

# The Friday Burrito

Why, Oh Why, Oh Why, Oh

*"To a father, when a child dies, the future dies; to a child when a parent dies, the past dies."*

*Red Auerbach*

*"Mistakes are part of the dues one pays for a full life."*

*Sophia Loren*

*"You have to, in your own life, get people to want to work with you and want to help you. The organizational chart, in my opinion, means very little. I need my bosses' goodwill, but I need the goodwill of my subordinates even more."*

*Lloyd Blankfein*



You can take the boy out of Ohio but sooner or later he goes back to visit. I did so this week, and it recharged my spiritual battery to spend time with my high school homies for two days and enjoy their enduring company that has vintaged over 60 years. In fact, I have known one of them since we were in second grade at Belvoir Elementary School.

There are 10 of us that meet like this every other year, and this year, in a repeat performance, we rented canoes to paddle along a 5-mile section of the Cuyahoga River in Geauga County. Yes, this river did catch fire many decades ago about 35 miles downstream from us. My stern-mate and I meandered atop the slow, clear water current on a perfect weather day, steering around fallen trees that have been clearcut, through undisturbed park land, with nearby private homes having wide open backyards with mowed green grass, and several bridges. It wasn't white water conditions. Never is. The only waves we saw were from a gentle breeze blowing across the water that provided slip-'n-slide for swarms of flickering water bugs and landing spots for red-tipped-wing dragon flies.

They say that keeping long-term friendships is a tonic for a healthy life. I concur. Go out and find yourself an old friend.

## Renewables Curtailment Returns with a Vengeance

Monthly, I recap the previous dips into the renewable energy fleet at the CAISO that didn't clear the markets to serve demand or power exports. Until this year that was a springtime-only newsworthy item. However, now that summer-like temperatures have ebbed and the sunshine makes solar generation abundant, once again there is a significant oversupply of renewable energy. Readers may be interested in [jumping to the Energy GPS commentary below](#) for more detailed information.

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## Odds & Ends (!\_!)

### Western States Ticker

*CAISO YTD Renewables Curtailment:*

As of 8/31/24: 2,980,978 MWh  
As of 8/31/23 2,267,205 MWh

% of solar and wind output curtailed:

YTD as of Aug 2024 5.42%  
YTD as of Aug 2023 4.92%

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Most of the generation is curtailed because the renewable sellers (or their scheduling coordinators) enter bids that are above either the day-ahead or real-time markets clearing prices. Last Tuesday, the CAISO posted the highest post-summer renewables curtailment volume at 23,000 MWh. Typically for a day in September, 3,000 MWh to 5,000 MWh might be the norm. The latest number portends a whopper for total annual volume. Remember, the ratepayers for the load-serving entities pay the contract costs for these assets. And people wonder why electricity bills are so damn high in California.

Last year there were over 340,000 MWh of curtailments from September 20<sup>th</sup> til year-end. Just using that same amount of curtailment for the last 102 days of 2024 will make this year's total close to 3,400,000 MWh (3,400 GWh), a whopping 740,000 MWh more than last year.

If that same held-back energy could be captured, stored, and delivered in some fashion to a California public utility, then it could meet 100% of the 2022 customer electricity demand for Modesto Irrigation District and it would be a smidge below that for Imperial Irrigation District. If I was a Stanford academic, I'd make all kinds of splashy news about the wrongful waste because the media loves this kind of loose thinking.

Riverside, City of	2022	2,221
Anaheim, City of	2022	2,222
Metropolitan Water District of Southern California	2022	2,235
Turlock Irrigation District	2022	2,306
Department of Water Resources	2022	2,596
Modesto Irrigation District	2022	2,634
Imperial Irrigation District	2022	3,584

Well, we know that storing and redistributing energy is an expensive and complex undertaking. However, I just wanted to show y'all a benchmark by which to compare the CAISO renewables curtailments. The data for the table above comes [from the CEC for 2022](#) and the right-hand column is total electricity consumption in GWh.

