

“A [Russian] military victory in Ukraine now will be indistinguishable from defeat.”

Holman Jenkins

“Russia is a gas station masquerading as a country. It's kleptocracy. It's corruption. It's a nation that's really only dependent upon oil and gas for their economy.”

John McCain



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May you live in interesting times is a Chinese trope that is also a curse. Given recent events across the pond that saying couldn't be truer due to the result of Russian aggression and the backward move to a cold-war era. News reports about the Russian leader's mental condition may be accurate but I confess that my deepest hope is that the carnage is the result of one man's miscalculations on many different levels. If so, then possibly the economic sanctions will work in turning back the tide. But I'm not sure how realistic is my expectation. You don't defeat an armed enemy with paper swords. It takes military strength or the threat of such.

One thing the Ukrainian conflict has done is highlight to the world that dreams about energy choices have consequences and present sovereign risks that should and can be avoided, but those sorts of suggestions are

Western States Playbook

CAISO EDAM Update: [Informational call](#) on Mar. 18, 9:00 a.m. - 11 a.m. PDT, to provide an update on the progress of the EDAM stakeholder working group activities.

EPSA Competitive Power Summit: Tuesday, March 29, at the National Press Club, 529 14th St NW, Washington, DC. From 8:35 a.m. to 4:30 p.m. To register and pay online click [here](#).

WPTF on LinkedIn: Follow the group on LinkedIn by clicking [here](#).

never heeded. I suppose that was also the case during the Oil Embargo of the early 1970's. Consequently, we have seen military conflicts over oil flows, and now natural gas produced in Russia and shipped via pipeline to Western Europe. The corrective actions needed for energy are rarely, if ever, acted upon by energy-consuming countries unless a crisis arises. It is only then that the vulnerability of a population and its economy becomes a focal point.

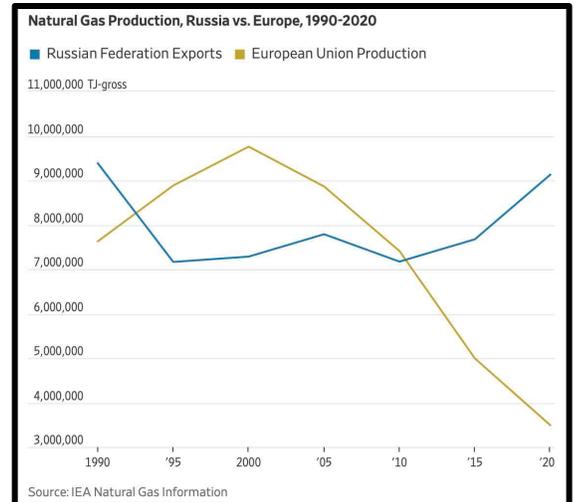
So here is the question ... How should international crises in energy production, delivery, and consumption be addressed? Second question ... Over what time horizon can energy choices be made? Alternatives do not occur within weeks or months but over many years. For example, technological advancements in oil exploration and production turned the U.S. in the 1990s and early part of this century from an oil and gas importer to exporter ... and sadly we are once again an importer, at least with respect to

crude oil. Energy markets rather than political leadership make those things happen. Therefore, the world will remain stuck between economic rational choices and geopolitical reactions to protect energy security. I think the right balance, if such exists, is a figment of writers' imaginations; discussion points for academic lectures; and column inches for Op-Ed pages. Yes, a bit pessimistic but it comes with age.

Diversity of energy supplies seems like the best option. That is, don't put all your resources or even most of one's selections in one basket. That is a mild panacea, but the best one can do. It brings to the fore the wisdom of 100% clean energy for electricity, or 100% EVs for trucks and cars. For a taste of what is ahead in Germany and very likely someday in California, the [WSJ](#) ran an [editorial last Monday](#) entitled, "Germany's Climate Left Gets Serious". The current ruling coalition that includes Germany's Green Party has difficult decisions about backing off from lofty national energy goals. The opinion reported that Germany's Vice Chancellor for Economy and Climate suggested: "[The effort to wean Germany off Russia ... includes extending coal-fired](#)

power past the desired 2030 cutoff, and perhaps extending the lives of Germany's three remaining nuclear power plants, which are due to shut down this year." Long have I waited to read words such as those from the country that thumbed its nose at energy prudence. Long have I to go until a political leader in California has the guts to do the same. Thus, in Germany all options are on the table including committing to a new LNG import terminal that will take many years to build ... not much help given the current situation. The editorial further explained: "The nuclear plants are in advanced preparation for shutdown and may not be able to return to extended service immediately. Nor is it possible for coal to replace all of the natural-gas imports Germany could lose from Russia ... German dependence on Russia didn't develop overnight, and neither will its new energy independence." Bold move on the part of Germany's environmental leaders, and per the [WSJ](#), "It's a lesson the British and North American left could stand to learn."

