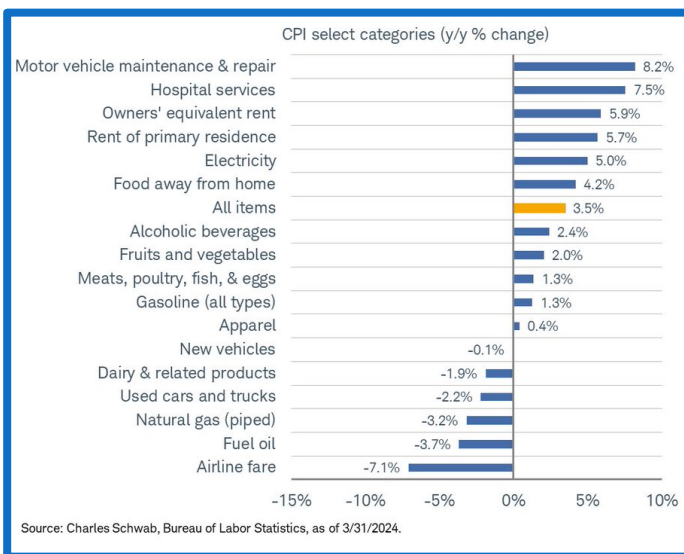
⁷ <https://www.argusmedia.com/en/news-and-insights/latest-market-news/2557045-gunvor-set-for-buying-spree-after-windfall-ceo>

The latest data points to more issues hitting the underlying economy and the consumer. Inflation came in well above expectations in the U.S., and the market FINALLY priced out Fed rate cuts in the near term. Gold has pushed to new all-time highs with treasury bond yields making another push up: Markets are currently pricing 40bps of Fed cuts in 2024, down from 65bps on Tuesday (4/9) prior to the March CPI report.

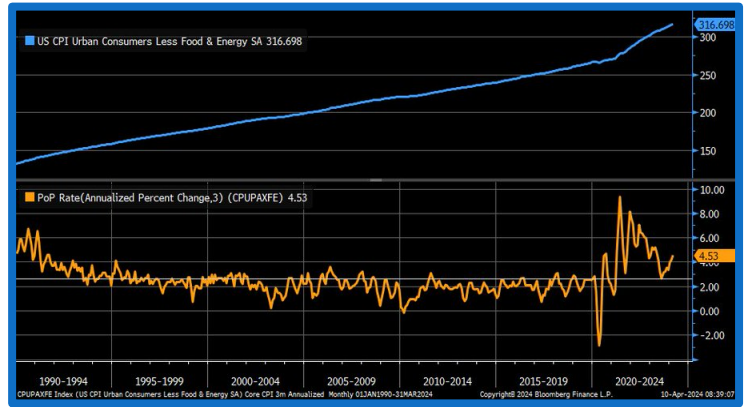
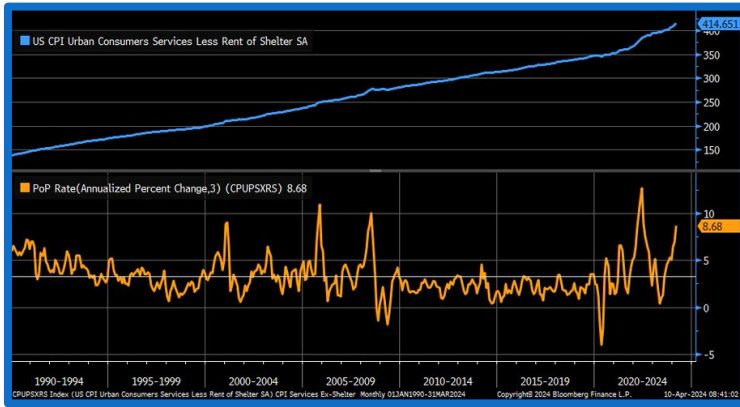


We still believe that two rate cuts are too aggressive, and we could see one or none this year given inflation moved higher. In month/month terms, headline CPI (blue) numbers show +0.4% vs. +0.3% est. & +0.4% prior; core +0.4% vs. +0.3% est. & +0.3% prior.