## DOE Study on Nukes

Last week, the [DOE released a brief study](#) on the potential to reclaim spent coal power plant sites, and both existing and shut-down nuclear sites for new nuclear power generation. The 13-page study was entitled, "Evaluation of Nuclear Power Plant and Coal Power Plant Sites for New Nuclear Capacity."

In summary, the study establishes an estimated potential for new nuclear power in the U.S. It is a quick turnaround study to estimate the number of potential new sites having, *"A capacity of 600 MWe or greater that could be situated on (1) currently operating and recently retired coal power plant (CPP) sites and (2) current nuclear power plant (NPP) sites."* Current NPP sites with cancelled plans for additional units

## What we believe...

Competition yields lower electricity costs. Stable and transparent rules and regulations promote private investment.

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.

Private sector investment results in lower average prices without risking consumers' money.

However, when IOUs do the investing, the risks to them are minimal or non-existent because ratepayers effectively cover the utilities' costs.

Overcapacity lowers electricity spot market prices; yet retail rates can still increase in this case due to full cost-of-service regulation.

Markets work best when there are many buyers and sellers.

At-risk money will be put to investment where markets exist that are well regulated and yield credible prices.

## And what we should do ...

Believe in ourselves.

Actively support the creation of independent, multi-state regional transmission organizations that coordinate policies with respective state utility commissions.

Support rules for resource adequacy that apply uniformly to all load-serving entities.

Enforce competitive solicitations by utilities for purchasing either thermal or renewable power.

during initial site construction were evaluated, as well as sites that have initiated the process to build new NPPs.

The table below from the study shows both the number of nuclear units and gross nameplate generation for the 145 coal sites that might be

**Table 1. Summary of CPP results**

CPP Evaluation	Total # of units (GWe)
Potential 600 MWe units	290 (174)
Potential 1,000 MWe units	136 (136)
Potential 1,117 MWe units	115 (128)

developed. If one picks the middle value for the likely potential, then 130,000 MW of nuclear capacity at these sites would be nothing to [Continued on the next page](#)

Support choice among retail electricity customers.

Lobby for core/non-core split of retail customers.

Advocate against policies that limit, through bid mitigation, merchant returns on investment that are comparable to utility returns.

### **A Hardy Regional Outlook Unintended Consequences**

*My last two Burrito columns described transmission and renewable resource acquisition challenges for Pacific Northwest (PNW) utilities, particularly Portland General Electric (PGE) and Puget Sound Energy (PSE). But there is more to this story.*



*In 2019/2021, Washington and Oregon mandated their utilities to rely on 80 percent clean/decarbonized energy by 2030. California, via SB100, required utilities/entities to achieve 60 percent RPS by 2030. At present, California is steadily moving toward 60 percent with robust transmission construction and complicated, but seemingly successful, progress in acquiring the necessary renewable and storage resources.*

*Steady progress is not occurring in the PNW. In its Open Access transmission system, BPA, as the region's major transmission provider, must solicit and analyze every transmission service request (TSR) submitted by a developer (or other entity), and then somehow cobble them together into a meaningful plan. For its upcoming 2025 transmission cluster study, BPA received 68 GW of TSRs, an impossible amount to even analyze much less use to formulate a viable plan.*

*This constipation of TSRs, and the resultant inability to steadily progress toward PNW clean energy targets, is a consequence (though unintended) of setting unreasonable goals/achievement timeframes in the first place. The 80 percent clean energy goals by 2030 sounded great when initially set but ignored the typical 10-15 year timeline for planning/constructing most major new transmission projects. In addition, **they set off a virtual gold rush** of proposed renewable development, which grossly overloaded BPA and PNW utilities' ability to process in a timely fashion. In retrospect, California got it right, with initially less aggressive, but ultimately more readily achievable clean energy goals. Oregon and Washington, by ignoring transmission realities and other factors, created goals/timelines that could not be met in a timely fashion and that will also significantly increase costs/utility rates in the interim.*

sneeze at. That would be a considerable addition of clean energy to the national fleet.