The next day, on Tuesday of this week, the [WSJ](#) editorial board wrote this piece entitled, "A Lesson in Energy Masochism." As the title suggests, Europe's woes with respect to energy supplies are their own (un)doing. Natural gas production in European countries (both onshore and offshore) could have been extended using fracking techniques but the fashionable liberal leanings raised a stink about it. The result was greater imports of Russian natural gas as the plot on the right from the Op-Ed clearly shows.



Is there a parallel between Europe's current dilemma and California? Yes. Clearly. The evisceration of natural gas as the preferred fuel for electricity production, space and water heating, and industrial processes will take the Golden State to its knees if enacted. I don't believe

these policies will weather the public outcry. People will get a hint of the costs to eliminate natural gas and suddenly the political landscape will change. Politicians will adopt a conciliatory policy that allows for natural gas and clean energy. As to how the back-peddling will occur is anyone's guess, though one example is that natural gas has been deemed clean if the generation is "cleaner" than predecessor technologies. Quite frankly, it's hard for me to imagine irrational justifications for a new paradigm, but it will happen.

- What we believe...**
1. Competition yields lower electricity rates.
 2. Stable and transparent rules and regulations promote private investment.
 3. Private investors, rather than utilities, will spend money on new power plants and transmission facilities if they can earn a return that is balanced with the risks.
 4. Private sector investment results in lower average prices without risking consumers' money.

Turning our attention on the European fracking opportunity foregone to a different [WSJ](#) author, Holman Jenkins has written some outstanding pieces in his Op-Ed column but based on the number of Burrito readers who sent me his [column that last week entitled, "Should We Grow Up About Energy?"](#), the message hit home in a big way. The thrust of Jenkin's condemnation is that popular virtue signaling about a clean energy future has been misleading, and panders to ignorance instead of responsibility. The mainstream media just

laps it up and regurgitates the same over-simplified story. He said, "Unfortunately, some scientists, like many journalists, pretend to be inquirers into reality when they are really advertising their affiliation with their chosen virtue movements."

Jenkins wrote about the fracking fracas: "In the Eastern U.S., fracking took off because most land and the accompanying mineral rights are privately held. Homeowners and farmers directly profited from drilling. In

Europe, mineral rights are controlled by the state, leaving local interests no incentive to go along or put up with costs and inconveniences." I had never considered that explanation. I think it makes sense.

One of Jenkin's conclusions at the end of his essay that I wholeheartedly agree with is: "Give the public a choice between believing climate change is the end of the world or a crock, they will choose crock. Even more so if choosing 'end of the world' also means volunteering to surrender their standard of living." That's basic human decision-making. A story oft told and soon forgotten.

Since I am in high-bitch mode, I feel compelled to share one more energy item from the [WSJ](#) because lately the publication has been killing it with top-notch coverage on widely misunderstood topics about new-age electricity grids. The topic is battery storage breakthroughs that have produced only evolutionary improvements rather than revolutionary advancements. I have often thought the battery story has been vastly overplayed because at-risk capital, about \$18 billion, has flowed in that direction. The notion is that people with money on the line never make mistakes in picking winners. I say money flows where there is potential upside but that doesn't guarantee a happy outcome. Fund managers don't want to be left out if there is a stampede towards or away from a certain technology. [The article by technology guru Christopher Mims](#) is entitled, "Why All Those EV-Battery 'Breakthroughs' You Hear About Aren't Breaking Through." Do tell.

Mims wrote: "According to scientists, engineers, startup founders and analysts, the use of the word 'breakthrough' in the context of battery technology is misleading at best. Claims that the latest research finding or startup launch will bear fruit in the near future are almost always nonsense, they say." I concur. Star-eyed prognostications about the imminent decline in battery storage costs seem a bit ahead of itself. I mean, it might happen, but until there is a recognized breakthrough instead of imagining such then don't count on it. Plus, materials costs for storage components have been zooming skyward as of late. Thus, the battery storage revolution may or may not falter, but in either case there is nothing on the horizon bespeaking of a technological breakthrough. Mims also commented that the physics of storage is complex because, "At the molecular level, what goes on inside the average lithium-ion battery is a complex cascade of chemical reactions that—and this is the really tough part—unfold one way when the cell is charged, do the reverse when it is discharged, and must repeat the process countless times ... This process is never perfect, and is the primary reason the capacity of even the best batteries degrades over time." Now you know more than the average technology fund manager.



