



Western Interstate Energy Board

Bilateral Forward Contracting in the West

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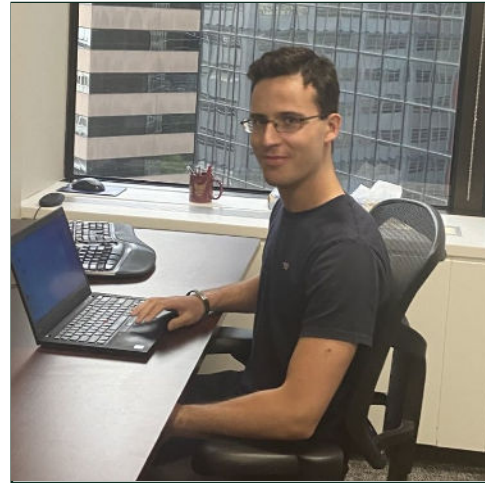
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Background

- The Western Interconnection has a changing resource mix that is impacting power markets
- Trends in bilateral markets outside of an ISO area can be inscrutable to regulators due to the lack of available data
- Regulation of these markets is a complex, interstate issue



Project Objective

- Report on concepts and trends in the western bilateral power markets
- Main topics covered:
 - Long-term power procurement
 - Risk-management and trading
 - Forward contracts
 - Gas market
 - Specified vs. unspecified contracts



Project Methodology

- Qualitative interviews with market participants
- **Limitation:** Presentation reflects the understanding of markets according to trading and risk management personnel



Outline

1 Introduction to Utility Power Procurement

2 Bilateral Markets

3 Trends

- Shift to contract specification
- Consequences of a more irregular use of gas units
- Increased need for super-peak products

4 Recommendations

Utility Power Procurement

Power Procurement Strategy

	Long-term (3+ years)	Term (day-ahead to 2 years out)	Real-time (hours, minutes)
Risks	Technology Policy Load Renewables production	Plant availabilities/ outages Prices Load Renewables production	Plant availabilities/ outages Prices Load Renewables production
Goals	Meeting PRM requirements Limiting financial exposure	Adjusting portfolio as forecasts get more accurate	Adjusting portfolio as forecasts get more accurate
Tools	Owned generation PPAs	Bilateral OTC ICE Brokers	Bilateral OTC EIM WEIS

Integrated Resource Plan: Main Trends And Challenges



Legislation and regulation:

- carbon emissions reduction goals
- renewable portfolio standards
- phase-out of coal implying replacement of capacity



Increase in renewable energy penetration, resulting in an increase in planning reserve margins



Load growth:

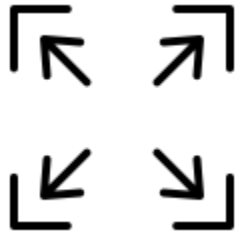
- population growth
- post-covid rebound
- electrification



Climate change:

- higher loads in the summer, particularly in the SW
- NW utilities moving from winter-peak years to winter + summer dual-peak years
- less hydro in NW resulting in a need for new resources

Integrated Resource Plan: WRAP Impact



Capacity requirements



Resource planning is becoming more regional, leveraging capacity of neighbors



Utilities must show rigorously they can provide their share



Requirements must be met monthly rather than seasonally: WRAP publishes monthly reserve margin objective ranging generally from 13 to 19%

EIM and WEIS IMPACT on Real-time Market



Submitting bids in the market on every hour



Need to come to the market balanced in every hour: utilities procure energy 2-3 hours in advance



Cost-minimization model: makes the process of balancing load with variable production much easier than the bilateral approach



Leaving limited liquidity on the day-ahead/hourly timeframe

Trading in the Term Window

- There are many definitions of the start and endpoints of the short-term, mid-term, and long-term trading windows
- In the context of this presentation, “term” is defined as the time between one month out – where forward power contracts can be traded, and the roughly 2-year time horizon – where the resource mix is considered fixed (i.e., the utility cannot expect to build a new resource)
- Term window trading aims to optimize existing power supply to meet demand through market purchases and sales

Trading Goals

- Publicly regulated utilities are risk-adverse
 - Must meet reliability requirements
 - Can pass transactions on to customers
 - Regulators may disallow transactions
- 100% of utilities surveyed said they avoid speculative approaches
- May aim to be structurally long to secure resources and meet load, particularly in the case of extreme load peaks (typically in summer)
- Most utilities recognize speculating actors are beneficial to the market
 - Add liquidity
 - Add price discovery
 - Share risk with utilities

Trading Floor Personnel

- Trading floor functions:
 - Real-time
 - Day-ahead
 - Long-term
 - Organized markets
 - Gas traders
 - Gas schedulers
- Significant amount of interaction and coordination between departments (particularly day-ahead and real-time power departments) to understand trends and ensure consistent decision-making

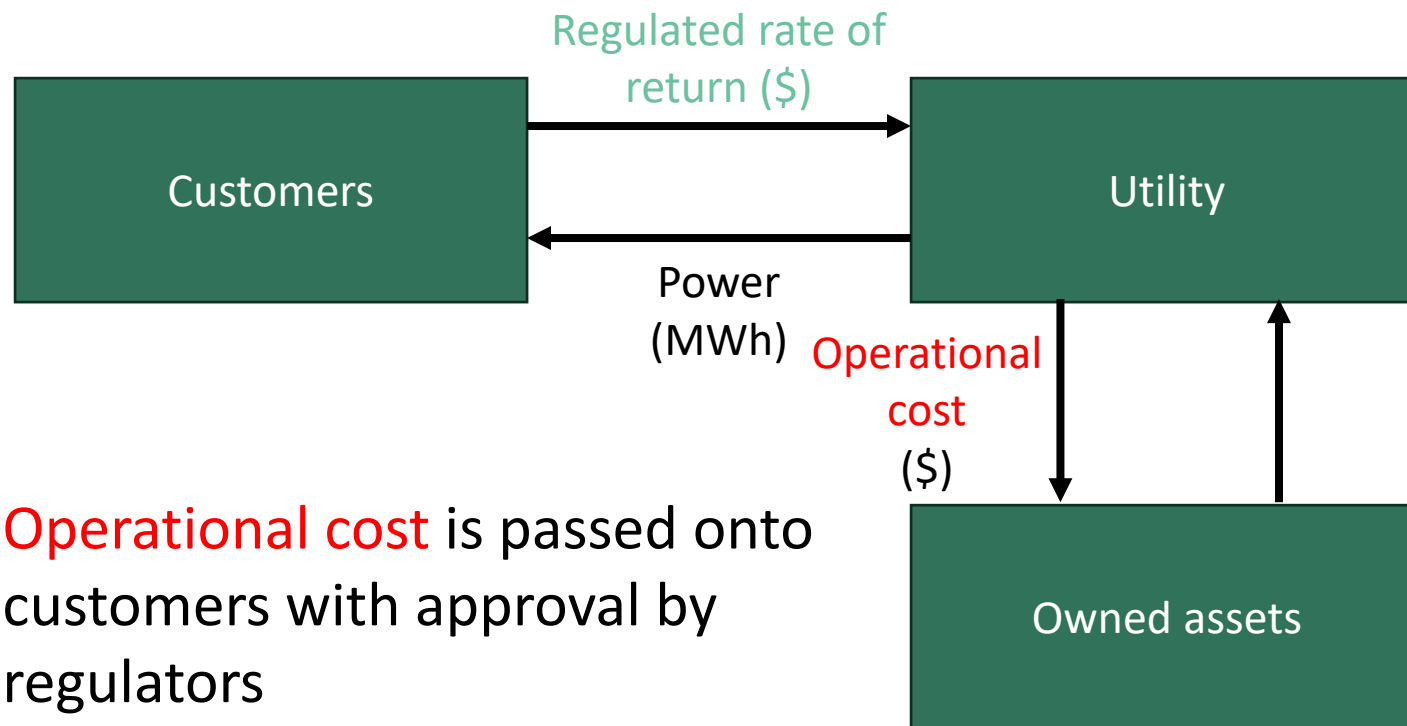


Risk-Management Policy

- Revised continuously; read by employees regularly
- Restrictions on:
 - Products
 - Exposure
 - Counterparties
- Risk management committees meet regularly and oversee transactions
- Need for manager approval above some caps
- Seasonally specific restrictions: scaling back day-ahead sales in summer months; minimizing exposure to CAISO transmission if forecasted next day peak exceeds some value increasing the risk of curtailment