The potential for development at existing nuclear sites has a more modest outlook as can be seen below. DOE evaluated 54 existing nuclear sites and 11 at retired nuclear locations. There is a potential to backfit 60 GW to 95 GW at these sites located throughout 31 states.

Locating new nuke plants at existing nuclear plant sites has obvious advantages because communities surrounding these plants already support nuclear energy, know the safety culture, and are aware of continuous strict environmental monitoring of areas surrounding the plants. There are a lot of upsides for plugging and playing this clean energy technology.

**Table 2. Summary of NPP results**

<b>NPP Evaluation</b>	<b>Total # of units (GWe)</b>
Potential 600 MWe units	158 (95)
Potential 1,117 MWe units	54 (60)

### **Capture This Indiana**

There is a sudden rush of investment in ammonia production that doesn't alter its feedstock, natural gas, but rather captures the carbon emissions in the process and stores it below ground in vast caverns or bedrock formations. One might wonder why investor interest is running high. The answer is investment tax credits provided by the Inflation Reduction Act (IRA). [According to an article this week in the WSJ](#), ammonia is an essential ingredient in farmland fertilizer and can be "cleaned" through carbon capture. As such, it can make all the applications of ammonia greener, including using the chemical as a fuel for electricity generation. In the latter sense, it would be no different than a natural gas generator capturing its carbon from the combustion chamber and also storing it underground. The difference is that the former strips the carbon at the fuel supply link of the supply chain and the latter at the power generation site. Which of the two processes is less inefficient is a good question but answering it is above my pay scale.

According to the [WSJ](#), DOE is, "*Funding a project backed by oil companies and hydrogen-vehicle startup Nikola ... to repurpose a facility that was part of a decades-old coal plant in Indiana for low-carbon ammonia production. Wabash<sup>1</sup> uses a byproduct of oil refining to make ammonia and says it has an advantage over competitors because its facility is close to the farms where fertilizer will be used to grow corn. It expects to produce 500,000 metric tons of ammonia a year.*

*"Once it starts operating in 2027, Wabash expects to get about \$140 million in carbon sequestration tax credits annually on top of the loan. Wabash still needs to raise about \$800 million in equity and meet other project milestones before it starts receiving the loan."* Let me tell you, muchachos, \$140 million in tax credits that can be sold on the open market to any buyer, subject to IRS approval, is a lot of cashflow. Wabash can lose money producing its fertilizer for years and still come out ahead by monetizing the tax credit.

There are other problems to consider in advancing an ammonia economy. For example, subsidies are critical because rising costs are derailing many projects. Wabash's equipment and project costs have risen about 25% to 50% in the past three years. Finally, there is a big push to get financing done before the national election. If Trump wins, you can guarantee that these tax-credit sweeteners for clean energy will get chopped.

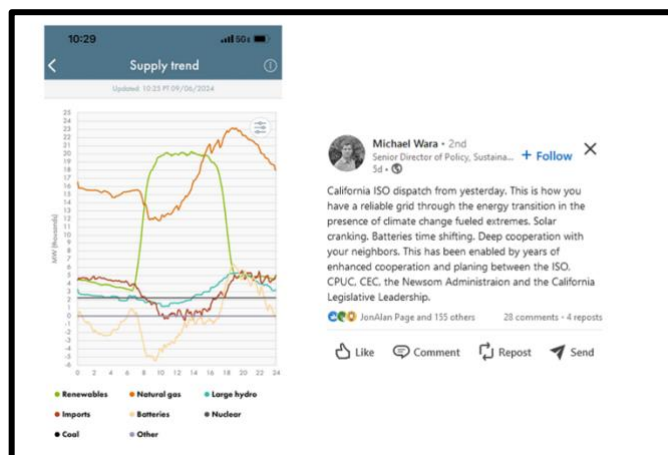
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<sup>1</sup> *Wabash Valley Resources (WVR) is a \$1.2 billion entrepreneurial venture established to demonstrate the industrial application of net-zero-carbon-capable manufacturing processes to produce low-carbon intensity anhydrous ammonia fertilizer.*