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Last week, the Texas Court of Appeals for the Fifth District (Dallas) ruled en banc, 12 to 1, that ERCOT does not enjoy sovereign immunity and the PUC of Texas does not maintain exclusive jurisdiction over disputes brought against it. In doing so, it reversed its 2018 decision to the contrary. This is a significant blow to ERCOT and disquieting to other ISOs. The ruling opens the way for Panda Power Funds, the plaintiff, to proceed with its claim that in 2011 and 2012 ERCOT knowingly misrepresented in reports and presentations that Texas had a "serious and long-term scarcity of power supply," inducing Panda to invest \$2.2 billion in new generation. ERCOT does not have a capacity market and, therefore, generators do not receive capacity payments. They make all their revenue in the energy market. After the Panda investments became operational, there was greater supply of energy and prices dropped very low. Thus, the investment has been uneconomic without a capacity revenue stream.

The Court found that although the PUCT authorized ERCOT, as a private, independent, membership-based nonprofit corporation, to serve as the independent system operator for Texas, ERCOT was not created or chartered by the state of Texas or any of its political subdivisions. The Court found no "legislative intent to vest ERCOT with the nature, purposes, or powers of an arm of the State government," and rejected ERCOT's argument that it has "the power to make binding law." The Court also rejected ERCOT's claim that it is entitled to derivative immunity for the regulatory functions it performs at the behest of the PUCT.

In determining that the PUCT does not have exclusive jurisdiction over ERCOT, the Court concluded ERCOT did not meet its burden to prove the Texas Legislature intended the regulatory process to be the exclusive means of remedying the problems Panda complains of. The Court ordered ERCOT to reimburse Panda for the costs of the appeal and remanded the case to the trial court.

Yet, the primary market for battery storage is the auto industry, not electricity grids. The latter will always adopt whatever the former embraces. That is the way the R&D efforts continue to roll. I would have thought that independent research on grid-level storage technologies and subsequent improvements in performance thereof would launch equally high-profile ventures.

One final item to discuss before we break for goodies. Last week, I wrote about the Stanford professor, Mark Jacobson, selling snake oil research regarding the ease at which 100% renewable energy can light the darkness in the U.S. and improve grid reliability. I was also correct that he was the lead researcher on an earlier such study in 2015. His research was questioned in the Proceedings of the National Academy of Sciences (PNAS) after the journal published an article which cast doubt on some of the conclusions in the 2015 paper Jacobson had written in PNAS. According to an online journal called [Retraction Watch](#)¹, Jacobson opted to sue his detractors for \$10 million from each of the two parties, plus punitive damages.

But the saga continued. Jacobson withdrew his complaint in 2018 and his demand for a retraction, but the PNAS and the journal's author filed a counter suit demanding that its legal fees be paid by Jacobson. Per

[Retraction Watch](#): "Those fees weren't trivial: As we reported last July, the plaintiffs in the anti-SLAPP case told the court they'd spent more than \$600,000 defending themselves against Jacobson's initial complaint — \$535,900 for PNAS, and \$75,000 for [the author] Clack." Well done, I thought.

What we believe... (cont.)

5. However, when IOUs do the investing, the risks to them are minimal or non-existent because ratepayers cover all of the costs.
- 6) Overcapacity lowers electricity spot market prices; yet retail rates can increase in this case due to full cost-of-service regulation.
- 7) Markets work best when there are many buyers and sellers.
- 8) At-risk money will be put to investment where markets exist that are well regulated and yield credible prices.

The Superior Court of D.C. ordered that, "Jacobson ... pay Clack \$75,000 ... and the judge also said that at least one of Jacobson's claims about the fees bordered 'on the frivolous and is in no way persuasive.' Ten days later, [the judge] granted Jacobson's motion to allow his initial team of attorneys... to step down from the case after the scientist told them he wanted to represent himself — pro se, in legalese — in the matter. The following day Jacobson filed another motion, this one to vacate the judgement requiring him to pay Clack. Clack in turn filed a counter motion ... opposing that request — which Jacobson parried ... with a new motion asking the court to vacate its order that he reimburse his critic. That hasn't happened yet."

My academia has changed. You couldn't invent a crazier story.

Here's a better topic ... food. Chef [Laura Manz](#) is offering us her recipe for Chicken Kiev: "My foodie friends have been posting their Ukrainian culinary accomplishment as we witness unprecedented world events. A famed classic, Chicken Kiev, has been presented as our kitchen challenge. Chicken breasts wrapped around seasoned butter, fried then baked, yield a dramatic result."