Bilateral Markets

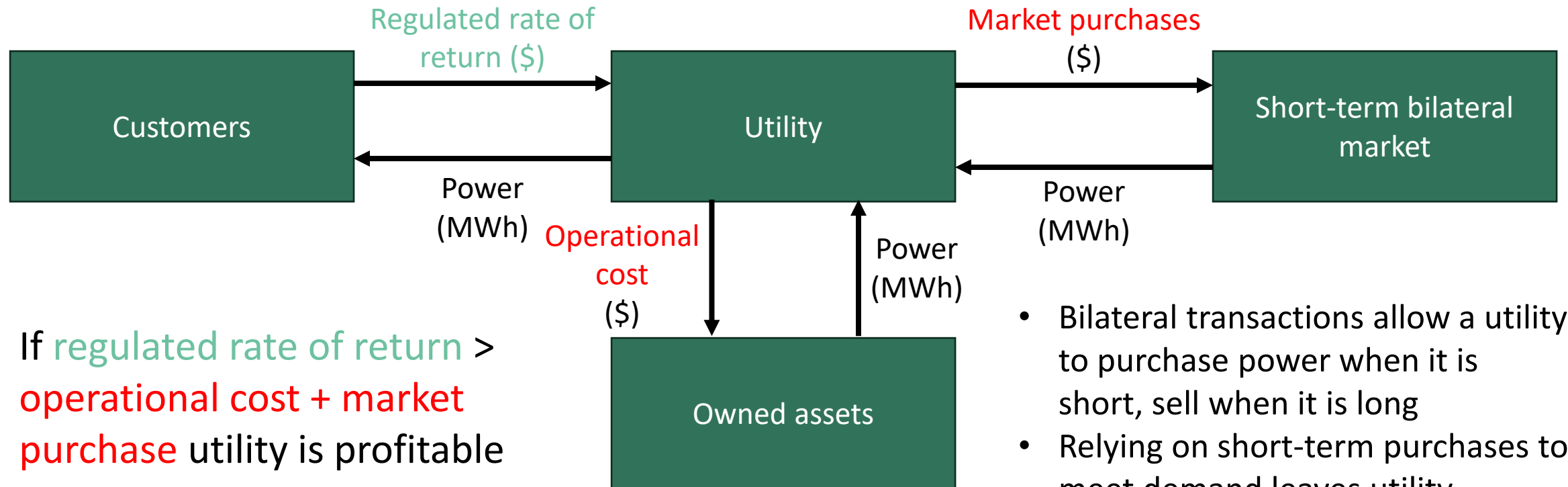
Simplified Model of Vertically Integrated Utility



Operational cost is passed onto customers with approval by regulators

- It is unlikely that a utility will match demand with owned supply for every hour of the year
- Load changes significantly throughout the year
 - Other market participants may have surplus generation from cheaper units

Bilateral markets allow utilities to access power provided by other utilities, IPPs, and marketers

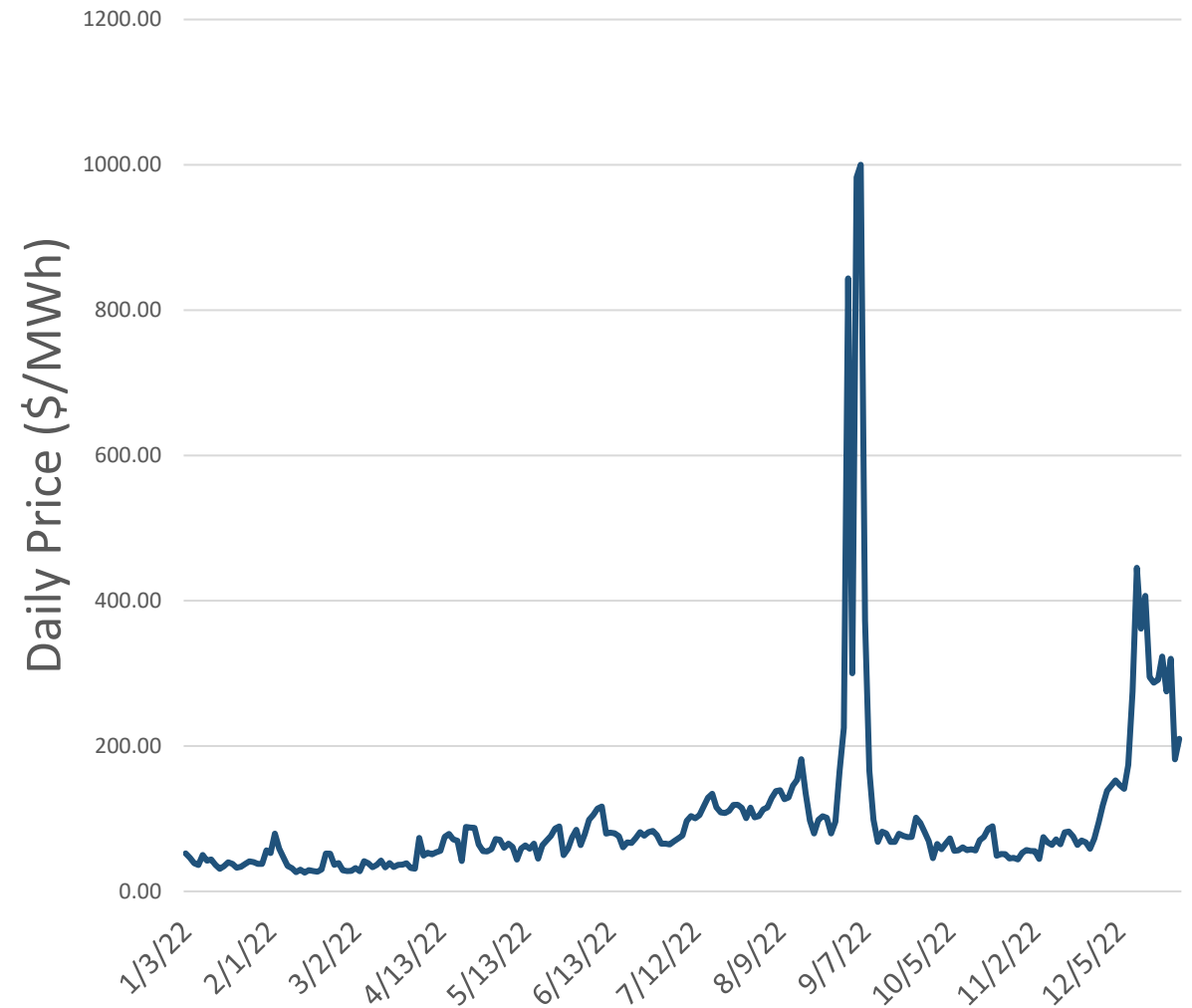


- Bilateral transactions allow a utility to purchase power when it is short, sell when it is long
- Relying on short-term purchases to meet demand leaves utility exposed to market conditions

Relying on the short-term market is risky

- When supply is constrained, purchases face significant losses if relying on the spot market to meet demand
- Even worse, capacity may become so constrained that it is impossible for an entity to meet its load obligation

Palo Verde Day Ahead On-Peak Prices for 2022



Utilities use many different tools to procure power and manage risk in the term window

- Forward Contracts
 - Physically Settled
 - Financially Settled Swaps (Fixed-for-Float)
- Options
 - Power Options
 - Heat Rate Call Options
- Tolling Arrangements

Multiple Avenues For Transactions

- Intercontinental Exchange (ICE)
 - Online exchange for variety of electricity and natural gas products, including physical electricity
- Request for Offers/Proposal (RFO/RFP)
 - Entity will put a request into the market for certain products it wants to buy or sell
 - Used for everything from intra-month power purchases to long-term asset procurement
- Over the phone, bilateral transactions
 - Between utilities / IPPs
 - Often short timeframe
- Brokers
 - Third parties that aim to source and negotiate transactions

