



Letters to the Editor: on mega-cap stocks, artificial intelligence, narrow market leadership, biotech investing and some of my unsolicited letters to Barron’s, MSNBC, the “No Labels” US political movement, the Federal Housing Finance Agency, the Urban Institute, the National Housing Conference and Jeep

It’s been another one of those years when US equity markets are dominated by mega-cap stocks. The average YTD return on Amazon, Apple, Google, Meta, Microsoft, NVIDIA and Tesla: **84%**. The average YTD return for the rest of the S&P 500: **just 3.7%**. Apple’s market cap is now the same as the entire Russell 2000 Small Cap Index, the largest 7 companies represent the highest share of market cap on record (25%), and the percentage of stocks beating the S&P 500 on a trailing 3-month basis is just 11%, surpassing the March 2000 low of 20%.

What’s driving this? A lot of mega-cap P/E multiple expansion, although there’s a difference between NVIDIA, Apple and Microsoft which are priced at the high end of their historical ranges and the other four which are not. For NVIDIA and Meta, sharply increased earnings expectations also explain their rise this year. For the other five stocks, earnings expectations are either flat, or in the case of Tesla down substantially due to \$2k-\$10k price cuts for Model Y, S and X vehicles (which hasn’t prevented Tesla from rising by ~110% YTD).

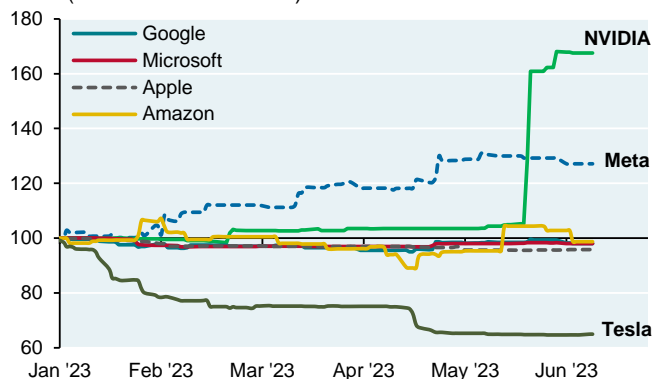
Mega-cap stock YTD results

| | NVDA | META | AMZN | GOOGL | MSFT | AAPL | TSLA |
|---|------|------|------|-------|------|------|------|
| YTD return | 181% | 125% | 51% | 40% | 40% | 41% | 110% |
| Jan 2023 Fwd P/E multiple | 38x | 13x | 32x | 15x | 24x | 21x | 25x |
| Current Fwd P/E multiple | 44x | 18x | 38x | 20x | 31x | 28x | 55x |
| Percentile rank of current Fwd P/E, 2013 - 2023 | 79% | 17% | 6% | 28% | 85% | 93% | 14% |

Source: Bloomberg, JPMAM. May 2023.

Mega-cap stock earnings expectations for 2023

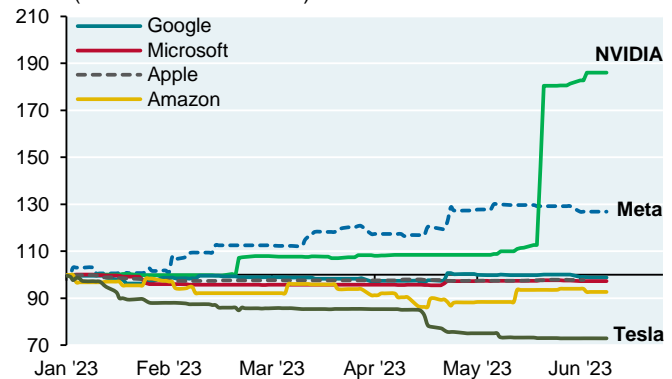
Index (100 = December 2022)



Source: Bloomberg, JPMAM. June 13, 2023.

Mega-cap stock earnings expectations for 2024

Index (100 = December 2022)



Source: Bloomberg, JPMAM. June 13, 2023.

On a related note, investors are paying a sizable premium for AI exposure. One example: the 32 stocks in the \$CHAT Generative AI ETF have returned 77% this year. The 22 \$CHAT ETF stocks that have positive earnings projected for the next 12 months trade at an average P/E of 31x. The other 10 \$CHAT ETF stocks have infinite P/Es, either due to negative earnings or trivially positive earnings that create nonsense P/E ratios over 100x. The large language model revolution is going to have to live up to the high end of expectations to justify this. I have seen estimates that AI will eventually add ~10% to the fair value of the S&P 500 due to some combination of augmented employee productivity and staff reductions, but I’m not sure how one would measure that.

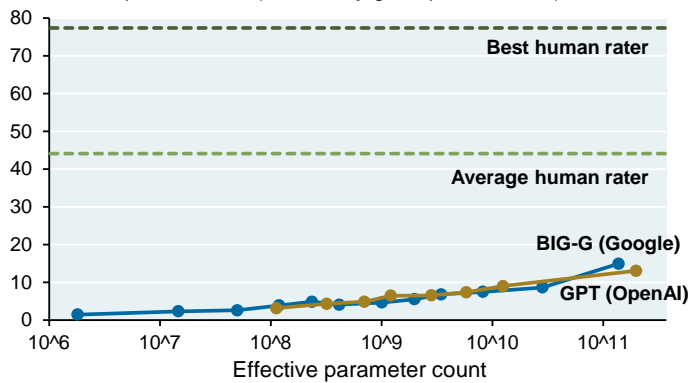


As we wrote earlier this year, a multi-firm effort called the **Big Bench project** is assessing large language models according to 204 complex tasks created by over 400 researchers. The tasks include challenges related to linguistics, childhood development, math, common-sense reasoning, biology, physics, social bias, software development, logic, image recognition and ethics. The last Big Bench update was June 2022 and was based on GPT 3.0, at which time LLMs were still scoring well below humans (chart, left).

But a few months is a long time in the LLM world, and OpenAI’s latest GPT 4.0 update shows a substantial improvement over GPT 3.5. While LLMs are essentially “conventional wisdom” machines, there are billions of dollars in market cap and millions of employees in industries which traffic in the packaging and conveyance of conventional wisdom every day. **Just be aware that the AI hype machine is in full swing right now**, alongside whatever real productivity gains or job force reductions¹ it may result in.