Prepare a seasoned butter from ½ lb. (2 sticks) of softened unsalted butter, 1 Tbsp. of finely chopped fresh parsley, 1 Tbsp. of finely snipped fresh chives, 1 tsp. of (three cloves) minced garlic, ½ tsp. of salt and ¼ tsp. of freshly ground black pepper. Mix thoroughly, transfer to a piece of parchment paper and shape into an approximately 6" x 3" loaf. Refrigerate for at least 2 hours until firm.

Pat dry 8 boneless and skinless chicken breasts (about 3 lbs.). Remove the white tendon. Place each piece between sheets of plastic wrap and pound with a mallet until ¼" thick. Season with salt and pepper. Divide

¹ The mission of the Center for Scientific Integrity, the parent organization of Retraction Watch, is to promote transparency and integrity in science and scientific publishing, and to disseminate best practices and increase efficiency in science.

the chilled butter into 8 x 3"-long fingers. Arrange chicken in a diamond shape, tender side up. Place a finger of butter about 1/3 of the way up from the bottom tapered end. Bring the bottom end up over the butter, fold in the sides to cover the butter completely, and continue to roll up to completely enclose the butter.

In a shallow bowl, whisk together 2 large eggs with 2 tsp. of water. Spread 1/2 cup all-purpose flour on a separate plate. Add 2 cups of panko breadcrumbs on another plate. Coat the chicken packets in flour completely. Roll the packets in the egg mixture, then coat on all sides with breadcrumbs. Press the breadcrumbs into the chicken so they adhere. Cover the rolls loosely with plastic wrap and refrigerate for at least 1 hour and up to 8 hours.

In a very large skillet heat 1/2 cup vegetable oil. Arrange the tightly sealed rolls in the skillet and cook 2-3 minutes until browned. Turn carefully and brown the second side. Transfer rolls to a baking sheet and cook in a 350° oven for 15 minutes. Serve immediately.

Serve alongside broccoli and lemon halves that have been tossed in olive oil. Roast for about 20 minutes at 375° until tender. Remove and squeeze the lemon juice over the broccoli. Salt and pepper to taste.

Terrific idea for a food dish, Laura. Thanks. I am trying to remember if I ever made this dish, and I don't think I have. I imagine one could attempt using a fish fillet for the protein instead of chicken, but the cooking times would be much shorter. Intriguing idea.

Here is your roll-up for this week:

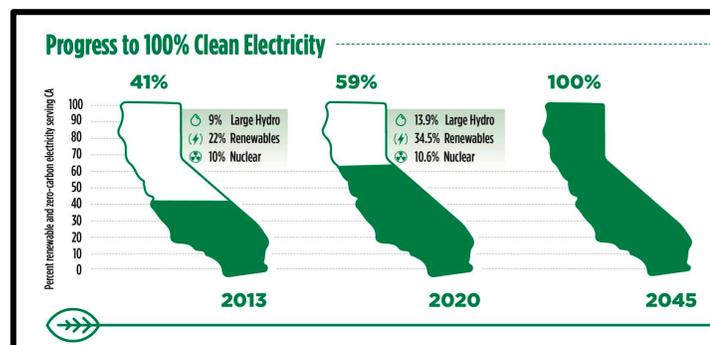
>>> Things in the People's Republic of California
@@@ CEC Issues Its 2021 Energy Almanac

>>> Shout Outs

>>> Odds & Ends (!_!)

>>> Things in the People's Republic of California
@@@ CEC Issues Its 2021 Energy Almanac

Last month, the California Energy Commission (CEC) issued its **Energy Almanac** for the previous year. I don't recall reviewing previous editions, but I was compelled to review this because I was curious what sorts of bragadocio might be included. What I saw was the epitome of a System Planning Coloring Book (SPCB) that



attaches a story to pictures. Well, if the CEC can do that, then so can I. Let's step through some of the more interesting story lines therein.

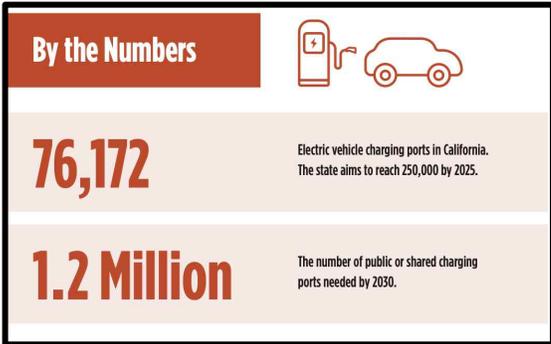
First, when I say SPCB, trust me that it is right on the money. The page-two depiction in the Almanac (left) explains how the state will go from its current clean-energy level of 59% to the vaulted goal of 100% twenty-five years from now... it simply fills in the entire state map with more green color! And look,

- ... and, what we should do:**
1. Believe in ourselves.
 2. Encourage creation of independent, multi-state regional transmission organizations that coordinate policies with respective state utility commissions.
 3. Support rules for resource adequacy that applies uniformly among all load-serving entities.
 4. Enforce competitive solicitations by utilities for purchasing either thermal or renewable power.