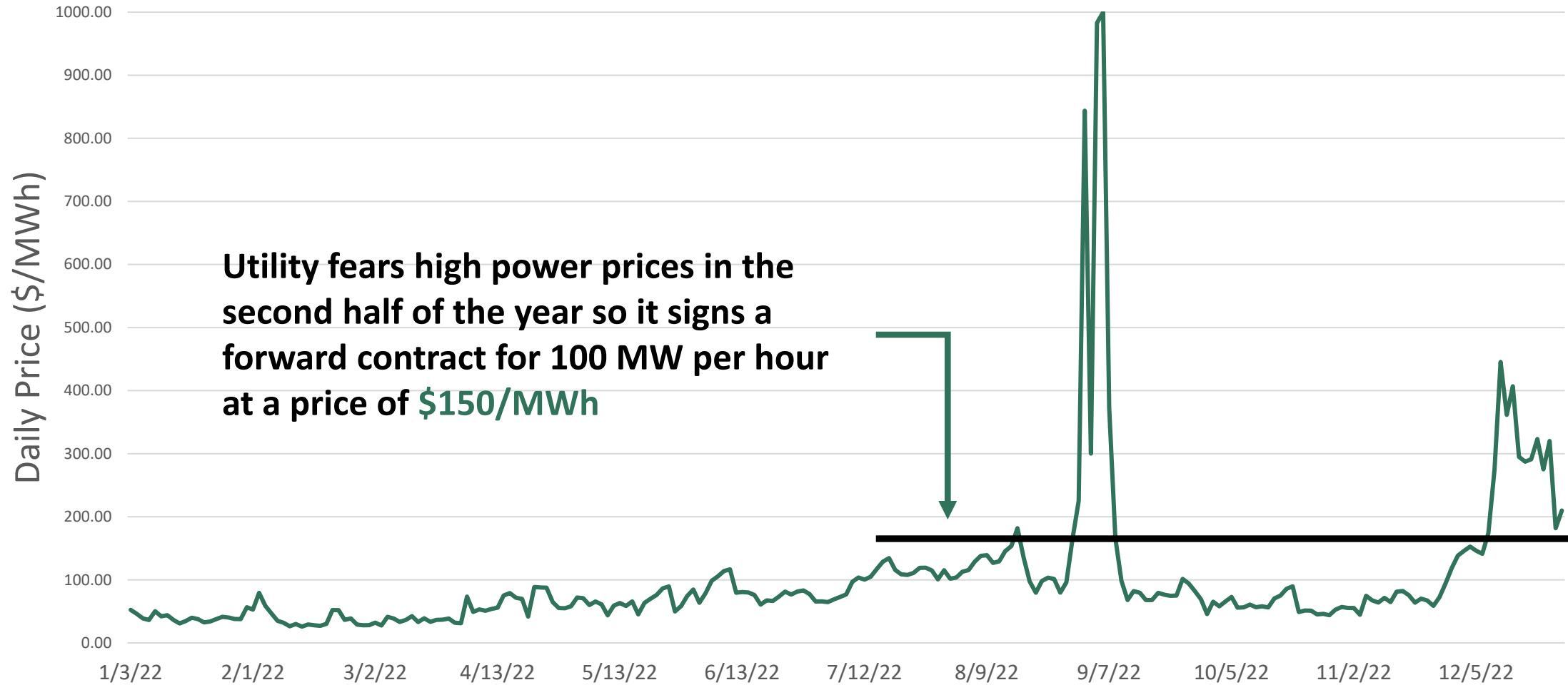


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- **Tolling Arrangements**

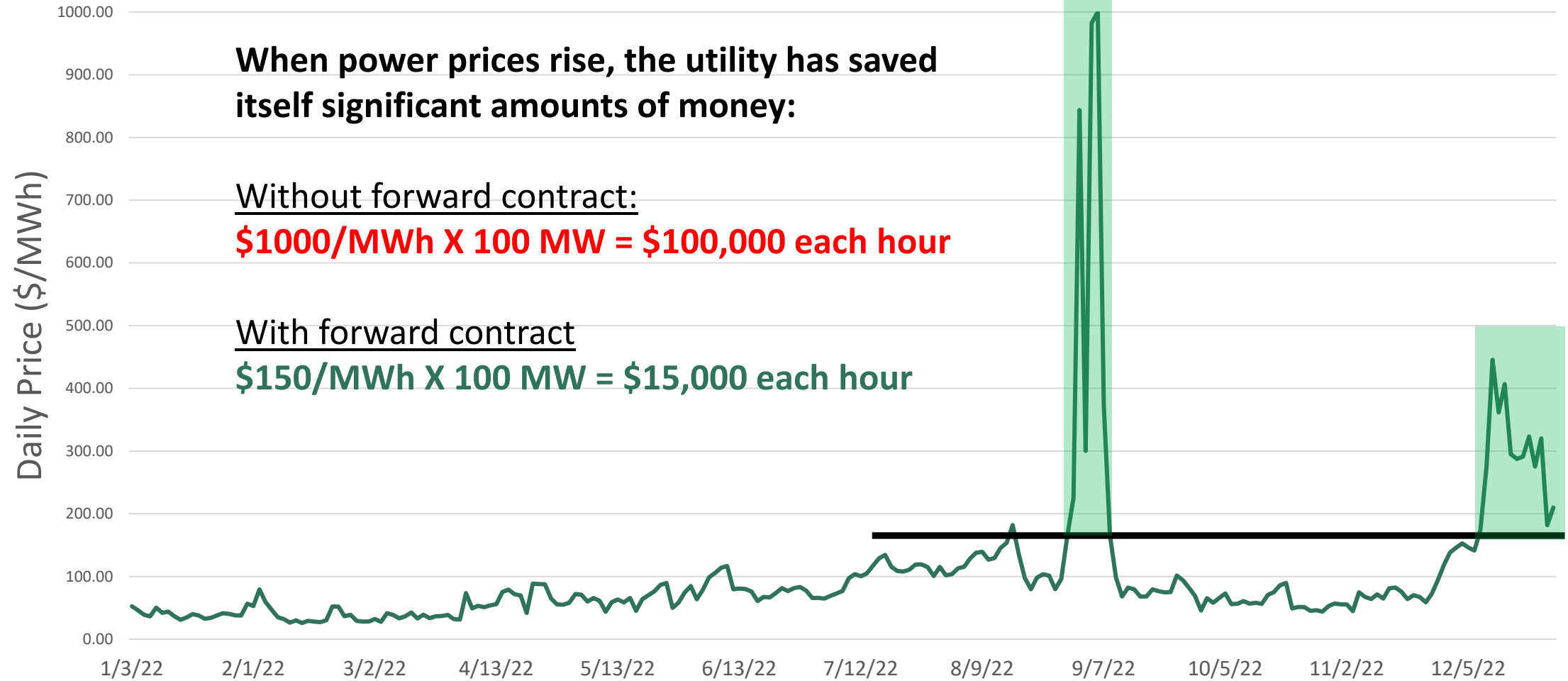
Forward Contract Dynamics

2022 Palo Verde Peak Prices



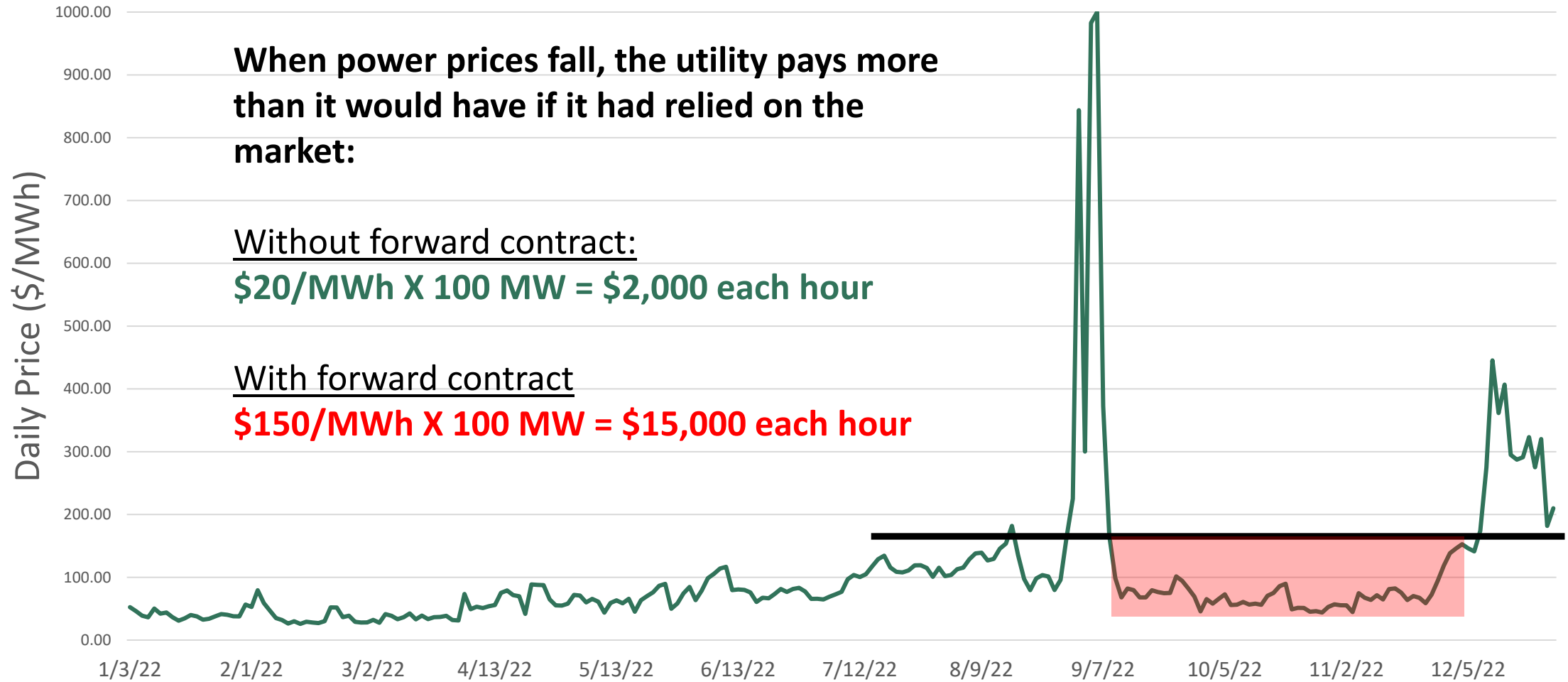
Forward Contract Dynamics

2022 Palo Verde Peak Prices



Forward Contract Dynamics

2022 Palo Verde Peak Prices



Physical vs. Financial Settlement

- Signing a forward contract is an exchange of price exposure for a different type of risk
- **Physical Settlement** - Seller takes on the risk that the buyer will not be able to receive the power they purchased due to:
 - Transmission constraints
 - Lack of capacity
- **Financial Settlement** – Seller does not take on any risk of delivering power to buyer

Risks associated with forward physical purchases

- Power is not delivered in the same way as other commodities
 - The power grid is an interconnected system
- Market participants can mitigate risk by reserving capacity on transmission routes to-and-from the point of sale
- There are many reasons a physical transaction might not be able to be completed
 - Assignment of responsibility is an issue