Performance with one-shot prompting vs human-raters

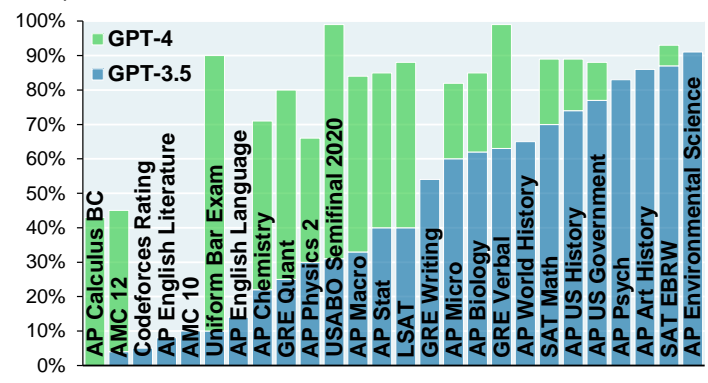
Normalized performance (100 = very good performance)



Source: Big Bench project. June 2022.

GPT-4 improvements vs GPT-3.5

GPT percentile vs human test takers



Source: OpenAI. 2023.

Since it’s the beginning of summer, it’s time for some of my unsolicited letters to the editor. This year’s crop includes letters to Barron’s, MSNBC, the “No Labels” US political movement, the Federal Housing Finance Agency, the Urban Institute, the National Housing Conference and Jeep. Topics include cell/gene therapy investing, gas stoves, unity tickets, the Electoral Count Act, housing subsidies/shortages and my new Jeep Wrangler 4xe. Apologies in advance to all recipients.

Michael Cembalest
JP Morgan Asset Management

¹ If you accept OpenAI’s view on the matter, ~60% of jobs will be augmented by AI rather than eliminated. OpenAI came to this conclusion by analyzing the O*NET database which breaks down 1,000 occupations into a mix of skills, activities and knowledge, and estimating how displaceable each occupation is by AI. They estimate that ~20% of jobs are “at risk”, defined as occupations where current and future anticipated LLMs can reduce the time required for associated tasks by at least 50%. See “An Early Look at the Labor Market Impact Potential of Large Language Models”, OpenAI, OpenResearch and University of Pennsylvania, March 2023



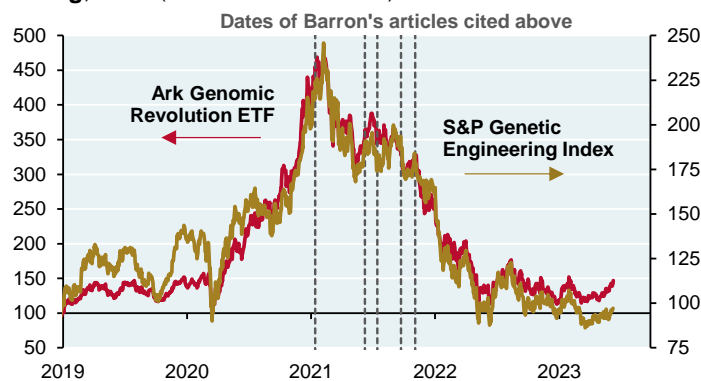
To: Barron's

Re: Your coverage of cell and gene therapy investing

Barron's articles on genetic medicine during the 2021 peak in biologic stocks included "Healthcare's Golden Age is Dawning", "Synthetic Biology Could be the Next Big Thing", "An Investor's Guide to the Promise of Genetic Biology", "Gene Therapy is a Huge Opportunity", and "With Rare Speed, Gene Editing Emerges as Biotech's New Cutting Edge". The vertical lines in the chart correspond to the timing of each article. Then the sector collapsed.

We scanned all 3,600 US ETFs and identified an **Icarus List** of ETFs that soared and crashed the most. Biotech occupies two spots on this very short list. Other boom/bust themes include bullish exposure to Chinese internet stocks, clean energy, semiconductors and crypto/blockchain, and bearish exposure to oil & gas. Barron's latest biotech pieces are entitled "Biotech Stocks are Heavily Shorted. They Could Be Winners", and "Biotech Has Fallen Hard; Now Could Be A Good Time to Buy". Given the collapse, I understand the sentiment and am always more interested in a sector after a fall than at its peak.

Genomic investment benchmarks and Barron's article timing, Index (100 = December 2018)



The Icarus list: Thematic ETFs with the largest gains and subsequent fall, since January 2019

| ETF name | Peak vs Jan 2019 | Drawdown from peak |
|--|------------------|--------------------|
| Direxion Semiconductor, 3x leverage | 1214% | -65% |
| Amplify Blockchain / Crypto | 325% | -68% |
| ARK Genomic Revolution | 369% | -69% |
| ARK Next Generation Internet | 342% | -70% |
| Invesco WilderHill Clean Energy | 536% | -70% |
| Direxion S&P Biotech, 3x leverage | 458% | -96% |
| Direxion CSI China Internet, 2x leverage | 480% | -96% |
| Direxion Oil & Gas E&P, bearish 2x leverage | 667% | -100% |

Source: Bloomberg, JPMAM. June 13, 2023.

But during the 2021 peak in biotech stocks, where were the Barron's articles on the hurdles and challenges facing investors in cell and gene therapies (CGT)?²

- CGTs represent just 1% of all drug sales globally and only 1% of ongoing drug trials. 90% of these trials are Phase I / II and unlikely to reach commercialization
- Even when looking at just biologic drug approvals, cell and gene therapies make up just 8%
- Approval timeframes for regular drugs is ~9 years, and the CGT timeframe for each phase is longer
- The CGT success rate even when starting at Phase II is 14% compared to 43% for all small molecule drugs
- Some CGTs have prices over \$2 million since they target such small populations (see table, next page)
- Some CGT cell alterations aren't disclosed for proprietary reasons, which can create liability. In some instances, patients developed diseases post-treatment that were found to be linked to CGT viral vectors
- CGTs generally deliver lipid nanoparticle treatments to the liver, eyes and blood rather than to the entire body. This can create risks such as deaths last year of two Zolgensma (Novartis) patients from acute liver failure, and liver-related deaths during clinical trials for another rare neuromuscular disease in 2021

There's some good news: 13 more CGTs may be approved in the US and Europe this year, and after a decade, the first CRISPR treatments for sickle cell and beta thalassemia may be approved this year as well. Some CGTs up for review target larger populations, such as treatments for retinitis pigmentosa and macular degeneration. And as shown in the table, the efficacy rates for many existing CGTs is above 50%.

² Sources: Evaluate Pharma, RSM LLP, In Vivo Pharma, Bloomberg, Global Data Healthcare, Gene Editing Institute



Also, since some CGTs are conceived as “cures” to replace ongoing treatments, their high costs might be worth it. The Institute for Clinical and Economic Review found that CGTs for hemophilia A/B and beta thalassemia (when they are successful) could be priced at \$2.5 - \$4.0 mm and still result in net cost savings when compared to costs of standard care.