This chart gives a clear breakdown of what is accelerating across the consumer's basket. As we talked about food earlier, there is a lot of pressure on spending as wages fall and prices of goods and services rise. Even though gasoline and diesel prices rose, PPI data "seasonally adjusted" it lower, which is why the leading indicator of PPI came in slightly below expectations. As you can see below, that is far from the truth, and as we switch from winter grade blends to summer grade, gasoline prices are going higher.

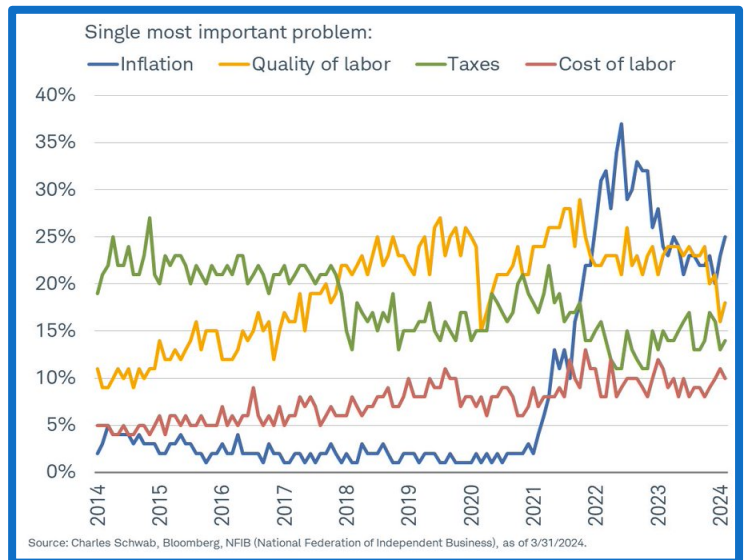


The market continues to show a shift in expectations, and we've seen 10-year yields, gold, and USD respond because of it. Inflation is running hot on pretty much every metric—especially when looking at 3/6 month annualized changes. Looking at CPI services ex-rent of shelter, 3-month annualized change has shot up to +8.7%.



Inflation picked up across every metric tracked by the Fed, and even though they are “playing” with the PCE/ PPI data, it won't be enough to hide how quickly pricing is shifting higher.

Small businesses represent about 44% of the U.S. economy, and they are signaling more issues ahead. Inflation has spiked up again hard, which is a sign that small businesses will be moving prices up once again. They will try to push through as much of their cost as possible, and it shows up in here first.