WSPP Agreement

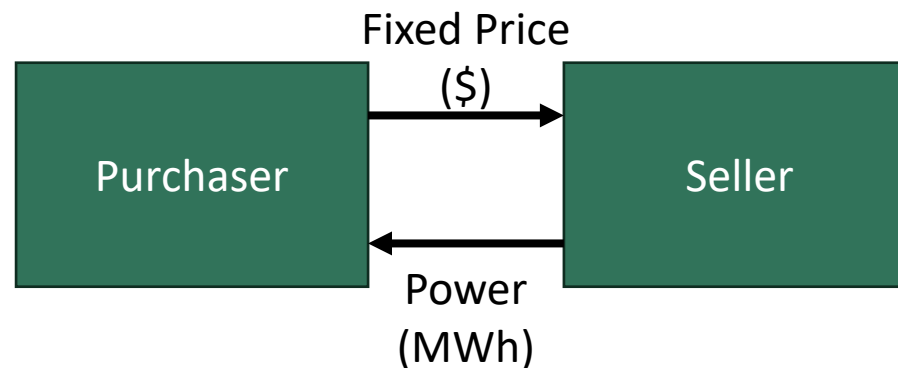
- The WSPP Agreement offers standardized terms for physical energy and capacity, ancillary service, renewable energy and imbalance transactions to WSPP members
- Counterparties have clear guidance for the following scenarios:
 - Failure to deliver
 - Failure to receive
 - Default
 - Creditworthiness concerns
- WSPP agreement is designed to be customizable

WSPP Schedule C

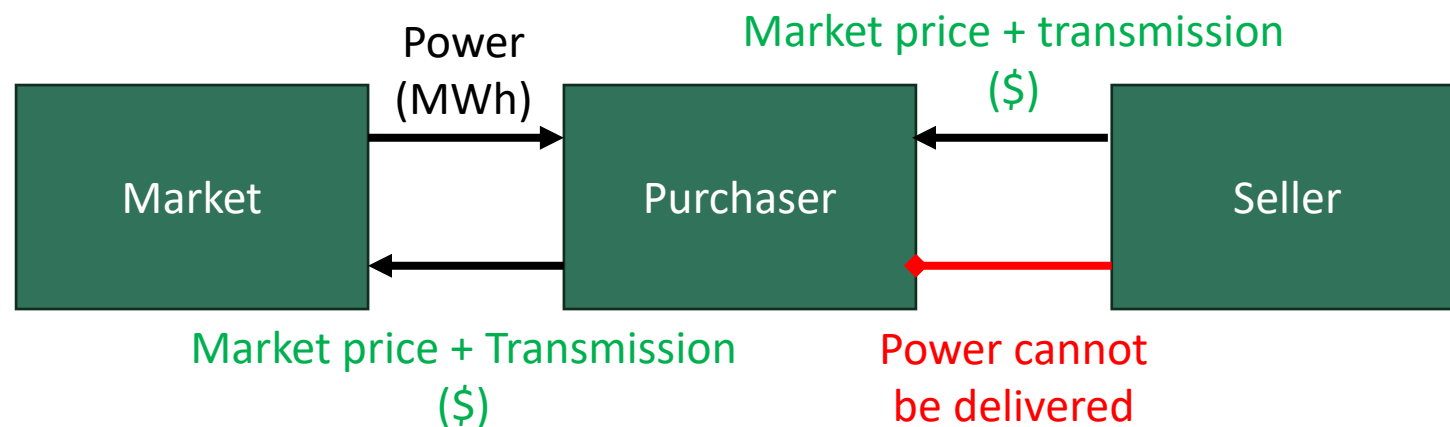
- WSPP Schedule C is the standard contract for bilateral physical energy purchases in the West
- Most entities said transactions conducted under WSPP Schedule C represented more than 80% of their market activity
- Uses liquidated damages to ensure purchase is "firm"

Liquidated Damages

Standard Case

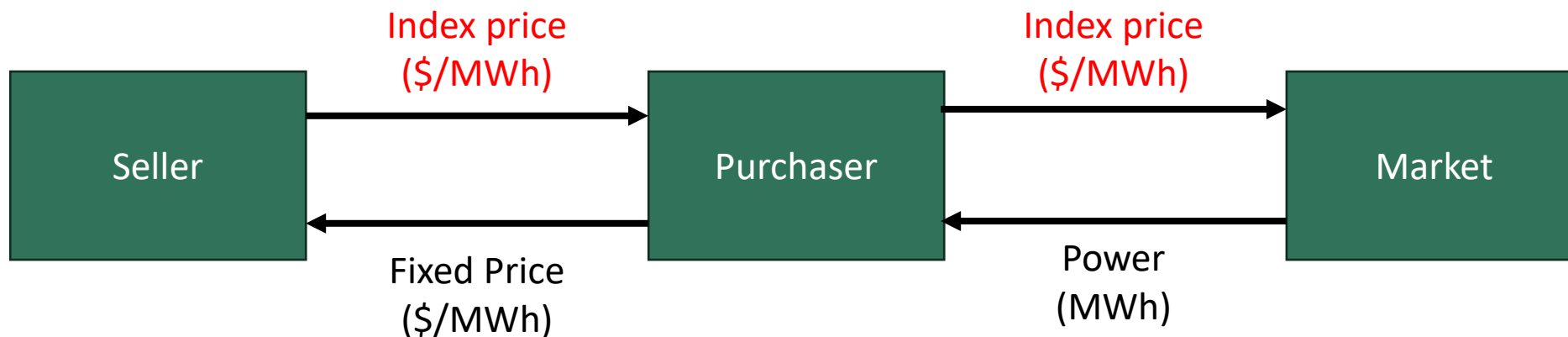


Seller is unable to deliver



Financially-Settled Forwards

- A financially-settled contract performs the same price hedging function as a physically settled contract, **without requiring the seller to pay liquidated damages** if power cannot be delivered
 - Still an exchange of default and credit risk
- Assumes power can be physically delivered from the hub where the index is located



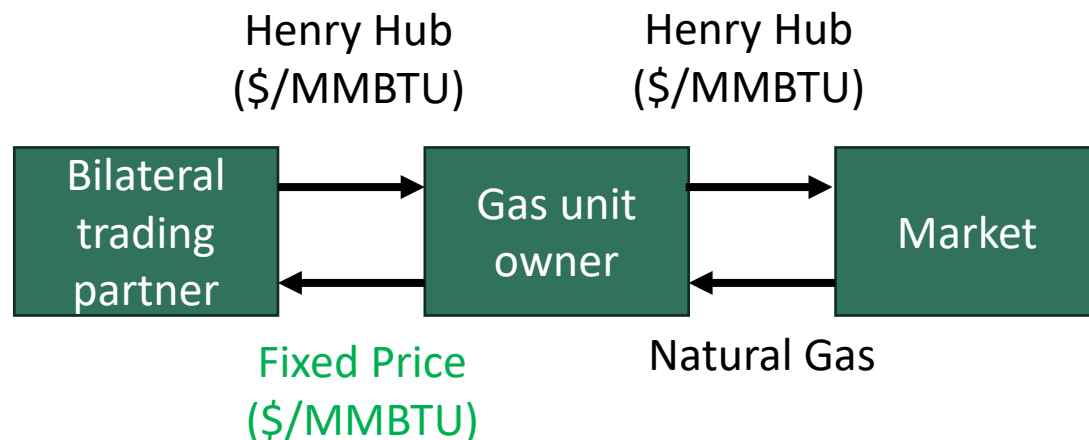
Role in RTO/ISO Markets

- Fixed-for-Float Swaps play a crucial role in RTO/ISO markets
- As delivery is managed by the RTO/ISO, all forward contracts that are not imports or capacity sales must be financially settled
- For an independent generator, signing a forward incentivizes them to bid their units at marginal cost
- Can keep overall system prices lower

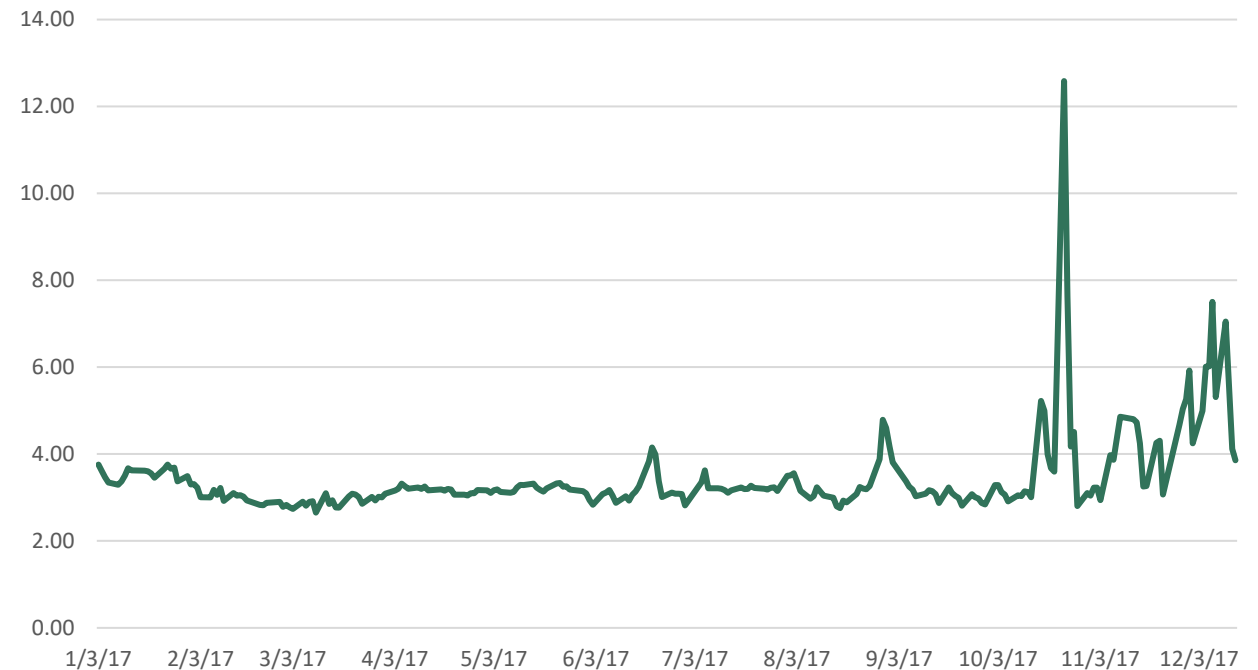
Fixed-for-Float Swaps are commonly used to hedge gas risk