There’s also good news from the intersection of artificial intelligence and structural biology. Researchers using AI-driven target discovery platforms and protein structure predictors³ identified a novel pathway for treating liver cancer. Then, within 30 days they developed a compound to possibly treat it. The speed of the entire process is unprecedented, and is a new milestone in structure-based drug discovery.

But as the paper of record on financial markets, Barron’s should be just as focused on returns to investors and the timeframe over which they are earned as they are on promoting the CGT sector.

Select cell and gene therapies approved as of December 2022

Rare diseases, defined by the Orphan Drug Act as affecting fewer than 200,000 people in the US

| CGT | Disease | Company | Cost | Target pop. | Efficacy |
|---|---|---|----------------|-------------------------------|---|
| Abecma | Multiple Myeloma | Celgene (Bristol-Myers Squibb) | \$545,000 | 100,000 | Complete (28%) or partial (44%) response after 11 months |
| Breyanzi | Large B-Cell Lymphoma | Juno Therapeutics (Bristol-Myers Squibb) | \$470,940 | 50,000 | Complete (54%) or partial (19%) response after 17 months |
| Carvykti | Multiple Myeloma | Janssen Biotech | \$504,344 | 100,000 | Complete (78%) or partial (20%) response after ~22 months |
| Hemgenix | Hemophilia B | CSL Behring | \$3,500,000 | 6,000 | 56% of patients: no vector DNA in blood after 2 years |
| Luxturna | Leber Congenital Amaurosis | Spark Therapeutics | \$850,000 | 50,000 | 71% of patients: vision improvement in at least one eye |
| Tecartus | Acute Lymphoblastic Leukemia | Kite Pharma | \$373,000 | 111,425 | Complete (62%) or partial (25%) response after ~6 months |
| Zolgensma | Spinal Muscular Atrophy | Novartis Gene Therapies | \$2,100,000 | 25,000 | 91% survival rate and without breathing support after 14 months |
| Zynteglo | Beta Thalassemia | bluebird bio | \$2,800,000 | 1,200 | 89% achieved and maintained transfusion independence |
| Rethymic | Congenital Athymia | Enzyvant Therapeutics | \$2,720,000 | 17-24 births per year | 72% survival rate after 10.7 year median follow-up |
| Skysona | Cerebral Adrenoleukodystrophy | bluebird bio | \$3,000,000 | 1 in 21,000 male births | 72% major disability-free survival rate 2 years since first symptoms |
| Kymriah | Follicular Lymphoma | Novartis Pharmaceuticals Corporation | \$475,000 | 15,000-20,000 people per year | Complete (32%) or partial (18%) response after ~9 months |
| AlloCord, Clevecord, Ducord, Hemacord, HPC Cord Blood | Hematopoietic stem cell transplantation | Various hospitals and blood treatment centers | Free - \$2,300 | 20,000-25,000 per year | 80-90% of patients reporting >20K platelets/ μ l recovered by day 100 |

Non-rare diseases

| CGT | Disease | Company | Cost | Target pop. | Efficacy |
|-------------|--|-------------------------|---------------------|------------------|---|
| Adstiladrin | Non-Muscle Invasive Bladder Cancer | Ferring Pharmaceuticals | \$160,000-\$260,000 | 507,884 | 51% complete response at 3 months; 23% at 12 months |
| MACI | Knee/Ankle Cartilage Repair | Vericel | \$40,000 | 191,000 per year | 90% success rate for 5 year outcomes |
| Omisirge | Reduce Infection Risk In Blood Cancer Patients | Gamida Cell | \$338,000 | 1,300,000 | 46% faster recovery in neutrophilic white blood cells vs standard umbilical cord blood graphs |
| Provenge | Prostate Cancer | Dendreon | \$93,000 | 3,343,976 | 38% more patients still alive 3 years post treatment |
| Yescarta | Non-Hodgkins Lymphoma | Kite Pharma | \$373,000 | 788,781 | Complete (51%) or partial (21%) response after ~8 months |

Source: JPMAM. 2023.

³ **A drug discovery milestone, thanks to AI.** Researchers used PandaOmics to identify possible molecular pathways for treating hepatocellular carcinoma (most common liver cancer). Using Deep Mind’s AlphaFold, the 3D structure of the selected protein pathway was predicted; then, the Chemistry42 platform was used to develop a protein kinase inhibitor compound to bind to it. **Deep Mind’s Alpha-Fold is critical, since it solved the “protein folding problem”.** Before AlphaFold, the 3D shape of only ~17% of human protein structures had been identified using expensive X-ray crystallography and magnetic resonance equipment, after years of trial and error. Now, 98.5% of protein structures have been identified. Protein shapes are critical in drug development; recall how COVID vaccines were adapted to fit the shape of the SARS-CoV-2 spike protein.

**To: MSNBC producers****Re: Your coverage of the natural gas stove issue**

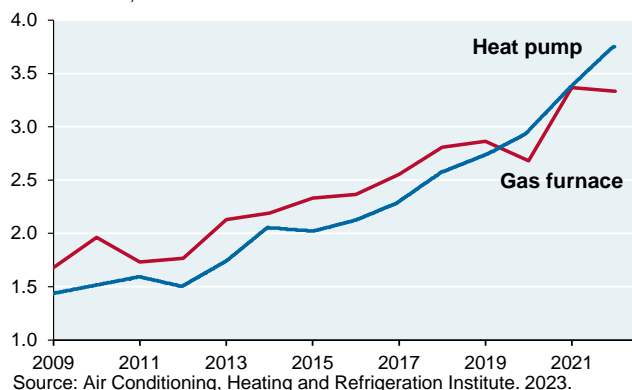
When certain news outlets reported that “the government is coming for your gas stoves”, MSNBC hosts summarily dismissed the idea. Oops; while no city or state will force people to get rid of existing gas stoves, **a natural gas ban was passed in New York State for new buildings⁴, and Los Angeles passed a similar law⁵**. New York’s law will effectively ban gas-powered stoves, furnaces and propane heating in most new homes and buildings less than seven stories as early as 2026, and in taller buildings by 2029. **Let’s avoid the semantics; those news reports correctly anticipated government intervention in home heating and cooking decisions⁶**.