California will do that without nuclear power that is one-fifth of the clean energy total in 2020!!! That's how it is done. I've often thought so too. Fill 'er up.

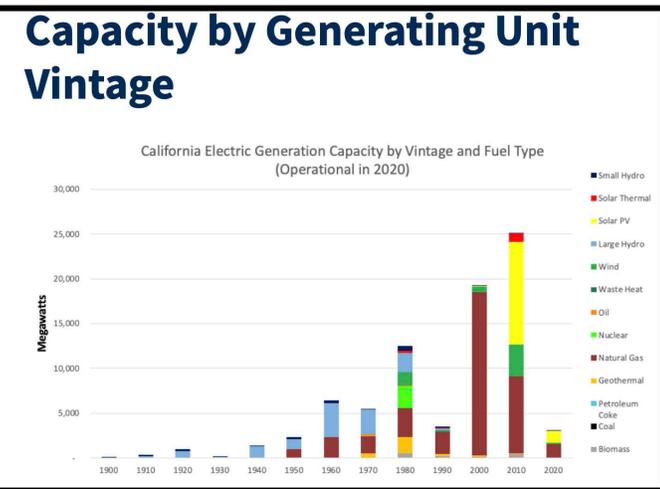
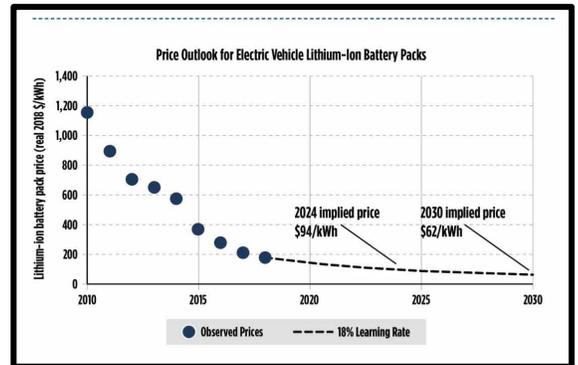
Despite my immature attempt at humor, I do give the CEC credit for identifying the actions taken by the CAISO, CPUC, and itself in terms of reaching the clean-energy mandate. The list to the right is accurate and alludes to the use of temporary generators with a plan to mitigate emissions. I could add at least one bullet item, but it wouldn't resonate with the taboo on carbon in 2045, unless, of course, it is renewable hydrogen used as a fuel for electricity generation. Or, I could add small modular reactors, but that would stir up an ado. But, hey, the list as is works for me and is the most realistic element of the report.

- Coordination with adjacent balancing authorities.
- Expanded demand response measures and financial incentives.
- Consumer education campaign through the Flex Alert program.
- Streamlined permitting and interconnection for clean energy projects.
- Accelerated deployment of new energy resources such as temporary generators, with a plan to track and mitigate any associated emissions.



The next item is clean-energy transportation. The chart to the left is startling because it acknowledges that the lift to get from the current EV charging ports to 250,000 in 2025, and then to 1.2 million in 2030 is possibly doable, but it begs the question who or what is going to pay for these investments? I guess it depends on who owns the charging ports. I suspect that a lot will be utility-owned and therefore the investment dollars will be rate-based and come from electricity customers. Their money will be used to service the debt and support the utility's equity. And then I wonder whether the electricity will be charged at a tariffed rate or given away for free? Turn on the rate-making juice.

Now, if there are all these electric vehicles populating the roads and charging at EV ports, and the additional electricity demanded will come from renewable resources, then of course battery storage becomes an essential part of the solution. What does the CEC foresee regarding battery storage costs? Look at the rosy prediction on the right. The cost-reduction miracle certainly belies **the article I reviewed above** from the WSJ about battery breakthroughs. An efficiency improvement of 8% per year is reasonable but given the recent rise in materials costs I think the unit battery storage costs will outpace the efficiency gains. And 18% per year cost reduction is pure nonsense. Well,



this is the agency that in 1990 predicted crude oil would be \$100/bbl. and set policies accordingly. It took a long time to see that forecast materialize and we also saw oil prices below \$30/bbl. for a spell. Remember? If you don't, then look at today's crude oil prices. Once again above the century mark. But I digress. The CEC prediction is bunk for lithium-ion battery prices, especially the forecast for 2030 at \$62/MWh.