- 88% of utilities used fixed-for-float swaps to hedge gas price risk

Hedging gas using fixed-for-float



2017 Gas Price (\$/MMBTU)
Social Citygate



Regional Differences

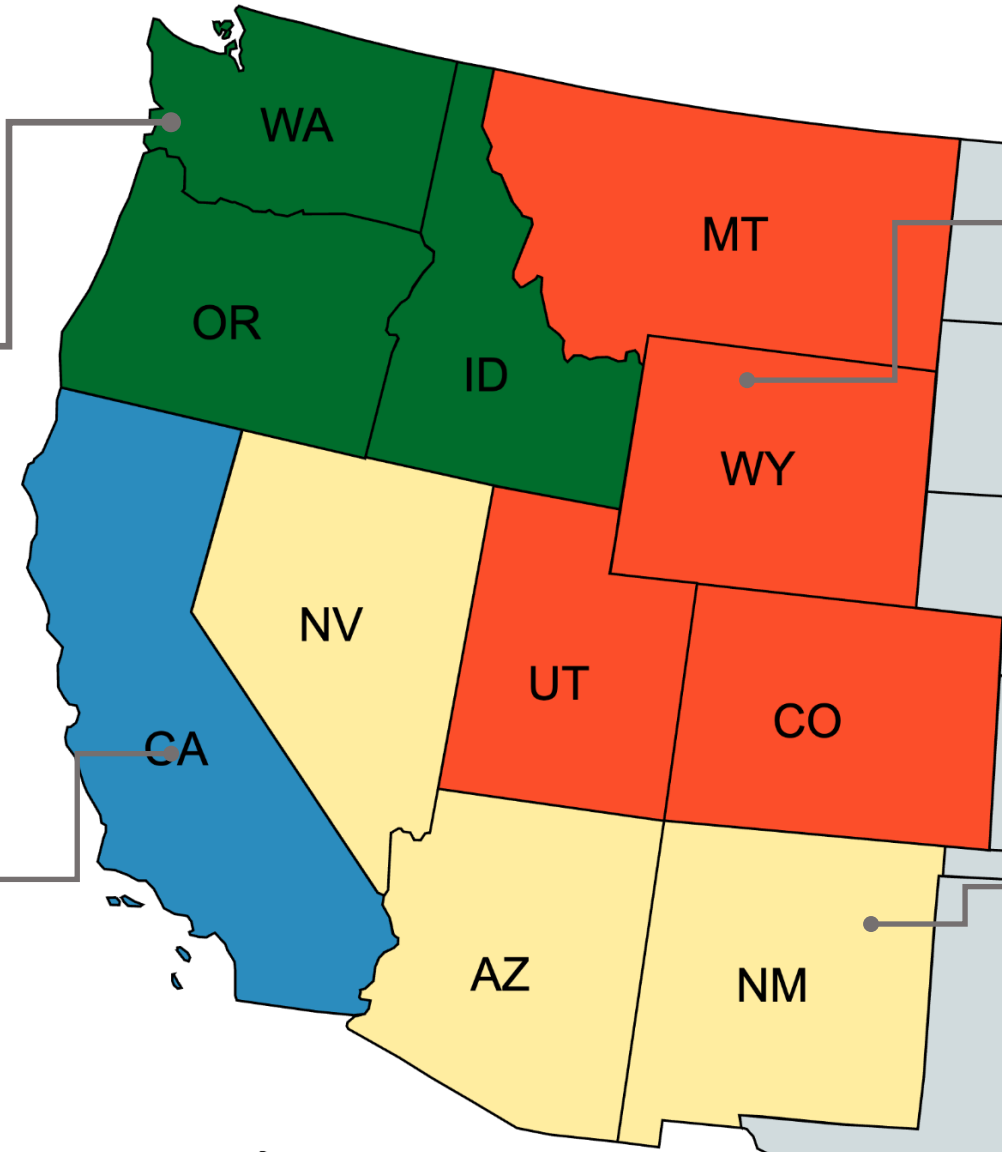
Forward contracting practices vary by region

Pacific Northwest

- MID C
- Traditionally strong liquidity in physical power
- Led to comfort with financial contracts

California

- COB, SP15
- Physical power is transacted to meet RA requirements
- Financial is essential for entities within the CAISO



Mountain West

- MID C
- Distance from trading hubs has traditionally left region isolated
- Focus is primarily on procuring owned generation

Desert Southwest

- Palo Verde, SP15, Mead
- Very low liquidity in power and transmission, efforts are dedicated to sourcing physical

Utilities use many different tools to procure power and manage risk in the term window

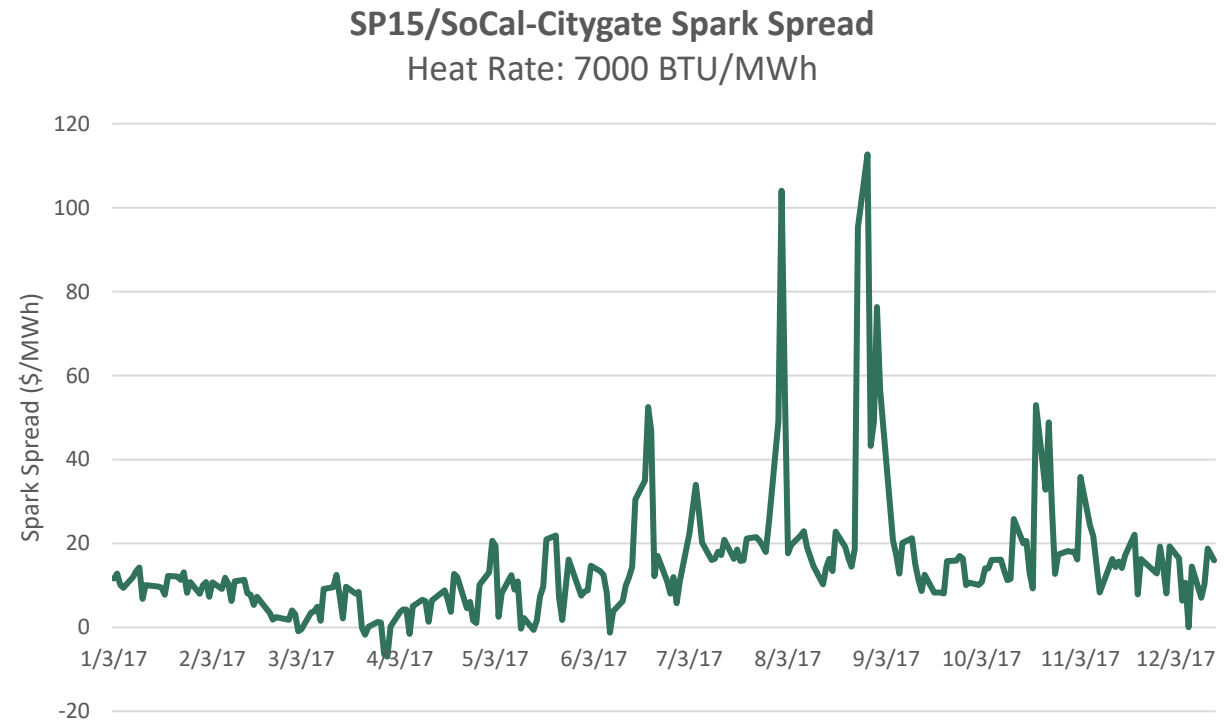
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 - **Heat Rate Call Options**
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Liquidity in options has largely dried up

- Right, but not obligation, to purchase power at a fixed price, in exchange for a regular payment
- Only 20% of utilities use physical options traded on ICE
- Option market has declined since Enron, with few entities willing to take on the risk profile of power options for premiums that the market is willing to pay
- Unlikely to see a substantial recovery in the market unless capacity is greatly increased and new participants enter