Your hosts could have discussed improvements in heat pumps and induction stoves and how they contribute to decarbonization⁷. Or, they could have discussed Federal and state subsidies for homeowners that purchase them (see box). Or, they could have mentioned how heat pumps are already overtaking gas furnaces in the US. Or, they could have discussed the economics of electric heat pumps: they’re more efficient, but electricity costs a lot more than natural gas; the incentives to switch are greater if you use fuel oil or propane instead. If they wanted to dig deeper, they could have discussed possible strains on the grid from simultaneous electrification of commercial/residential energy use and transportation. Finally, they could have discussed a Court of Appeals decision to strike down a gas ban in Berkeley California, or the 20 states whose legislatures have passed “pre-emption laws” which prohibit cities from banning fuels for heating homes and buildings.

Instead, MSNBC hosts told viewers that the premise itself was just culture war material⁸. But it’s more than that, and your hosts missed an opportunity to discuss real-world costs and benefits of changing climate policies. Note to Rachel: this is why I don’t watch these shows with you. They are for entertainment purposes only.

US heat pump sales exceed gas furnace sales

Annual sales, millions

**Federal subsidies**

The High-Efficiency Electric Home Rebate Program covers up to 100% of project costs (up to \$14,000) for low-income households and 50% of project costs for moderate-income households. This includes purchase, installation and labor costs for heat pump driven HVAC, water heaters and dryers, and electric stoves. Households that are not eligible for this rebate can still receive a \$2,000 tax credit for qualifying stoves, water heaters, heat pumps etc.

New York State subsidies

NYSERDA offers rebates for installation costs for qualifying heat pumps, water heaters and other appliances

⁴ Fiscal Year 2024 New York State Executive Budget Bill No. A03006

⁵ Los Angeles requires new residential and commercial buildings to be built all-electric starting on or before January 1st, 2023, with exceptions for commercial cooking

⁶ Denver, San Francisco and Seattle have enacted bans on natural gas for home heating in new construction starting in specified future years but will still allow gas stoves; in December 2021, NYC banned both

⁷ Our 2023 energy paper illustrated improved heat pump efficiency vs gas boilers; see page 9

⁸ **Stephanie Ruhle**: “You might think that the US government is coming for your gas stove. That is a new, and absolutely ridiculous one”; **Joe Scarborough**: “Everyone talking about gas stoves. The sheer stupidity of it... they keep getting dumber and dumber”; **Medhi Hasan**: “The right-wing freak over the use of gas stoves out is maybe the latest in a long series of made-up culture war battles designed to enrage and rile up their right wing and paranoid base”; **John Heilemann**: “The Republican party has become addicted to this culture of lies and conspiracy theories that they have fermented. They know that there is a substantial number of people in their party that they can convince that this is true”; **Chris Hayes**: “The right-wing freakout over war on gas stoves”

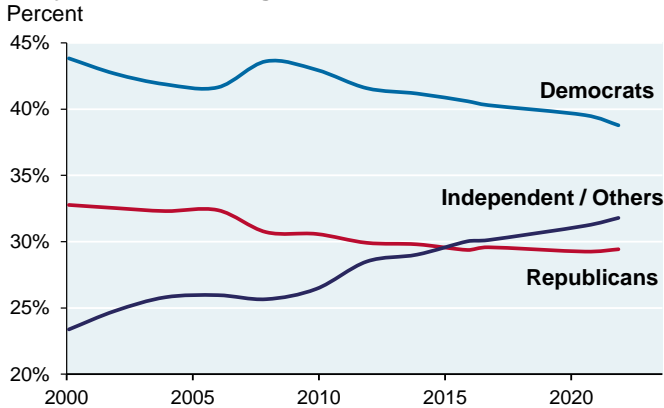


To: The No Labels movement

Re: Your “insurance policy bipartisan unity ticket” for the 2024 Presidential election

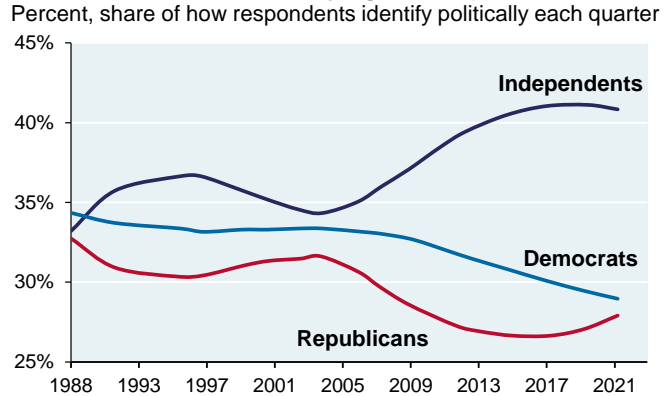
Your plan, as explained to me: after the Super Tuesday primaries, if state-by-state polls indicate “unpopularity” of both likely nominees and if polls show that a No Labels “unity ticket” could win the general election with 270+ electoral votes, you would seek ballot access across the country. I understand the temptation to field an alternative ticket; major party affiliation is on the decline and more Americans are declaring as independent.

Party affiliations of registered voters since 2000



Source: Ballot Access News, Ballotpedia, JPMAM. October 2022.

More Americans are identifying as independent

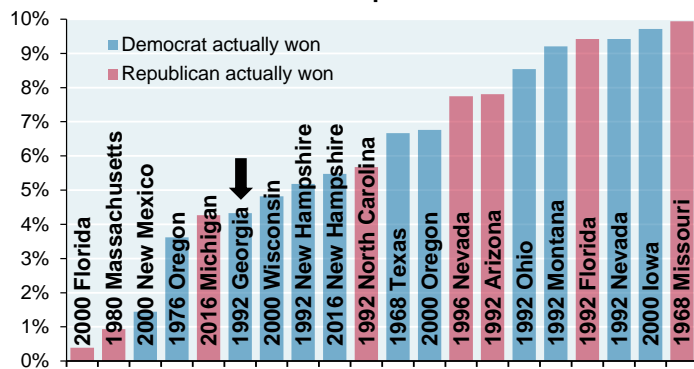


Source: FiveThirtyEight, Gallup. Q1 2021.

But determinants of “unpopularity” and assessments of whether a unity ticket could win are subjective and not as formulaic as they’re implied to be, and history shows that third party and Independent candidates can change state outcomes in close races. The first chart shows how many third party/Independent votes could have changed the outcome in each state if switched to the second place candidate. For example: in 1992, if just ~4.5% of Perot voters in Georgia had voted for Bush instead, Clinton would not have won the state.