Often the CEC reports have useful data even if their forecasting abilities are questionable and politically motivated. For example, the chart on the left is about the age of the generation fleet in 2020. Note that the majority of the natural gas units (brown), 18,225 MW, are twenty-years old, with a lesser amount over ten years old. Do the

math for 2045 and simply add 25 years to the 2020 metrics. Kind of ridiculous, right? The generation output by vintage showed much the same thing, but it is important to understand that over twice the amount of energy produced by vintage solar was produced by older natural gas plants. Those MWh must be replaced by the new renewables plus storage and especially so after Diablo Canyon retires in 2024/25. What's the plan? According to my colleague Steve Huntoon, there is no plan. Color me green with envy.

The last topic I want to cover using the CEC's rich data library is the Net Short renewables energy needed to reach the 33% Renewable Portfolio Standard (RPS) requirement that was required by 2020. The RPS goal for 2030 is 50%. The CEC website shows there is a net-short renewables situation for each forward year out to 2025. If the state hasn't achieved 33% energy sales by 2025, then how can it expect to reach 50% by 2030? A heroic achievement if it materializes.

The table on the right is for 2021 and based on my review of the later years, the net-short position declines a bit but never meets or exceeds the requirement ... not as a percent of energy sales. The RPS for 2021 is between 25% to 28.8% depending on which demand forecast is used. Hm. Where does the braggadocio come from now?

	2021 All Values in TWh	Formula	Low Demand Forecast Renewable Net Short	Mid Demand Forecast Renewable Net Short	High Demand Forecast Renewable Net Short
1	Statewide Retail Sales - CED 2016-2026 Adopted Forecast		261.9	272.9	281.6
2	Non RPS Deliveries (CDWR, WAPA, MWD, CCSF, etc.)		11.0	11.2	11.3
3	Retail Sales for RPS	3=1-2	250.9	261.7	270.3
4	Additional Achievable Energy Efficiency IOU CED 2016-2026 Adopted Forecast		15.3	13.3	10.2
5	Incremental Energy Efficiency POU IEPR 2015 S-2		0.3	0.2	0.1
6	Additional New Combined Heat and Power		8.4	3.8	-
7	Adjusted Statewide Retail Sales for RPS	7=3-4-5-6	227.0	244.4	260.0
8	Total Renewable Energy Needed For 33% RPS	8=7* 33%	74.9	80.6	85.8
Operational Renewable Generation					
9	Total In-State Renewable Generation (COD prior to 1/1/2015)		51.7	51.7	51.7
10	Total Out-of-State Renewable Generation (COD prior to 1/1/2015)		13.6	13.6	13.6
11	Total Operational Renewable Generation for CA RPS	11=9+10	65.4	65.4	65.4
12	Total RE Net Short to meet 33% RPS In 2021 (TWh)	12=8-11	9.6	15.3	20.4

California's energy scene is in good hands but not living up to the hype. It's a bit larger than life, and a wee bit beyond reality.

>>> Shout Outs

Congratulations to Community Power Alliance (CPA), the community choice aggregator (CCA) for Los Angeles County as being the newest Public General Member of WPTF. The WPTF contact there will be Ted Tardif, Sr. Portfolio Manager, Environmental Products & Compliance who can be reached at ttardif@cleanpoweralliance.org or (213) 440-0908.

Angie O'Conner is a long-time friend and former President of the Massachusetts DPU. She has been my eyes and ears about ongoing stuff in New England. She wrote: "I did have some comments as a former regulator about some of Ed Randolph's insights, and while it is very challenging to engage with stakeholders - you made some interesting suggestions about bringing stakeholders together with the assistance of a knowledgeable moderator and a tight attendee list that might be helpful in encouraging discussions.

"It certainly sounds like it should be a great idea, but from my experience - whoever is NOT invited there screams to the press, the legislature, Governor's office and whoever will listen about a lack of transparency, unduly discriminatory for environmental justice communities - which BTW there are 351 cities and towns in MA - over 200 have been determined EJ communities - including some of the most affluent in the state, but I digress. Maybe that's just in MA where no good deed goes unpunished as chief energy regulator for the state!"

It's a thankless job, girl. But you knew that. I'm glad Angie brought up the item. First, it was Ed's comment about the need for reality testing of CPUC Orders because only through engagement with the broader community can issues about implementation and execution be gathered. However, apart from Ed's comment and given Angie's observation about being all-inclusive or else, back in the day I conducted more than a handful of roundtable sessions with invited guests that included members of the CPUC staff, CAISO staff, sometimes CPUC Commissioners (don't think it can be done now), and WPTF members. I followed the template used by another trade association called California Foundation on the Environment and the Economy (CFEE) whereby designated guests sat in assigned seats around a large square hollow table, and all others would sit in a gallery elsewhere in the same room. The participants around the table could speak during the meeting whereas everyone else was an observer. The format worked well. In fact, the current executive director of WPTF, Scott Miller, has successfully done the same thing in Washington, D.C. for several years running except for the Covid-19 interruptions.