Exception: Heat Rate Call Options

- Right, but not obligation to call on a thermal generator at a specific heat rate (efficiency) in exchange for a regular fixed payment
- Heat rate call options are a popular product for utilities to hedge against high spark spreads
- Can be financially or physically settled



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Tolling arrangements are popular, but hard to source

- Utility purchases right to bring fuel and take power for a fee
 - Effectively operates the unit as one of its owned fleet
- Tolling arrangements are perfect hedge for generators – risk free profit assuming baseline performance standards are met
 - Upside is entirely restricted
- Although 55% of utilities said they used tolling agreements, many note that these deals are becoming harder to find
- With tightening capacity and high power prices, many IPPs might prefer to run their own units

Specified Contracting in Western Power Markets

Specification has largely been understood in GHG context

- California Air Resources Board (CARB) import purchase rules – specified sources can use a lower GHG intensity for CTS calculation
- More recently, WA Climate Commitment Act (CCA) has prompted “Non-WA Sink” product at MID-C
 - Concern that MID-C liquidity would decrease if buyers purchasing at MID-C moved to non-ICE bilateral transactions to not pay carbon costs
 - WSPP introduced Non-WA Sink product – LDs for carbon cost if power was sunk in WA

We found a region-wide movement to source-specification for reliability related reasons

- **66%** of interviewed utilities said they actively procured source specified contracts for reliability
- **95%** saw more market activity in these contract types, even if they themselves did not trade them
- Every utility mentioned constrained capacity as a risk to their power procurement operations

What does specification entail?



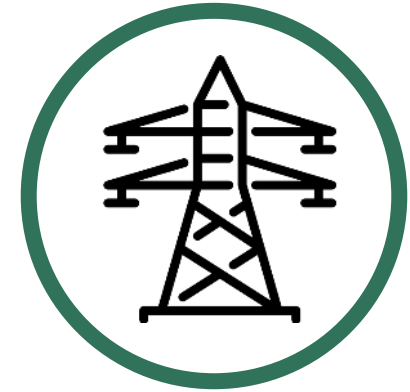
Asset-backed

- Generation capacity is reserved on a single or group of units
- Takes on greater risk of outage



Geographic Limitation

- Power is sourced or sunk away from a specific region
- Often structured as exclusionary constraint, i.e., Non-CAISO



Transmission Path

- Power must be delivered along a specific transmission path

Bottom line: Source-specified contracts provide an improved risk profile for a premium

Regulatory resource adequacy programs have driven this change, but are not the full story

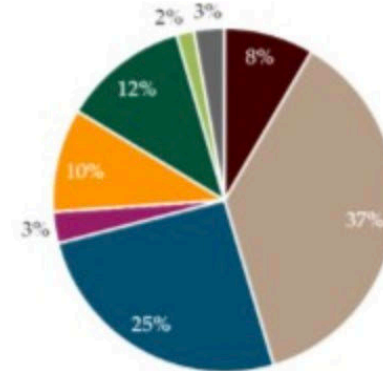
- Western Resource Adequacy Program (WRAP)
 - Forward showing requirement – prove you have procured adequate capacity 7 months in advance for 1-in-10 scenario
 - Operational component – Provides automatic capacity sharing for participants if they have a deficiency – at a high cost
- Market purchases must be specified to qualify for forward showing requirement
 - Joint Capacity Attestation Form – bilateral agreement to prevent double counting of capacity
 - Must be specified unit or system sale with NERC priority 7 or 7 Point to Point transmission firmness
- However – WRAP does not enter binding phase until 2028

Retirements of dispatchable resources are the primary driver of this change

- WECC State of the Interconnection reveals a significant decline in dispatchable capacity due to emissions reduction mandates
- 77% of utilities mentioned lack of dispatchable capacity as a primary challenge

Power Generation in WECC 2010-2021

Western Interconnection
Capacity 2021 (MW)



The total generation capacity in the Western Interconnection was almost 286 GW in 2021.

5-Year Lookback

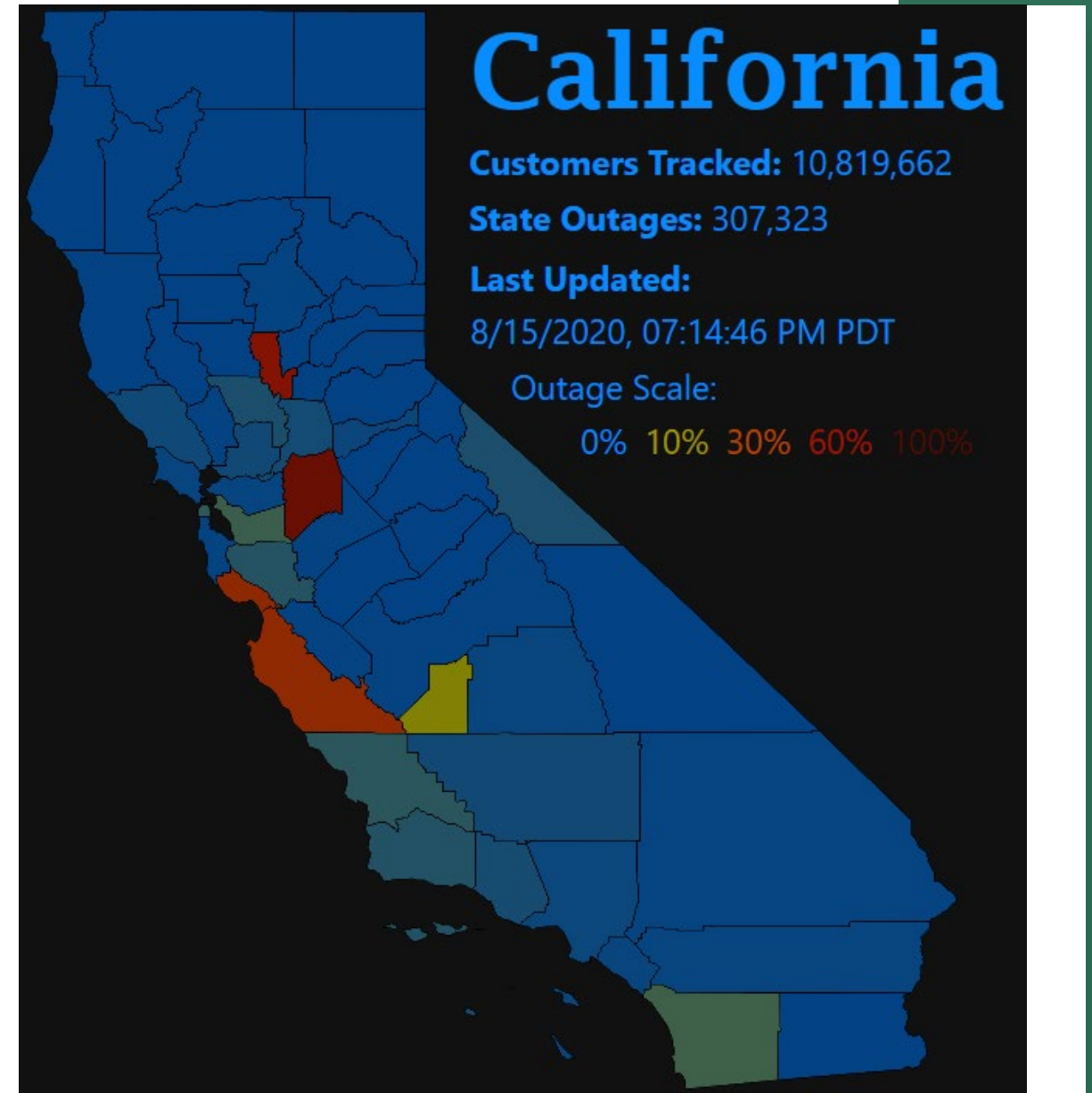
	2017	2021	% Change
Coal	37 GW	24 GW	-35%
Natural Gas	101 GW	106 GW	+5%
Wind	23 GW	34 GW	+48%
Solar	16 GW	28 GW	+75%
Hydro	72 GW	73 GW	+1%
Nuclear	8 GW	8 GW	-

Source: [WECC State of the Interconnection 2023](#)

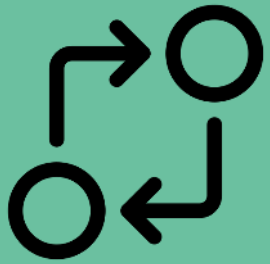
August 2020 Blackouts

Outside of CA

- Constrained capacity environment within California led to non-delivery of physical forward contracts in the Desert Southwest
- “Between Aug. 17 and 23, NV Energy saw more than 7,100 megawatts of purchased electricity curtailed.” – NV Insider
- NV Energy, APS, SRP, TEP issued voluntary curtailment requests to customers
- Entities with curtailed transactions were exposed to extremely high market prices, using Northwest Power Pool reserves



Three key realizations came from August 2020 situation



Capacity situation in the West was more constrained than regional resource adequacy reports predicted

- “Based on the CEC’s revised analysis, taking into account 35 years of weather data, the extreme heat wave experienced in August was a 1-in-30 year weather event for August.” – Final Root Cause Analysis



CAISO exports were not reliable in the case of capacity shortfalls due to export and wheel through curtailment