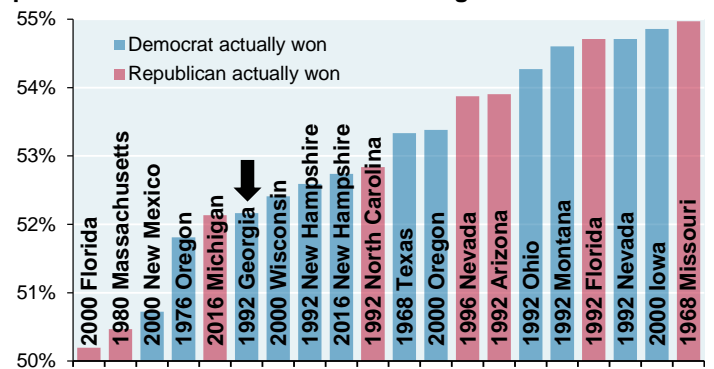
The chart on the right expresses the same concept a little differently: in 1992, had Perot not run, Bush would only have needed ~52% of Perot voters to win Georgia assuming that the remainder of Perot voters went to Clinton. The chart shows all cases since 1950 when anything closer than a 55/45 split of third party/Independent votes could have changed the outcome in that state. To be clear, for the latter chart we assume that third party voters would still vote for a major party candidate if their candidate wasn’t running, which may not be the case since some of them stay home instead; but the underlying point is the same.

Share of third party/independent votes to change state outcome if switched to second place candidate



Source: American Presidency Project, JPMAM calculations. 2023

Allocation of all third party/independent votes to second place candidate that would have changed state outcome



Source: American Presidency Project, JPMAM calculations. 2023



Now let’s assume that a unity ticket wins enough electoral votes to prevent any party from reaching 270. In that case, a **12th Amendment Contingent Election would be held under which each state delegation to the House would get one vote**. Currently, there are 26 House delegations controlled by the GOP, 21 by Democrats and 3 ties⁹. A Contingent Election would be based on the composition of the new 2024 House and not the current one; if the 2022 composition remains in 2024, the GOP would effectively control the outcome.

Bottom line: a unity ticket could win; or, your movement might have to exercise extreme discipline and not run a unity slate, despite all the time, effort and money your supporters invest; or you might decide to move ahead in an environment of extreme uncertainty, with all sorts of potential unanticipated electoral outcomes.

What does academic research say about third party candidate impacts? It’s a mixed bag

Analyses of third party impacts typically account for: (a) had third party candidates not run, how would their votes been split between major party candidates; and (b) how many third party voters wouldn’t have voted if their candidate did not run.

An example from 2016: in the states that determined Trump's victory (MI, WI, PA), the combined vote share of Johnson and Stein exceeded Clinton's deficit by 2-3%. But: most Johnson/Stein voters would not have voted if they hadn't appeared on the ballot and of the rest, a) 60% of Johnson voters would have voted for Trump and b) 75%-80% of Stein's voters would have voted for Clinton. If both Johnson and Stein had not run, the outcome of the 2016 election would be unchanged. If only Stein had not run, Clinton might have won Michigan but still lost the general election. This highlights the potential for a third party candidate in a single state to change the outcome in a very close election [Devine and Kopko, 2021]

Other analyses found that Perot did impair Bush’s re-election in 1992; and in 2000, if both Nader and Buchanan had not run, Gore would have won Florida and the Presidency based on modeled distributions of their voters [Herron and Lewis, 2006].

Highest vote shares for third party/Independent candidates in US Presidential elections

| Johnson 2016 | Nader 2000 | Perot 1996 | Perot 1992 | Anderson 1980 | Wallace 1968 | Thurmond 1948 |
|-----------------|---------------|---------------|---------------|------------------|-----------------|------------------|
| 9% NM | 10% AK | 14% ME | 30% ME | 15% MA | 66% AL | 87% MS |
| 6% ND | 7% VT | 14% MT | 28% AK | 15% VT | 63% MS | 80% AL |
| 6% AK | 6% MA | 13% ID | 27% UT | 14% RI | 48% LA | 72% SC |
| 6% OK | 6% RI | 12% WY | 27% ID | 13% NH | 43% GA | 49% LA |
| 6% MT | 6% MT | 12% ND | 27% KS | 12% CT | 39% AR | 20% GA |

Source: American Presidency Project, JPMAM calculations. 2023

⁹ In a 12th Amendment Contingent Election, states with legislative deadlock would abstain from voting unless their votes were needed to determine a winner, in which case they would keep voting until the deadlock ended. In 1800, **36 rounds of House voting** were needed before Federalists in Maryland and Vermont abandoned Aaron Burr, breaking ties in those states in favor of Thomas Jefferson.



Some good news on the Presidential election process: Electoral Count Act reforms. In the final days of 2022, reforms were passed regarding the Electoral Count Act of 1887 (ECA). In 2020, a lot of unsupported assertions were made about the powers of the Vice President at the January 6 Joint Session, and about other aspects of the ECA. Congress has now clarified via these reforms that:

- The role of the Vice President is a purely ceremonial one (“ministerial” is the word used)
- Congress must defer to the electoral slates as determined by the states, or by a state of federal court that orders a change to the state’s results before the electors meet
- 20% of both the House and Senate must agree to object to a state’s slate of electors rather than just one House member and one Senate member, after which the slate would be evaluated by Congress
- The executive of each state sends its slate of electors to Congress. In this context, “executive” is usually a governor unless state law explicitly identifies another officer such as the secretary of state. Also, the slate must include a “security feature” on the certificate of ascertainment to prevent unsubstantiated competing slates from being sent
- “Safe harbor status” was eliminated, effectively extending it to all officially submitted slates, reducing the potential for challenges and debates during the joint session of Congress
- Electors must be appointed in accordance with state laws present prior to election day

Even in the unlikely event that the Supreme Court accepts the premise of the independent state legislature theory (in *Moore v. Harper*, 2023), the ECA reforms would effectively require Congress to disregard any actions taken by state legislatures to ignore the results of the popular vote should they reverse the outcome of the presidential election in violation of state law.

Some uncertainties do remain. Presidential candidates can sue to compel state executives to transmit a certificate appointing electors, opening the door to litigation heard before a three-judge panel. Furthermore, reforms still do not clarify what “**regularly given electoral votes**” means in the original ECA, an issue that could arise if electoral votes were cast for someone that died before the joint session, for someone disqualified from holding office under Section 3 of the 14th Amendment (for engaging in insurrection), or due to “faithless” electors who don’t vote for the candidate they were originally bound to.