# Things in the People's Republic of California

## All I See is Natural Gas and More Natural Gas

In last week's edition, Tim Belden of Energy GPS wrote an excellent piece about the CAISO supply stack that occurred on Friday, September 6, 2024. It was a very hot day, especially in Southern California. All available resources were needed with a healthy slug of natural gas generation across the board. Tim noted an academic



post about that day's supposed demonstration of a successful energy transition in California. (See copy of Michael Wara's X post on the left.) Tim questioned how that day's dispatch demonstrated anything short of the necessity for natural gas generation, both directly and indirectly, through power imports and battery charging. Natural gas generation on September 6 peaked at 23,000 MW.

I wondered what would have happened had all that natural gas generation capacity been removed? How would the sustainable energy gurus adorn their System Planning Coloring Book?

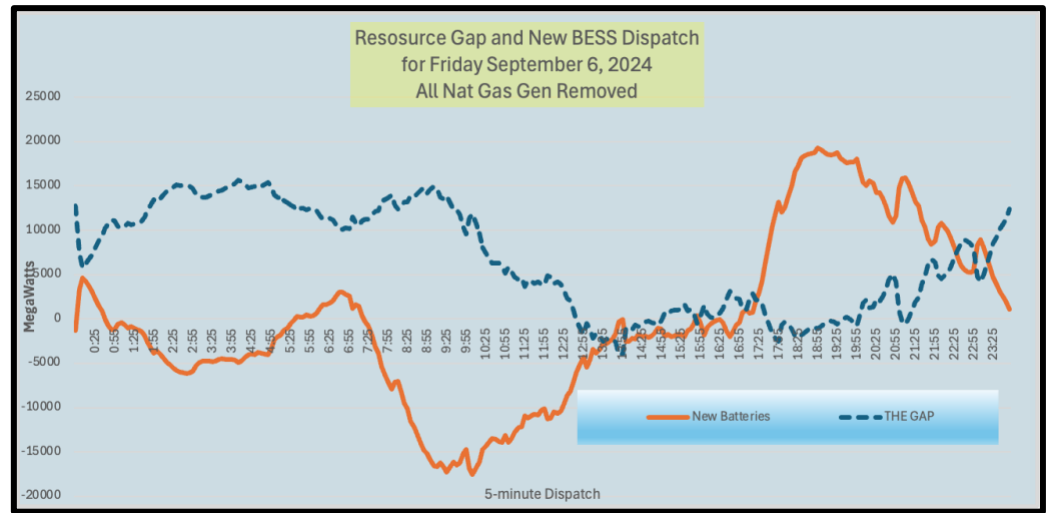
I took it upon myself to answer the question. In so doing, I underestimated the time required to heuristically reconstruct the supply stack absent natural gas. I also underestimated how difficult a task it would be. There are a number of sensible constraints that, individually are straightforward but in combination simultaneously, are complex. For example, how can the supply gap absent natural gas be filled during hours when the sun isn't shining? Here is the result of my effort, as seen in the figure below right. I amped the BESS capacity and shaped it with the same diurnal pattern in effect on September 6<sup>th</sup>. That alone wasn't enough so I pumped up both solar and wind installed capacity, again using the September 6<sup>th</sup> resource shapes, respectively. The figures in the table to the right show both the installed

installed Capacities	Sept. 6, 2024	Modeled
Batteries	9309	29025
Solar	19758	21401
Wind	8356	16712

capacities that were in place and my final determination of the supply portfolio after numerous iterations. This was an inelegant way to address the question but insightful at the same time. For example, in one iteration I had gobs of excess generation during the net peak hours ... that portfolio was a non-starter in my opinion. Subsequently, I dampened the BESS fleet by one-third. Had I a production cost model at hand and all the relevant data, then I could have done a better job at rejiggering the supply stack. However, back-of-the-envelope analyses are better because otherwise one drowns in numbers while being starved for insight. That said, I basically did three things to approach a solution: i) added about 20,000 MW of BESS, ii) increased the solar fleet by 10 percent, and iii) juiced the onshore wind fleet by 8,400 MW.