- California proposed revisions to its OATT to FERC in June 2021, which were accepted despite protests from surrounding utilities
- Although revisions clarified wheel through and export priorities, concern persisted that CA still presented a major risk



Liquidated damages were not sufficient to guarantee physical delivery in extreme grid conditions

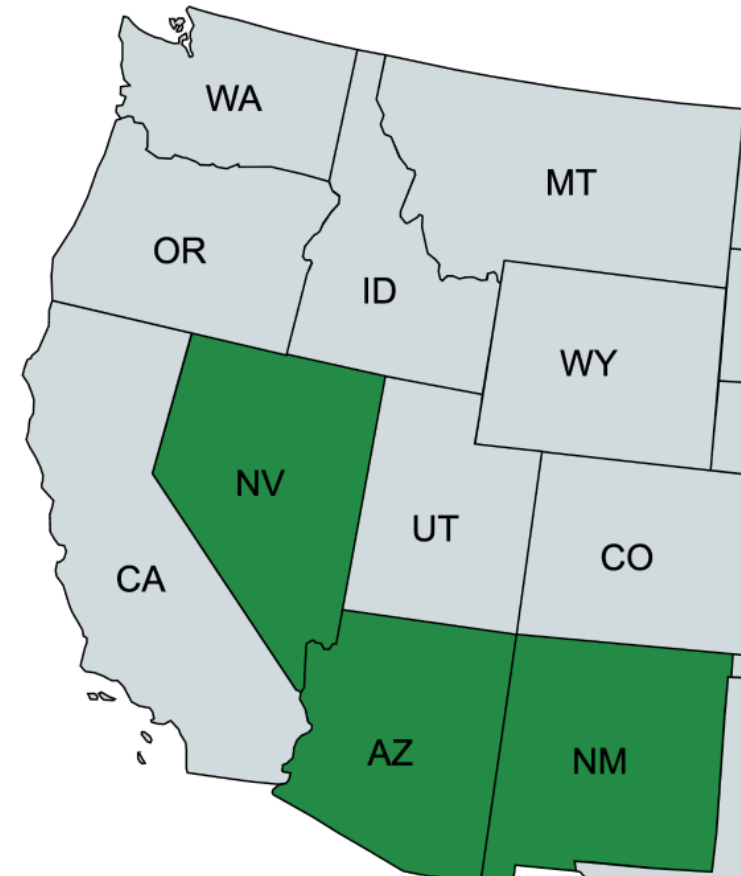
- Liquidated damage payments due to non-delivery did not adequately protect utilities from cost of lost load
- Purchases from marketers might result in liquidated damage payments instead of firm delivery

Effect on the Bilateral Market

- Physical forward power trades at a significant premium to financial at major hubs (Palo Verde, Mid C, SP15)
 - Pre-2020 \$2-5 premium was normal
 - Post-2020 \$15-30 premium is standard for peak months
- Forward procurement has begun to move away from unspecified WSPP Schedule C power
- Non-CAISO source products have become widely traded in the Desert Southwest region
- Marketers and utilities that recognize they have premium products have taken advantage of the premium price

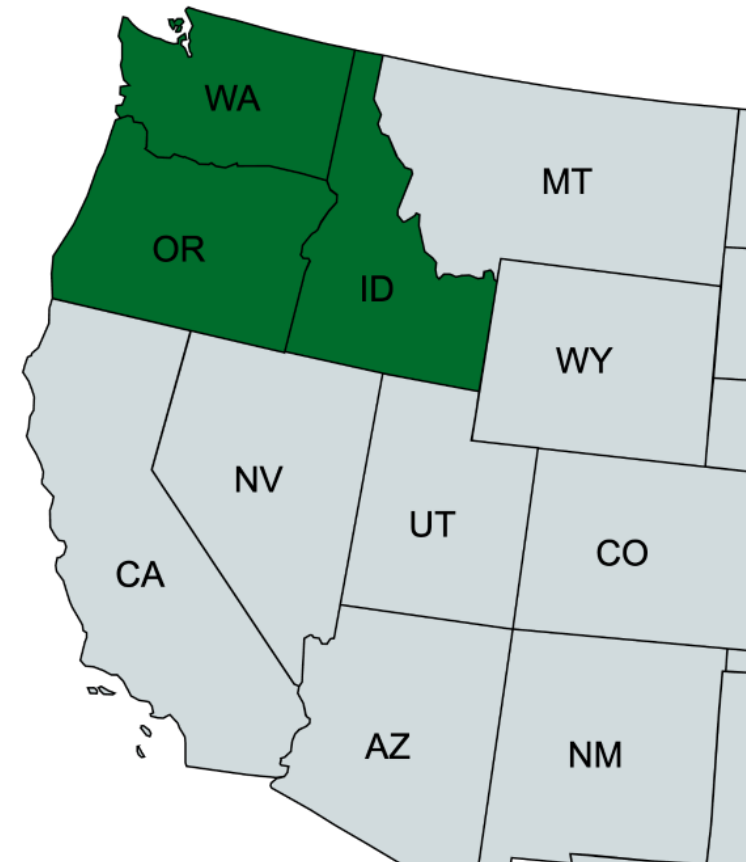
Desert Southwest

- Most dramatic movement to source specification since August 2020
- “We aim to be 100% source specified for summer months”
- Attempt to purchase Non-CAISO source “whenever possible”
- Still substantially reliant on purchases that wheel through California



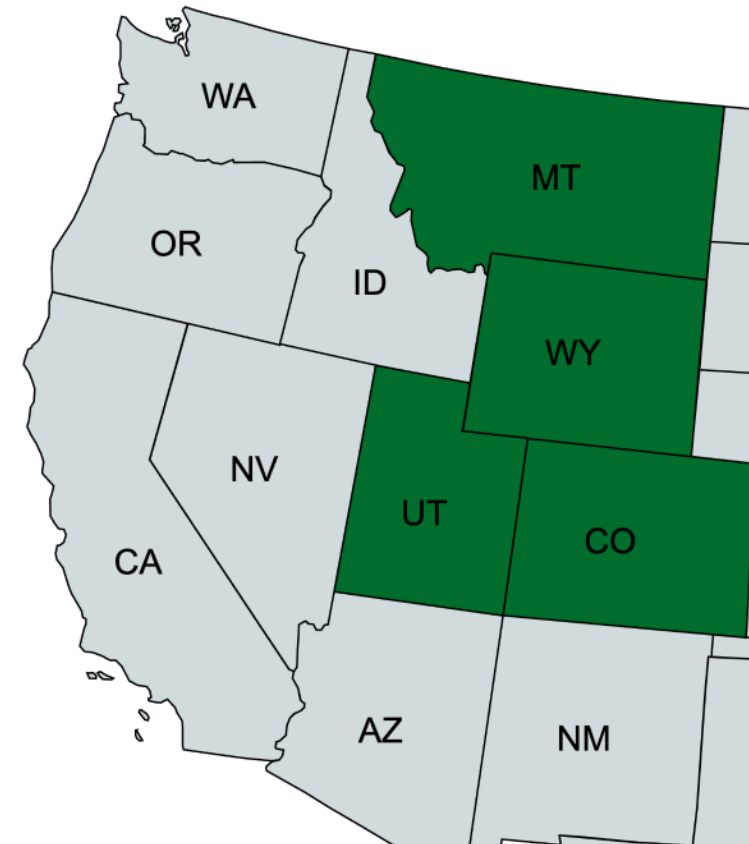
Pacific Northwest

- Transitioning from a traditionally capacity long, energy long, net exporter to a new paradigm of short capacity, short energy
- Movement to specification for reliability is beginning, but there is still significant reliance on unspecified purchases
 - Contract specification mentioned on many 2023 IRP or IRP updates
- Specification has been driven primarily by GHG accounting requirements so far



Mountain West

- Capacity has traditionally been short due to regional isolation
- Entities have focused on procuring capacity contracts, investing in owned generation assets for term needs
- Few utility counterparties for capacity procurement, most conducted with IPPs, marketers, and banks
 - Additional stipulations are always added to WSPP Schedule C