Special thanks to Michael Morley (Sheila M. McDevitt Professor of Law at FSU College of Law) for his insights. Michael is a specialist on election law, constitutional law and the federal courts, and author of “Election Emergencies” in the forthcoming Oxford Handbook of American Election Law



To: The FHFA, the Urban Institute and the National Housing Conference

Re: Your comments on the new GSE fees, and the shortage of affordable homes

You recently wrote that some reactions to the new GSE fees were wrong and misinformed¹⁰. As a reminder, borrowers with GSE-eligible mortgages pay an upfront loan level price adjustment (LLPA) that reflects loan to value and borrower credit risk, plus an annual guarantee fee of ~45-50 basis points. As you indicate, lower credit score borrowers *always* pay higher LLPAs, regardless of their loan to value (see grid). However, your recent articles don't tell the full story on the fee and subsidy landscape, and there are three reasons why.

First: the latest LLPA fee changes did increase the progressiveness of the pricing grid. LLPA fees for lower credit score borrowers generally went down and LLPA fees for higher credit score borrowers generally went up. This is clear when looking at Freddie Mac's color-coded grid on LLPAs for purchase mortgages; the same trend is also evident in the mortgage refinancing grid. Clifford Rossi at the University of Maryland came to the same conclusion in a recent note for Housing Wire and in his Congressional testimony, noting that prior fees rose roughly at the same pace as historical losses on such loans while the new fees do not¹¹.

Freddie Mac: Base grid fee for purchase mortgages

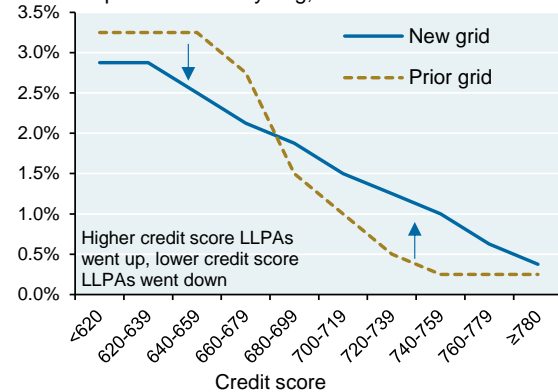
Arrows and colors represent direction of most recent change in loan level price adjustment (LLPA)

| Credit Score | LTV Ratios | | | | | | | | |
|--------------|------------|---------|----------|----------|----------|----------|----------|----------|----------|
| | ≤30% | 30%-60% | 60%-70% | 70%-75% | 75%-80% | 80%-85% | 85%-90% | 90%-95% | >95% |
| ≥780 | .000% | .000% | .000% ↓ | .000% ↓ | .375% ↓ | .375% ↑ | .250% | .250% | .125% ↓ |
| 760-780 | .000% | .000% | .000% ↓ | .250% | .625% ↑ | .625% ↑ | .500% ↑ | .500% ↑ | .250% ↓ |
| 740-760 | .000% | .000% | .125% ↓ | .375% ↑ | .875% ↑ | 1.000% ↑ | .750% ↑ | .625% ↑ | .500% ↓ |
| 720-740 | .000% | .000% | .250% | .750% ↑ | 1.250% ↑ | 1.250% ↑ | 1.000% ↑ | .875% ↑ | .750% ↓ |
| 700-720 | .000% | .000% | .375% ↓ | .875% ↓ | 1.375% ↑ | 1.500% ↑ | 1.250% ↑ | 1.125% ↑ | .875% ↓ |
| 680-700 | .000% | .000% | .625% ↑ | 1.125% | 1.750% | 1.875% ↑ | 1.500% ↑ | 1.375% ↑ | 1.125% ↓ |
| 660-680 | .000% | .000% | .750% ↓ | 1.375% ↓ | 1.875% ↓ | 2.125% ↓ | 1.750% ↓ | 1.625% ↓ | 1.250% ↓ |
| 640-660 | .000% ↓ | .000% ↓ | 1.125% ↓ | 1.500% ↓ | 2.250% ↓ | 2.500% ↓ | 2.000% ↓ | 1.875% ↓ | 1.500% ↓ |
| <640 | .000% ↓ | .000% ↓ | 1.500% | 2.125% ↓ | 2.750% ↓ | 2.875% ↓ | 2.625% ↓ | 2.250% ↓ | 1.750% ↓ |

Source: Freddie Mac. February 2023.

FHFA argues that prior fees were not calibrated to properly reflect borrower risks, and that recent changes moved in that direction. Perhaps; but this can't be independently verified since FHFA doesn't disclose enough information. According to former FHFA Director Demarco (an Obama appointee), **the GSEs earn above-target returns on some loan exposures and use those profits to subsidize generally riskier loans.** DeMarco argues that if the goal is subsidizing higher risk borrowers, there are more efficient and transparent means of doing so than LLPA pricing grid subsidies, such as down-payment assistance or credit repair. DeMarco believes that proper risk-based pricing has to be the basis for an eventual departure from GSE conservatorship¹².

Example of increased cross-subsidy: credit scores
LLPA for purchase money mtg, 80%-85% LTVs



Source: Fannie Mae. 2023.

¹⁰ "Setting the Record Straight on Mortgage Pricing: A Statement from FHFA Director Sandra L. Thompson FHFA", April 25 2023; "No, Fannie Mae and Freddie Mac Aren't Penalizing People with Good Credit to Help People with Bad Credit", Jim Parrott, Urban Institute, April 25 2023; and "Much Ado About Nothing – No one is paying more for a higher down payment or a better credit score", David Dworkin, National Housing Conference, April 27 2023

¹¹ Clifford Rossi at the University of Maryland has held senior risk management positions at Fannie Mae and Freddie Mac, and started his career at the Office of Thrift Supervision

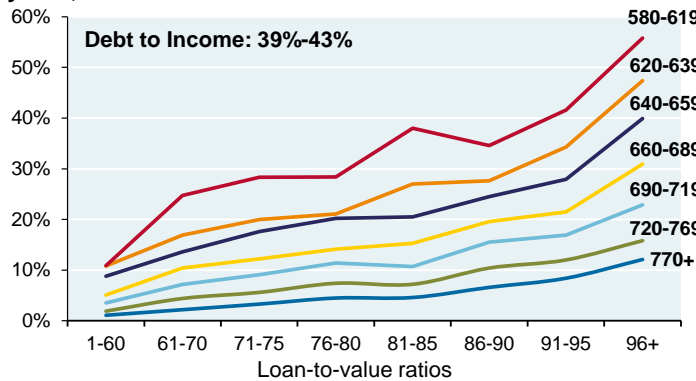
¹² Edward DeMarco testimony at the House Committee on Financial Services, May 17, 2023