... and, what we should do:

5. Support choice among retail electricity customers.
6. Lobby for core/non-core split of retail customers.
7. Advocate against policies that limit, through bid mitigation, merchant returns on investment that are utility-like returns.

Typically, a panel of three participants introduces a pre-selected topic and then time is reserved for the other participants to ask questions and make comments. I never heard any complaints about being excluded from the meeting except for journalists. I didn't allow journalists to monitor the session except on one or two occasions when there was a pre-standing agreement not to quote anyone without their expressed permission. The goal was to get people to talk openly and freely without any hesitation.

The following note is from my guru on all sorts of topics, Phil Muller. Phil and I were called out by our mutual pal, Kent Fickett, regarding sips of the deadly utility Kool-Aid. That's okay. That's why we are good friends. We maul each other only in print. However, Phil had some observations in reply to Kent's letter that I ran last week. "I've grabbed my glass of utility Kool-Aid, taken out my envelope, turned it over and grabbed a pen to respond to the recent missive from our buddy Kent, who I will characterize as the Solar Emperor's Tailor. If it fits, wear it.

"Let's start with few general numbers:

- The levelized cost of the 50 GW or so of utility-scale PV is about \$40/MWh in 2022 dollars
- The cost of distributed solar is about \$200/MWh
- The cost of 20 GW or so of utility-scale wind to complement the solar is no more than \$50/MWh

"If \$30 billion in transmission expansion could be avoided by relying on distributed solar versus utility-scale, allocated to all load in CA (350,000 GWh/year in 2035), with an amortization rate of 15% per year (\$4.5 billion/year), would save \$12.85/MWh in total costs.

"The installed cost of a rooftop PV is about \$2.10/watt after ITC. Assuming the same amortization (~7 year payback) and an 18% capacity factor, the cost per kWh is just under \$.20/kWh or \$200/MWh. The all-in cost for utility scale, including the cost of the transmission is thus \$52.85/MWh (e.g., \$40 plus \$12.85). Losses would not create parity between grid-level and behind-the-meter generation.

"This also assumes that some amount of battery storage will be needed to deal with all that solar wherever and whenever it is generated. While utility scale storage is likely less costly than the behind-the-meter variety, we can leave it off the envelope for this discussion."

Phil's note is the perfect segue to the next one in the mailbag and it's from Fernando Alvarado. Fernando clarified a point that I think I missed in his letter to the Burrito last week and it agrees perfectly with Phil's

exegesis, above: "My point was that solar alone is a problem. If your intention is to install solar for purposes of helping reduce fossil fuel consumption (and perhaps even helping the grid) you should consider spending some of the money on batteries so you can really help.

"And there is more. The TV show [60 Minutes](#) had a scary report recently on the vulnerability of the grid and the need for resilience. I can think of no better way to provide true resilience than a system where everyone had some limited 'emergency' capability. Utility based centralized solutions to resilience will always have limitations, no matter how much money you throw at the problem. Granted, batteries and solar are an expensive way of providing reliability -- until the day you need it, and on that day you would be willing to pay almost any amount to have some such capability. As long as we are looking at redesigning rate structures, infrastructure investments, energy policies to encourage emission reductions and more, let us also look at the true definition of reliability -- from the end-customer point of view."

Thanks for the clarification and the additional commentary. True, that reliability from the end-customer point of view is the right focus.

This last letter was anonymous in response to the notification that Powhatan Energy Fund filed for Chapter 7 bankruptcy to put an end to their 12-year long battle to defend themselves from FERC allegations of wrongdoing. I wrote about it two editions ago. "Any government agency that over a decade can't bring a matter to closure deserves to have its processes and procedures audited, revisited and improved. When the merits of a case can't be adjudicated by a neutral third party in this timeframe, then the only conclusions to be reached are that taxpayers' money is not being well spent, and the agency itself is incompetent. [From FERC's website](#): 'Ethics; Every citizen must have complete confidence in the integrity of the Federal Energy Regulatory Commission; otherwise, our ability to act in the public interest will be compromised.' I believe Powhatan and others have been shouting this loudly for years. Hopefully, someone of influence will take note and do the right thing. The days of bullying and shakedowns need to end."