The figure below charts the supply gap remaining to be closed (“The Gap;” blue dotted line) and my hypothetical net BESS dispatch with a larger fleet (“New Batteries;” orange solid line). A substantial resource deficiency persists of about 10,000 MW to 15,000 MW in the first half of the day given the resource mix . You can add all the utility-scale solar in the world, but it won’t help fill the gap either before sunrise or after the net peak hour. You can add more and more 4-hour lithium-ion battery storage systems (BESS), but how will these assets be charged? You find yourself chasing your tail squeezing more output from one resource only to discover that it inflates the need at another time for an alternative.



If you’re wondering why the BESS curve topped out at about 20,000 MW consider that a portion of the fleet was reserved for ancillary services duty, just like it does today, and a portion might be transmission constrained. Again, I used the diurnal shape of the BESS dispatch for September 6<sup>th</sup>.

Could power imports fill the gap? Well, that would be quite a stretch given the transmission maximum of roughly 11,000 MW at any one time into the CAISO assuming there are no outages or curtailments. Could more wind help? Sure, it can, but the wind profile for September 6<sup>th</sup> was at most less than half of the fleet’s installed capacity. How about more geothermal? Sure, bring it on baby, but only for half a day.

So, what did you learn from this exercise other than I’m an amateur sleuth and challenged Excel user?



## Grand Phunk Salsa a la Energy GPS

The Op Ed below is from the team at Energy GPS with Jeff Richter as the lead author. Reference herein is made to the firm’s [eCommerce Platinum Plus Package](#) and is incorporated in the CAISO Daily Battery Dashboard ([sample](#)). To request more information about Energy GPS email [sales@energygps.com](mailto:sales@energygps.com).

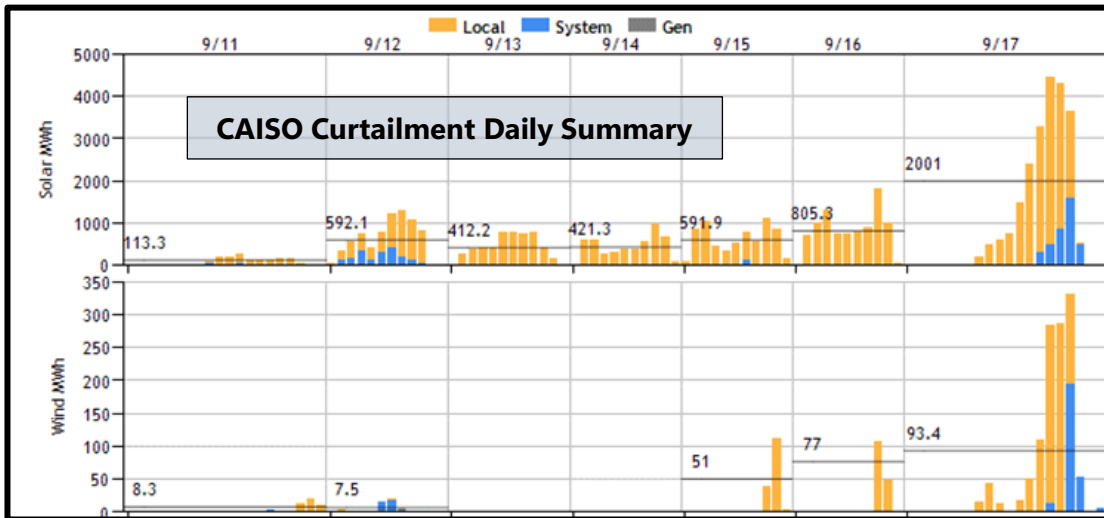
### A Closer Look at This Week’s CAISO Renewables Curtailments