Second: LLPA fees actually decline as loan to values rise above 80%. You argue that this makes sense since these borrowers purchase private mortgage insurance (PMI) as well as GSE insurance. I'm not so sure:

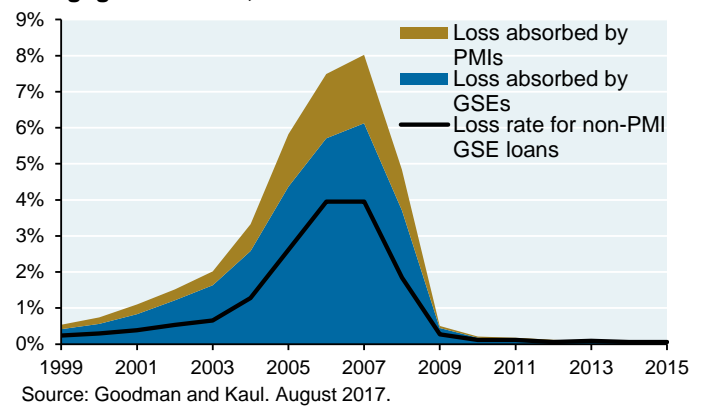
- The average LTV of all loans insured with PMI is ~92%, so let's use that as an example. For a 92% LTV loan, the private insurer MGIC covers the first 30% of losses (25% if it's a HomeReady Loan). As a result, GSE loss exposure on this loan would be lower than on an 80% LTV loan without any private mortgage insurance
- Since the GSE is "second in line" when losses occur on a loan with PMI, the severity of loss is often lower than when there's no PMI. Over several vintage years, the severity of GSE loss on defaulted loans with PMI has been 10%-15% lower than on loans without PMI. I agree with you on that part
- **However: the incidence of default on higher LTV loans is much higher as LTVs rise¹³.** This is illustrated in the first chart which uses 2006-2007 underwriting vintages
- So, what really matters is **realized losses**, which is the product of lower loss severity on loans with PMI and the higher incidence of default on such loans. We already know the answer to this: "even after PMI recovery, the loss rate experienced by the GSEs for loans with PMI is still higher than the loss rate for loans without PMI. Although PMI recovery reduces portfolio-level losses for the GSEs, the reduction is not large enough to overcome the lower LTV ratios of non-PMI GSE loans"¹⁴. That's the second chart below
- **Bottom line: the history of realized GSE losses does not support FHFA's assertion that GSE pricing can be lower for high LTV loans simply due to the presence of private mortgage insurance**
- One more thing: private mortgage insurers have failed in the past. Examples include PMI, Triad and Republic after 2008. That wasn't the first time; only half of the private mortgage insurers in business at the beginning of the 1980s were still in business by the end of the decade¹⁵

Default rates by credit score and LTV, 2006-2007 vintage years, Percent



Source: FHFA Mortgage Risk Analysis. 2023.

Realized losses for loans with and without private mortgage insurance, Percent



Source: Goodman and Kaul. August 2017.

¹³ The chart is derived from FHFA's mortgage risk analysis and shows the increase in default rates by credit score for debt to income ratios of 39%-43%. This trend is similar for other debt to income ratios as well. We have created charts for all debt to income ratios, and which are available upon request. Why do we use the 2006-2007 vintage year? The subsequent period of financial repression and negative real 10-year Treasury rates is a less sensible basis for pricing GSE insurance

¹⁴ "Sixty years of private mortgage insurance in the United States", Goodman and Kaul, August 2017

¹⁵ "Private Mortgage Insurance", Canner, Passmore and Mittal, 1994 Federal Reserve Bulletin



Third: you mention that recent LLPA fee increases are designed to recapitalize the GSEs since they're still undercapitalized. That's notable since the public sector sometimes argues the opposite¹⁶. However, you fail to mention the **FHFA expansion in fee waivers since 2020 that reduce GSE capital**¹⁷:

- In 2020, fee breaks were mostly provided to “HomeReady Loans” (less than 80% of area median income); for these loans, fees were capped at 1.5% and waived for borrowers with credit scores > 680. Since 2020, fee waivers have been expanded to all HomeReady Loans irrespective of credit score
- Fee waivers are now also provided to any first-time borrower whose income is less than 100% of area median income (120% for high-cost areas)
- FHFA now allows for six months of mortgage payment hardship waivers which are repaid without interest, even though the GSEs must make timely interest and principal payments to mortgage investors

Summing up. Some criticisms of GSE fee changes were off-base. That said, your responses excluded critical information on expanding fee waivers and also exaggerated the loss mitigation benefits of private mortgage insurance on high LTV loans. While broadening FHFA subsidies aren't as extreme as policy shifts leading up to the financial crisis, the relaxation in GSE lending standards is clear to anyone willing to analyze it.

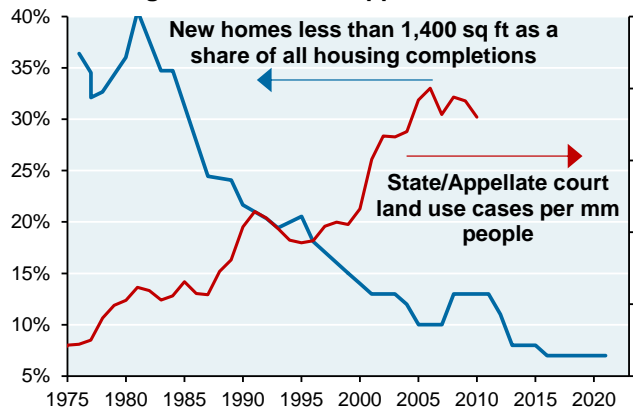
What to do about the lack of affordable homes? If the goal is increased home ownership that's durable (unlike the last unsustainable policy-driven surge), it might be better to focus on what Yale's Robert Ellickson describes as the most consequential regulatory programs of all: **large-lot zoning and restrictions on multi-family housing.** Small homes less than 1,400 square feet have collapsed from 35% of housing completions to just 7% as minimum lot sizes, community litigation and regulatory costs¹⁸ crowd out the economic rationale for building smaller homes. **More housing supply is a better solution to high home prices than more subsidies.**

Examples of local zoning restrictions which constrain housing supply

- Public hearing requirements for multifamily buildings and family occupancy requirements
- Minimum lot sizes, minimum parking requirements, maximum building height, maximum lot coverage, maximum floor to area ratio, minimum unit sizes