>>> Odds & Ends (!_)

The week's weather has been a see-saw affair in that early on Angelenos were suffering due to afternoon temperatures in the high 80s, and one day later wobbly cold in the mid 50's. That's March weather I guess ... winter and summer mixed together. I expect no empathy from readers due east. I usually start each Burrito with a note about the weekly weather, but I couldn't do it justice this week because other topics were pressing. However, the concept is to ease the reader into the Burrito chat room with a small tidbit or two that makes good conversation before diving into the nerdbots. I always imagined the flow of words in the Burrito to be as if a few college buddies were hanging out and discussing worldly issues at a local dive bar on the outskirts of East Lansing, near my alma mater. What doesn't happen on page one of the Burrito can be reserved for the Odds & Ends section. BTW, do you understand why the (!_) is added?

Speaking of empathy, I'm gathering up all I can in preparation for my right-hip replacement next Monday at USC's Keck Hospital in Los Angeles. I'd say it will be a walk in the park, but that's the problem ... it was getting increasingly difficult to walk at all. I will soon be cured of that problem, and I expect the recovery will be longer than I like but all-in-all not too long. Maybe three months. More about that in the next edition in two weeks.



Until then, here are your stories:

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Why Not Work at Home Forever? Written from perspective of a dog

As America is debating a return to work, we all should remember that it is essential not to rush. Because we need to balance the concerns of our public health and saving lives against the world's economy.

What about walks? We need to think about all the walks we need.

What about balls, then? We want to chase our balls. A lot of balls.

See? I am a dog. I am neither a wise person nor a public intellectual. I am just a very good dog. Sometimes

I have eaten half of the baseball gloves left in the garage. Sometimes I have knocked a potted plant in the drawing-room. But that goes. I am just a regular cute and good dog. What else could you possibly want from me?

Do you know what the important thing is? We, the dogs of the whole world, want you to stay at home with us.

This quarantine has been a great time in our lives, and you have spent time with us. You are with us in the morning; you are with us at lunch. You are with us in the evening. You are just here with us. It is simply the best, and we couldn't ask for anything more.

Now let's talk about the walks. We have never been fit like this before. Because you take us out on an 8:00 am walk, an 11:30 walk, a 2 pm walk, 4 pm walk, 7:15 pm walk, and sometimes we get too lucky to get a 9:00 pm walk.

There are times when you throw the ball. And in a while, I start to chase the ball and grab it so that I can bring it back to you in no time. You throw it again. I get it again. You throw it again. I bring it again. And again, and again, and again.

I am damn sure that the cats are telling you to go back to your walk. They inform you that they had it, but let me tell you, never trust rude animals like a cat. They will never appreciate you. They are just some rude animals.

But we, the dogs, try to understand what you bring to the table. We appreciate and love having you home and staying with us.

Cats don't like that. But we want you to stay. We want you stay forever. If you promise to last forever, we will promise to be a good dog.

America Needs to Get Back to Work: Written from perspective of a cat

Enough is enough. American business has taken a historic plunge over the past month. It's time to consider a practical plan for protecting public health—while also allowing for a return to work and, hopefully, a revival of the economy.

Oh, who am I kidding?

On behalf of cats everywhere, I'll just say it: We want everyone out of the house.

It was cute for a while, but the party is over. We're sick of this quarantine, shelter-in-place directive.

Sheltering in place? That's a cat's job. Cats invented sheltering in place—sleeping in the windowsill, the corner of the couch, the sock drawer in the closet and, if it gets a little too noisy, under the bed, eyes open, annoyed. Cats know what it takes to stay home all the time. We're just tired of sharing our home with everybody else.

Have we liked getting snacks at unexpected hours? Sure. Is it nice to roll around on that warm laptop keyboard during Zoom calls? Sure is. Warm keyboards are heaven.

But it's gotten to be too much. The other day I walked into the kitchen and saw someone standing in my 9 a.m. sunspot. So rude. That sunspot is only there for 15 minutes a day!

We (sort of) love you, and appreciate the occasional pats on the head, but cats are not the most social creatures. Sure, there are some exceptions. You might have one of those cats who actually enjoys human company. Congratulations. But the vast majority of us—not so much.

Please consider it. Not for America. For cats.

My co-editor for each edition is Jeli Cat. I open my laptop computer, he saunters over with his motorboat purr in low gear, and curls in a ball aside my left thigh until I get up or my foot falls asleep. He's a tough customer to keep happy as seen to the right. He's saying, "Write, you fool, write."

Have a couple of great weekends and don't forget to change your clock to Daylight Savings Time a week from Sunday. You know, with all the new gadgets and technology there are fewer instruments we manually alter when time shifting. We are autobots.

Gba (and Jeli)