*Daylight Savings Time (DST) carries the motto of ‘spring forward and fall back’ given the one-hour time change. California’s renewable energy has its own DST acronym, which stands for Daylight Sunny Times and its motto is ‘spring curtailments and fall back to more of the same.’*

*The heat wave that moved through California just after Labor Day gave way to moderate temperatures across the state with sunny skies across the desert landscape. This led to lower net demand and plenty of solar generation, especially during the midday block of hours in Southern California. As seen in the spring, the market fundamentals described lead to the CAISO modeling South to North congestion during the midday hours in both the day-ahead and real-time markets. Looking at the day-ahead auction clearing prices earlier*

this week, during the heavy-load period, the average price delta between the CAISO gen hubs had SP15 settling in \$17-\$18/MWh lower than NP15. The midday price level for SP15 sat near \$0.00/MWh with some hours in the

negative territory. In NP15, the marginal cost of energy equated to the most efficient natural gas units. If you recall, the heat wave tied to Southern California's record temperatures had SP15's heavy load trading above NP15. Everything flipped over in less than one week.

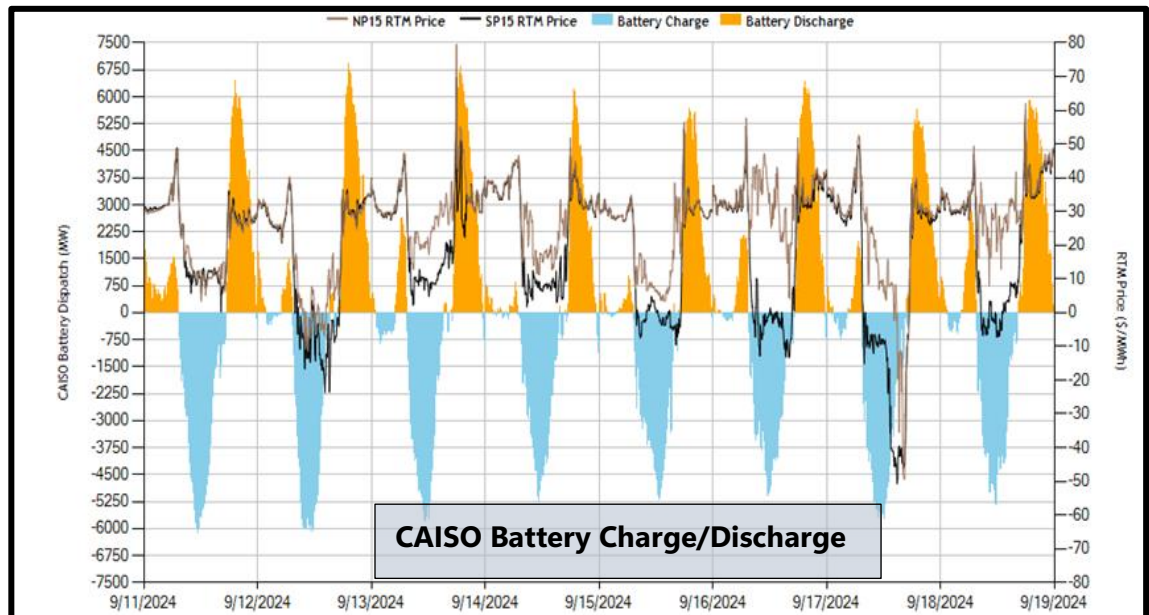


The real-time market is where the rubber meets the road. This fall it is starting to look like last spring within the CAISO balancing authority. For SP15 the result is simple -- renewables curtailments are the only solution, while NP15 has a wide range of outcomes depending on the day and hour. For curtailments to be in play, it means that the solar influx and lack of power demand outpace that of the aggregated charge tied to the battery fleet and the willingness for adjacent balancing regions to absorb CAISO megawatts. In other words, the SP15 real-time prices quickly dive into negative territory and hold there during most of the midday hours.