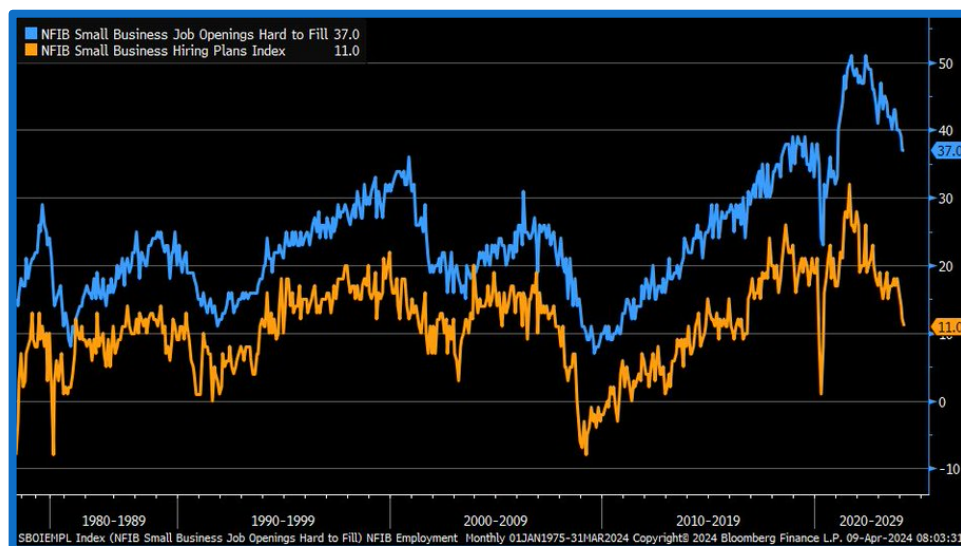
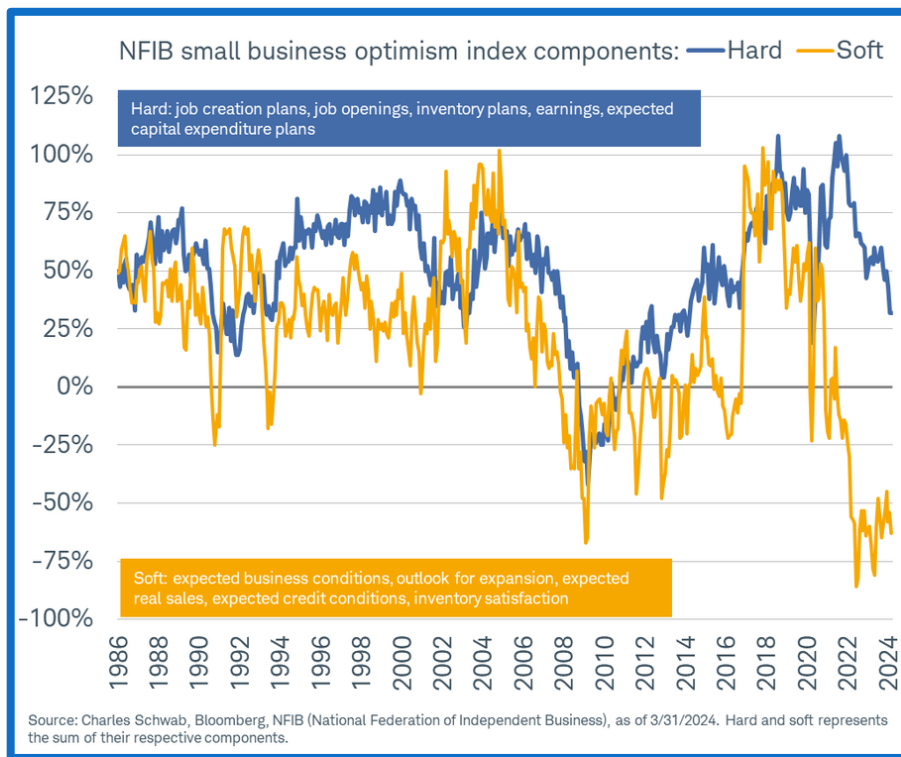
Measure of underlying inflation	12-month growth rate		Average difference Measure - Core PCE 2009-2019	Target based on 2% Core PCE	Stats for 1-mo growth rates (2009-2019)			
	Mar-23	Mar-24			Mean	Median	P25	P75
Core CPI	5.6	3.8	0.3	2.3	1.9	2.0	1.3	2.5
FRB Cleveland Median CPI	6.9	4.6	0.6	2.6	2.2	2.3	1.9	2.6
FRB Cleveland 18% Trimmed-Mean CPI	6.1	3.6	0.3	2.3	1.9	1.9	1.3	2.4
Atlanta Fed Sticky CPI	6.5	4.5	0.5	2.5	2.1	2.2	1.7	2.6
Core PCE	4.8	2.8	0.0	2.0	1.6	1.5	1.0	2.1
Market-Based Core PCE	4.7	2.7	-0.2	1.8	1.4	1.4	0.8	1.8
FRB Dallas Trimmed-Mean PCE	4.8	3.1	0.1	2.1	1.7	1.7	1.3	2.0
FRB San Francisco Cyclical Core PCE Inflation	8.1	5.0	0.7	2.7	2.2	2.4	2.0	2.8
Cyclically Sensitive Inflation (Stock and Watson (2019))	6.6	3.7	-0.1	1.9	1.5	1.5	0.9	2.1

*CPI-based measures last updated on April 10, 2024 with data through March 2024. PCE-based measures last updated on March 29, 2024 with data through February 2024. Median, P25 and P75 statistics of FRB San Francisco Cyclical Core PCE Inflation are based on 12-month growth rates.
Sources: Bureau of Labor Statistics; Bureau of Economic Analysis; Federal Reserve Banks of Atlanta, Cleveland, Dallas, and San Francisco; Stock and Watson (2019); staff calculations

- Measure is within target range (-/+0.25 from target)
- Measure is between 0.25 and 0.50 ppt below target
- Measure is more than 0.50 ppt below target
- Measure is between 0.25 and 0.50 ppt above target
- Measure is more than 0.50 ppt above target