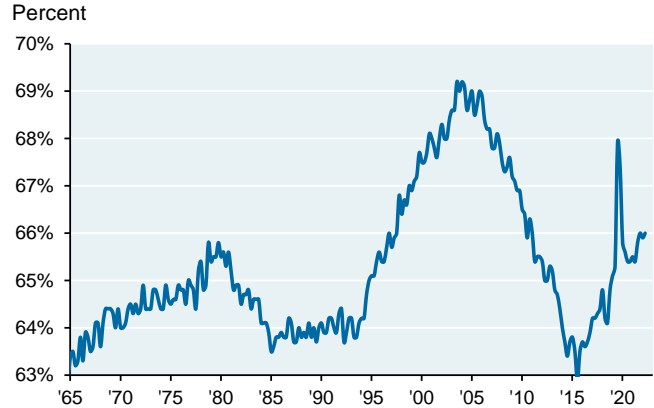
From “Zoning By a Thousand Cuts”, Sara Bronin (Cornell Law) in the Pepperdine Law Review, 2023

Land use regulation & the disappearance of small homes



Source: Census Bureau, Ganong and Schaugh (Harvard), 2021.

US home ownership rate



Source: US Census Bureau, Q1 2023.

¹⁶ In 2002, Joseph Stiglitz and Peter Orszag (OMB) sided with HUD and Congress that GSEs were adequately capitalized at just 0.45%. They estimated the probability of GSE loss at “substantially less than one in 500,000 - and maybe smaller than one in three million”, and estimated the cost to the gov't of guaranteeing \$1 trillion of mortgages at just \$2 million. Source: “Implications of the New Fannie Mae and Freddie Mac Risk-based Capital Standard”, Stiglitz and Orszag, March 2002

¹⁷ “Fannie Mae waives loan level price adjustments for specified loans”, Tenaco.com, November 16, 2022

¹⁸ “Regulatory costs add \$93,870 to New Home Prices”, NAHB, May 2021



To: Jeep

Re: Your new hybrid Jeep Wrangler 4xe

I loved my 2-door 2012 our Jeep Wrangler as much as anyone can love an inanimate object. But when it was time to trade it in for a new one last year, I bought the 4-door plug-in hybrid Jeep Wrangler 4xe (PHEV) instead of the internal combustion engine (ICE) Jeep, or the Ford F-150 Lightning battery electric vehicle (BEV).

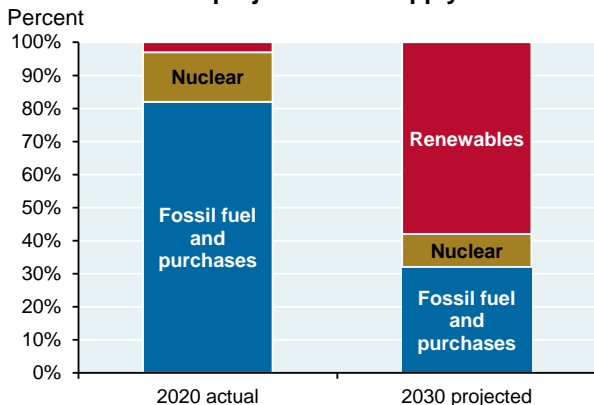
Most of my Jeep trips are less than 21 miles, which is the distance the Jeep 4xe can travel on the battery alone. The Long Island Power Authority LIPA¹⁹ reports its electricity mix as 82% fossil fuels with only 3% renewables, but plans for 58% renewables by 2030. As a longtime LIPA customer, I will believe it when I see it. If that goal were reached, the Jeep 4xe would eventually be less of a CO₂ hog; right now, it's got roughly the same carbon footprint as the ICE Jeep in my area as shown in the second chart. I added Seattle to the chart for context since its grid is one of the greenest in the US (80%-90% hydro/wind), and added the Ford F-150 BEV as well.

Anyway, that's not why I'm writing. A more immediate concern is that I've had a bumpy ride with the Jeep Wrangler 4xe so far:

- Recall #1: Loss of Motor Power, which was a software issue
- Recall #2: Thermostat gasket failure, leading to coolant leakage
- Heater for electric battery failed, preventing car from starting, part was on backorder

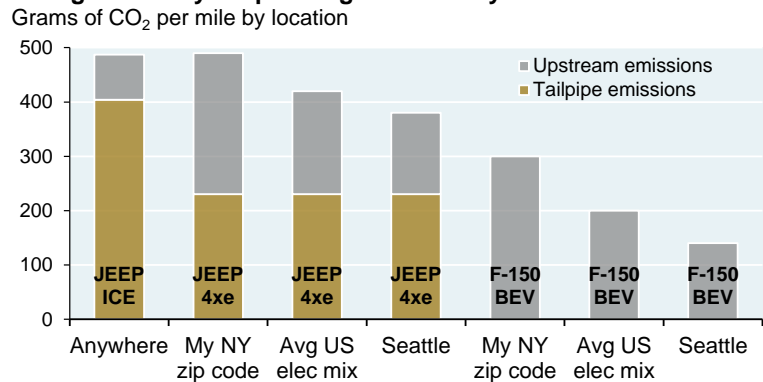
While the Jeep was in the shop, I called the dealer every few days to see if the back-ordered battery heater had arrived (a lot of them are having issues, as per the dealer). A replacement car didn't do me any good since I use the Jeep with a hitch to tow large objects, and the dealer did not have a pickup-truck or any other car with a hitch. I'm a big fan of plug-in hybrids since I don't have access to a wall charger in NYC, and given the potential for PHEVs to reduce CO₂ emissions²⁰...but they have to stay out of the shop.

LIPA current and projected fuel supply mix



Source: Long Island Power Authority. June 2021.

How green is my Jeep Wrangler 4 door hybrid 4xe?



Source: EPA fuel economy models, JPMAM. 2023.

¹⁹ When I typed "LIPA Electricity Mix" into Google, I got links to a **Dua Lipa** song called "Electricity MK Remix". I then refined my search to find the LIPA I was looking for

²⁰ **In the EU, plug-in hybrids will lose their "low-CO₂" status and tax incentives in 2025 after evidence showed that drivers charge them much less frequently than assumed.** The EU initially estimated that ~70% of PHEV miles would be driven on the electric motor, but found that privately owned PHEVs emit 3x more CO₂ than levels recorded in official tests. For company cars, results were even worse with only 10%-15% of miles driven on the electric motor. But if PHEVs are charged regularly, they can reduce CO₂ emissions by 2/3 vs gasoline cars compared to a 75%-80% reduction for battery electric vehicles (assuming national average US grid composition).

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