**It looks like the CAISO grid operations are working towards the same outcome in the fall and spring**

The graph below shows the daily CAISO battery energy storage systems charge and discharge. The blue shaded areas are the aggregated charge of the battery fleet while the orange sections represent the discharges. The two lines are associated to the real-time price signals tied to SP15 (black) and that of NP15 (brown, grey).

Two observations are apparent. First, the price lines when not overlapping meant there was real-time congestion from South to North. We know this given that SP15's line is below that of NP15. Second, look how low SP15's real-time midday price was, especially on the 16th and 17th. On the 17th, you can see that the start of the midday period had SP15 locked in at -\$15.00 while



NP15 was in positive territory. The negative floor was being held by the fact that the battery fleet was increasing its charge quantity to a point where 5.2 GW of demand was realized. We know that the battery fleet cannot hold this state of charge throughout the entire period, which does not bode well for the solar fleet as more curtailments occur as battery charging wanes. This led to a price drop whereby both SP15 and NP15 prices settled close to -\$45.00. As the net peak hour approaches, the grid requires flexible ramping resources. Accordingly, the intrastate transmission congestion dissipates, and the price level moves back into positive territory and settles in the \$30.00 - \$40.00 range for both gen hubs.

In the onset of Q4, moderate weather will bring more congestion and real-time curtailments as the adjacent balancing regions to the east deal with their own influx of solar energy and battery capacity, while holding on to baseload thermal generation. With all the talk of removing DST all together, it looks like the CAISO grid operations are working towards the same outcome in the fall and spring regarding in-state curtailments and deeply negative hourly prices.

## Recipes and Shout Outs

[Phil Muller](#) has been a good friend and colleague of mine for over 25 years. We both "grew up" during the California restructuring era that provided new opportunities for us to enhance our consulting businesses. Phil decided this year to hang up his shingle that he hung out many years ago. In honor of his work and dedication to a whole bunch of us in the biz, [Ellen Wolfe](#) is holding a hybrid event in Phil's honor at the home of Mary and Mark Lynch in El Dorado Hills, CA ... meaning you can attend in person or by videoconference. Either way is fine.

The party is scheduled for Thursday Oct 3, from 4 p.m. to 7 p.m. For online guests patching into the reception, the video will be active from 5:30 p.m. to 7p.m.

If any of Phil's friends can't attend either in person or via zoom and would like to offer a salutation, they can forward to Ellen ([ewolfe@resero.com](mailto:ewolfe@resero.com)) a video recording of 1.5 minutes or less by Friday September 27. She will endeavor to put those videos together and display them at the event.

To attend either in person or via zoom here is a [link to the invite](#).

### Ramen Eggs (ajitama) with Chef [Laura Manz](#)

*"When you come to San Diego to see the Giant Pandas, take a little side trip to the Convoy District for some amazing Asian food. Menya Ultra has about the best tonkatsu ramen you will find, and I always order it with a seasoned egg for the perfect umami bite. Make your own ramen eggs (ajitama) for jammy, sweet and salty little flavor bombs that are great in soups and also as a snack. My secret to 'boiled' eggs is to steam them and you can adjust the timing for the doneness you prefer. Rest the eggs on their side for a few hours before cooking. This recipe is for four eggs but can up or down as needed to completely cover the eggs."*



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Place 4 rested eggs in a steamer basket and steam for exactly 7 minutes. Remove from the basket and place into a bowl of room temperature water. After one minute, carefully tap the eggs on a hard surface to crack the shell into many pieces. Carefully peel and place in a marinade prepared from ¼ cup soy sauce, ¼ cup mirin, ¼ sake, 1 tsp. of sugar and 1 Tbsp. of rice vinegar. Marinate for about 8 hours or overnight, using a small container to keep the eggs covered in the liquid; place a paper towel over the top if needed to close any air gaps. Cut in half lengthwise to serve.