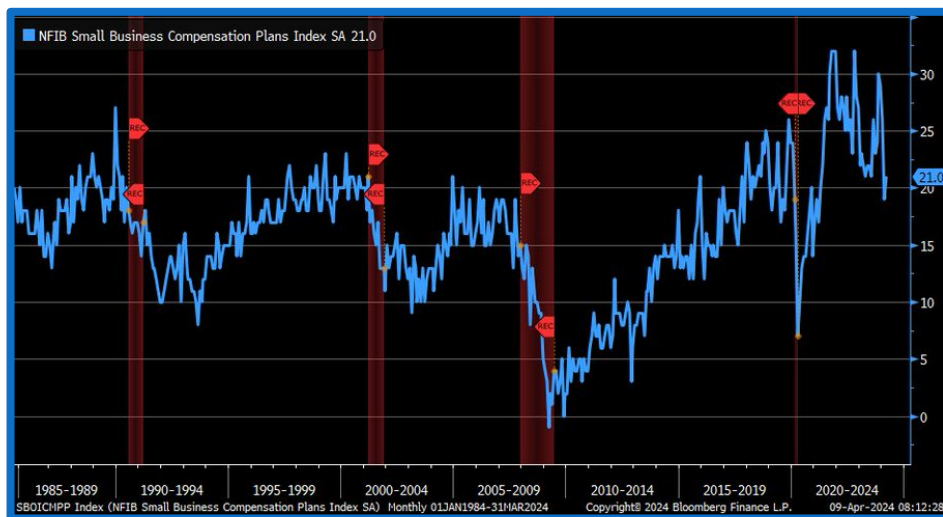
The inflation issue comes on the back of already worsening business components. Hard components (seen in blue on this chart) in the NFIB small business optimism index are at their weakest since the 2020 recession. Soft components are hovering near the GFC lows (but have improved from the most recent trough in 2022).

Even as labor markets get “better” when it comes to labor availability (which should result in lower wages, reduced price pressure/inflation), they remain at near all-time highs. Yes, we have clearly come off the highs, but still at a point we’ve never seen before.



Labor market indicators in the NFIB small business optimism survey continue to soften—a shrinking share of respondents say job openings are hard to fill (blue) and that they’re expecting to hire more (orange).

The percentage of small business owners planning to raise worker compensation has dropped sharply from peak and moved up a bit in March. Any further deterioration would start to look consistent with what has happened in prior recessions. It has clearly come down, but it's bouncing back up and holding here. It's off the highs but still elevated from previous peaks.

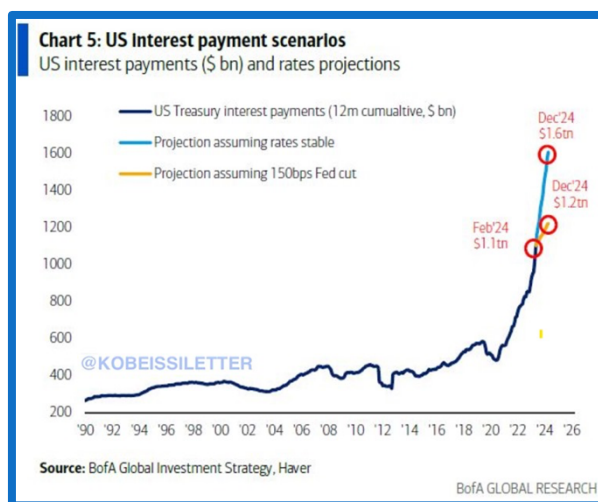


The price track will continue until we get a bigger degradation of sales. It's starting to hit on the retail sales pace, but it's still slow to materialize. We see this gaining a ton of momentum over the coming months given credit card rates and defaults, car delinquencies, and other pressure points. Poor sales are starting to move up



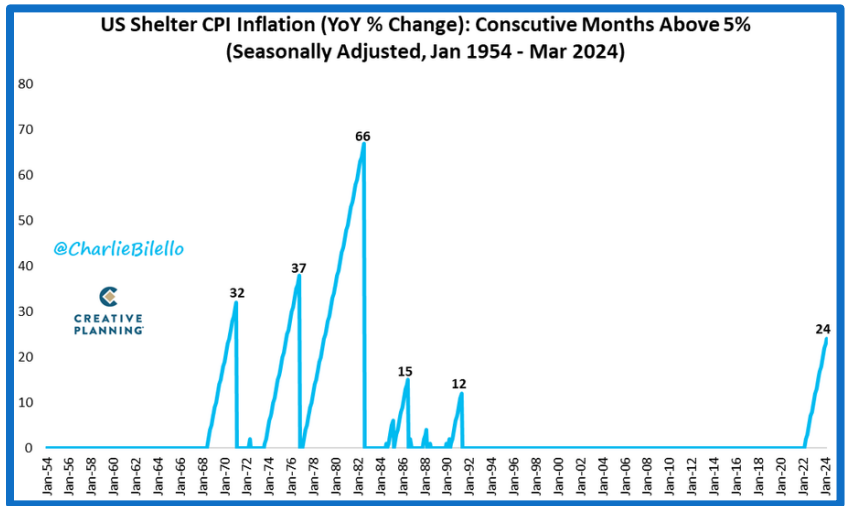
more meaningfully and is a top issue for NFIB small businesses. It does not seem overwhelming relative to prior downturns, but year/year trend (orange) is picking up some steam. Sales are still strong versus previous cycles, which will keep business owners pushing through price increases.

Even as the Fed keeps rates elevated, the government is running a step deficit that is pumping money into the system. It's coming by way of fiscal stimulus even as monetary tightening (QT) remains the basis of how things sit. This spending is going to put the U.S. in a TERRIBLE position when you look at interest expense, and a significant amount of new money will have to go to interest.



Another key driver is the shelter side of CPI: Shelter CPI has now been above 5% for 24 consecutive months, the longest period of elevated housing inflation since the early 1980s.

The cost continues to EXPLODE higher, and it will keep people paying all cash or sitting on the sidelines. A Redfin survey showed that 44% of renters believe they will never be able to afford a home.



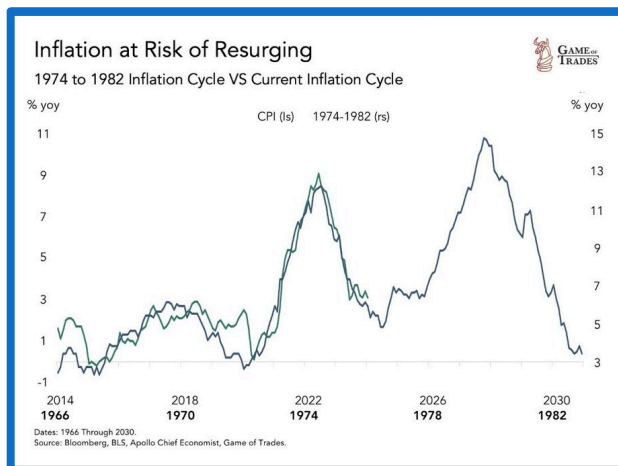
Here's a quick breakdown of the monthly mortgage payment needed to buy a median priced home in the US:

- April 2020: \$1,480
- April 2021: \$1,690
- April 2022: \$2,400
- April 2023: \$2,550
- April 2024: \$2,750

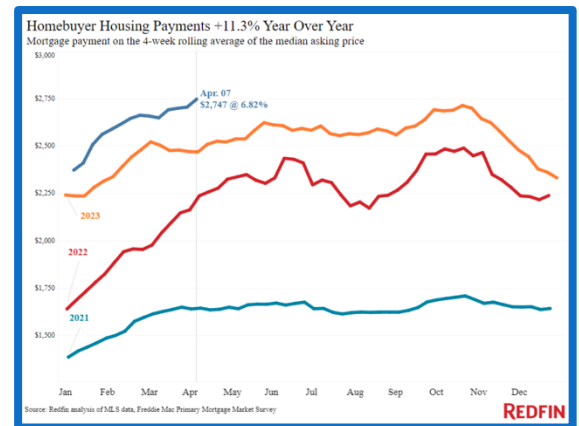
That's an 86% increase over the last 4 years. And that doesn't account for the extra amount of money needed upfront to even participate in the market.

This also doesn't include all of the other costs of homeownership that have skyrocketed as well (property taxes, insurance, maintenance, etc.). "The average annual home insurance cost rose about 20% between 2021 and 2023 to \$2,377, according to insurance-shopping site Insurify, which projects another 6% increase in 2024."