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Egg-zactly, Laura. I have to say, I've never seen such a beautiful presentation of a simple egg. Well done.

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## Odds & Ends (\_!\_)

Below the belt are your stories if you are reading the red-meat edition. Have a great weekend, y'all.  
Gba



If you remember the Original Hollywood Squares and its comics, this may bring a tear to your eyes. These great questions and answers are from the days when the "Hollywood Squares" game show responses were spontaneous and clever, not scripted and (often) dull, as they are now.

Peter Marshall was the host asking the questions, of course.

Q. Do female frogs croak?

A. Paul Lynde: If you hold their little heads under water long enough.

Q. If you're going to make a parachute jump, at least how high should you be?

A. Charley Weaver: Three days of steady drinking should do it.

Q. True or False, a pea can last as long as 5,000 years.

A. George Gobel: Boy, it sure seems that way sometimes.

Q. You've been having trouble going to sleep. Are you probably a man or a woman?

A. Don Knotts: That's what's been keeping me awake.

Q. According to Cosmo, if you meet a stranger at a party and you think that he is attractive, is it okay to come out and ask him if he's married?

A. Rose Marie: No, wait until morning.

Q. Which of your five senses tends to diminish as you get older?

A. Charley Weaver: My sense of decency.

Q. In Hawaiian, does it take more than three words to say, "I Love You"?

A. Vincent Price: No, you can say it with a pineapple and a twenty

Q. What are "Do It," "I Can Help," and "I Can't Get Enough"?

A. George Gobel: I don't know, but it's coming from the next apartment.

Q. As you grow older, do you tend to gesture more or less with your hands while talking?

A. Rose Marie: You ask me one more growing old question Peter, and I'll give you a gesture you'll never forget.

Q. Charley, you've just decided to grow strawberries. Are you going to get any during the first year?

A. Charley Weaver: Of course not, I'm too busy growing strawberries.

Q. In bowling, what's a perfect score?!

A. Rose Marie: Ralph, the pin boy.

Q. It is considered to be in bad taste to discuss two subjects at nudist camps. One is politics, what is the other?

A. Paul Lynde: Tape measures.

Q. Can boys join the Camp Fire Girls?

A. Marty Allen: Only after lights out.

Q. When you pat a dog on its head he will wag his tail. What will a goose do?

A. Paul Lynde: Make him bark?

Q. If you were pregnant for two years, what would you give birth to?

A. Paul Lynde: Whatever it is, it would never be afraid of the dark

Q. According to Ann Landers, is there anything wrong with getting into the habit of kissing a lot of people?

A. Charley Weaver: It got me out of the army.

Q. It is the most abused and neglected part of your body, what is it?

A. Paul Lynde: Mine may be abused, but it certainly isn't neglected.

Q. Back in the old days, when Great Grandpa put horseradish on his head, what was he trying to do?

A. George Gobel: Get it in his mouth.

Q. Who stays pregnant for a longer period of time, your wife or your elephant?

A. Paul Lynde: Who told you about my elephant?

Q. When a couple has a baby, who is responsible for its sex?

A. Charley Weaver: I'll lend him the car; the rest is up to him.

Q. Jackie Gleason recently revealed that he firmly believes in them and has actually seen them on at least two occasions. What are they?

A. Charley Weaver: His feet.

### **WHO DOES WHAT?**

A man and his wife were having an argument about who should brew the coffee each morning.

The wife said, "You should do it, because you get up first, and then we don't have to wait as long to get our coffee."

The husband said, "You are in charge of cooking around here and you should do it, because that is your job, and I can just wait for my coffee."

Wife replies, "No, you should do it, and besides, it is in the Bible that the man should do the coffee."

Husband replies, "I can't believe that, show me."

So, she fetched the Bible, and opened the New Testament and showed him at the top of several pages, that it indeed says... "HEBREWS"