As long as inflation tracks the 1970's playbook, the Fed will be

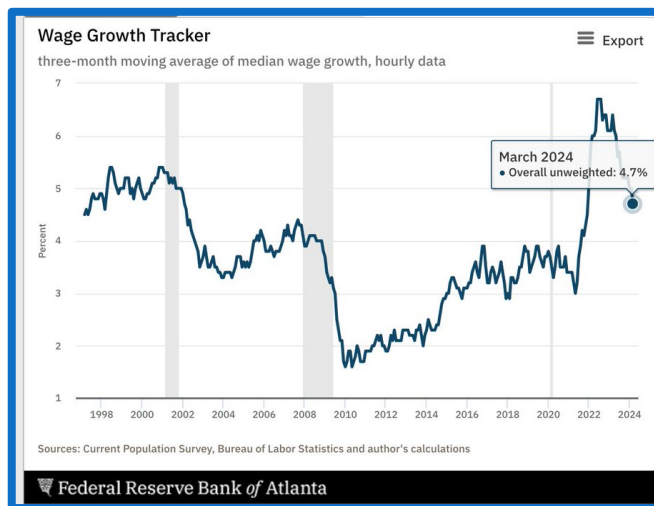
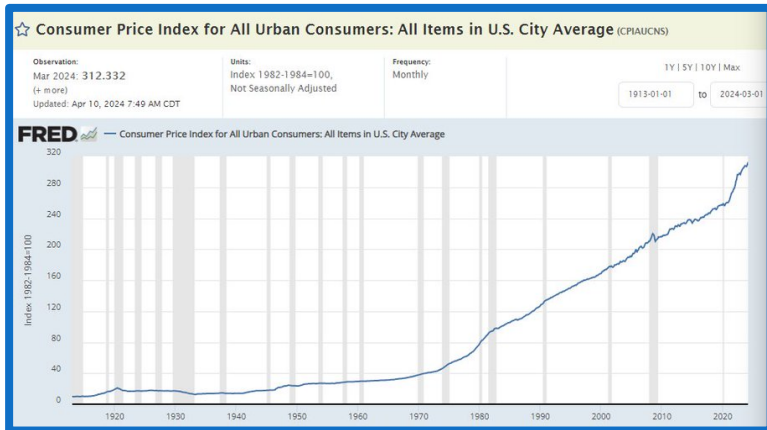


sitting on the sidelines, which will keep rates moving higher for all things (including mortgages, credit cards, auto loans, and other critical lending metrics for consumers).



The consumer's problems are getting worse as wages shift lower once again. They remain elevated versus previous years, but this will put way more pressure on consumers' balance sheets.

Here is the relentless climb higher!



The end of Modern Monetary Theory (MMT)

The last point that we want to discuss is the debacle at the BoJ as the Yen weakened against the dollar to the worst in history. The market will keep pushing the Yen to the brink of disaster and force the BoJ to gun rates higher. The “Invisible Hand” is going to make them close the carry trade, which is going to make U.S. treasury and note auctions more and more “sloppy.” Even as the BoJ tries, they won't be able to stave off a failed bond auction that will reverberate through the system. This has been a common theme for us. Here is video of Mark discussing this topic at the New York Alternative Investment Roundtable:

<https://ny-alt.org/2022/10/21/nyair-episode-84-financial-forecasting-navigating-monetary-policy-in-a-sea-of-macro-risks/>

Our view is: even if the Fed were to cut rates at the end of the year, they've lost control of yield. The interest/debt load of the U.S. is working against them, which only gets worse if other central banks (especially Japanese traders) sell down some of their treasury



positions. What's remarkable about the decline in Treasuries is that it hasn't *yet* been driven by foreign central banks selling. Their position in U.S. debt instruments remains the largest in history. Just imagine if they were to begin exerting selling pressure as well.

The problems in this market are FAR from over.

If anything, they are just beginning.

C6 saw many of these risk points coming and invested accordingly. Infrastructure outperforms in stagflation and inflationary environments, which we are going to be in for years to come. Bond yields aren't falling any time soon, and this will keep new solar and wind on the sidelines, UNLESS power prices go higher. The power markets are going to get more expensive, and C6 is positioned to buy underappreciated assets to capture this re-rating.