Utilities across the West are questioning whether liquidated damages are enough

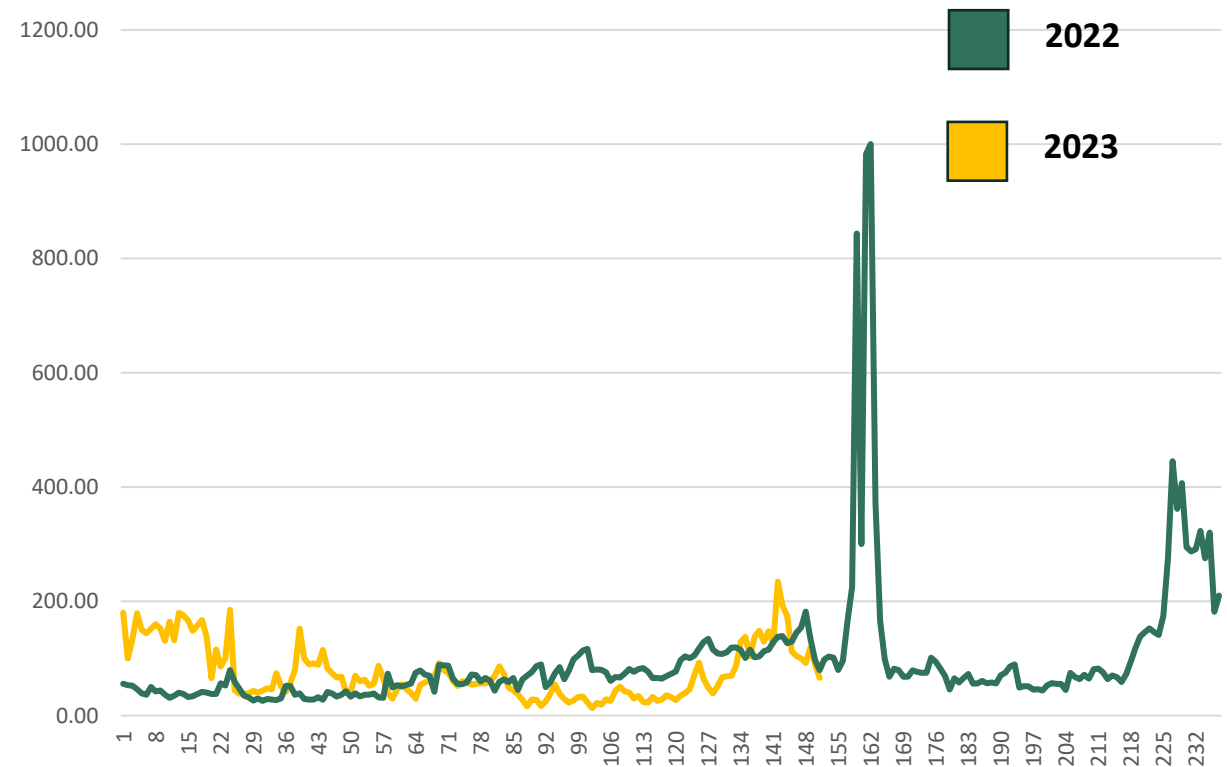
- FERC Order 816 – “Not interruptible for economic reasons”
- Liquidated damages are the technical definition of a firm energy purchase
- However, liquidated damages only cover the “cost of replacement,” not the cost of lost load
- In a capacity constrained environment, liquidated damages do not provide adequate protection against the true costs of being short
- A seller who pays liquidated damages for a few crucial hours might still come out of a transaction profitable

Is the risk profile worth the premium?

- Specified products are capacity/system sales with LDs included, thus giving the seller an incentive to procure power in the market in the case of outages or curtailment
- Specification gives the buyer confidence that there is a generation unit behind the transaction
 - Prevents overselling of resources
 - Limit's ability of marketers to procure short term power to meet long-term sales
- Transmission specification improves resiliency of power supply

Palo Verde Peak Prices

2022 vs. 2023

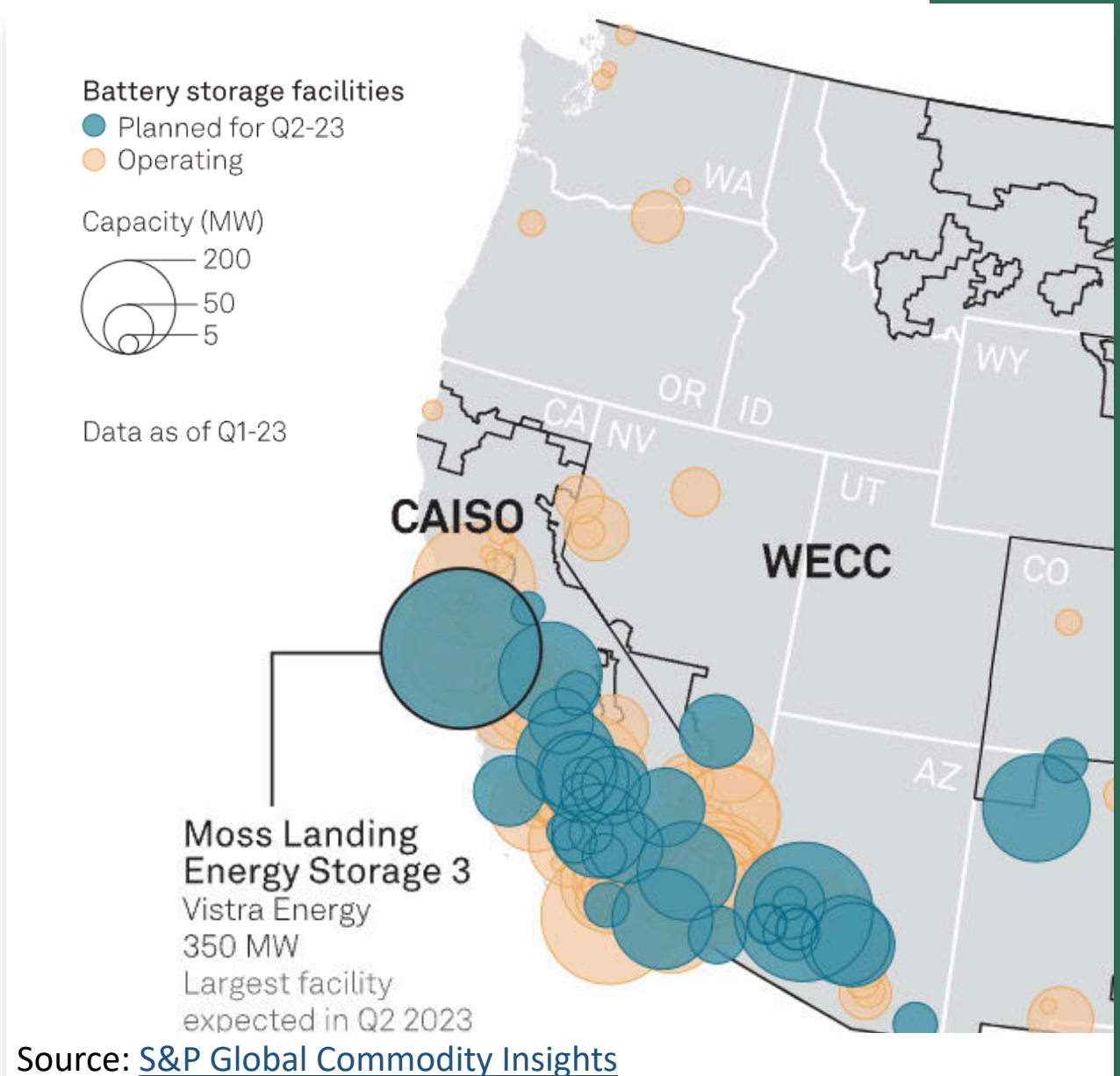


Non-CAISO Source Products

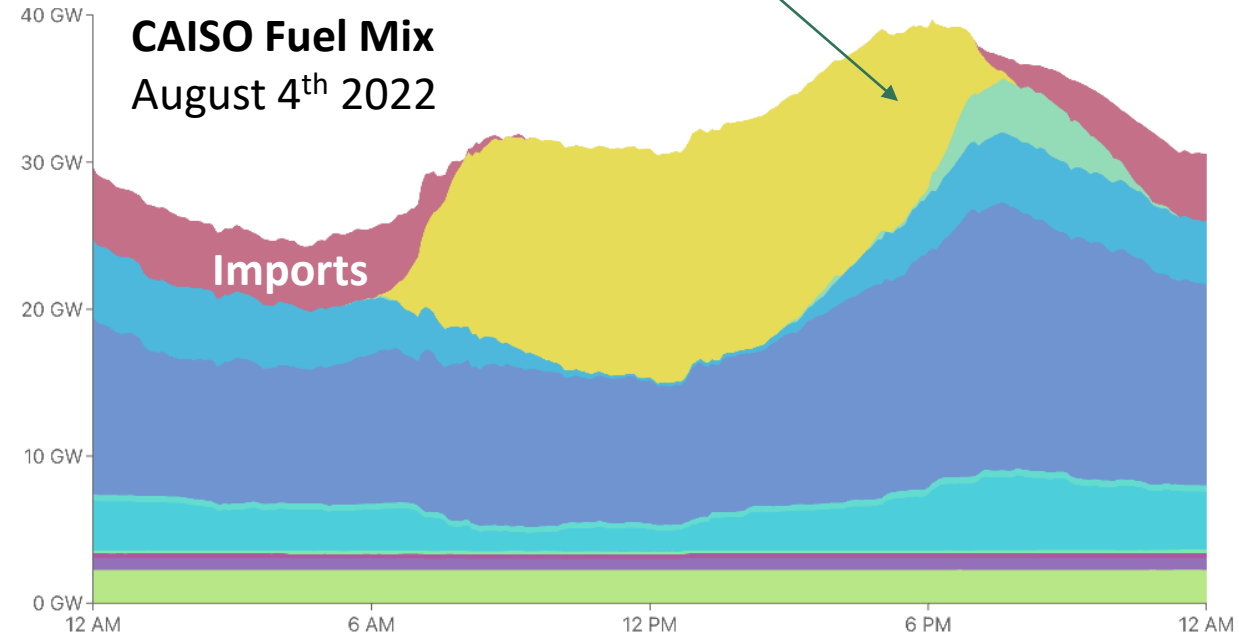
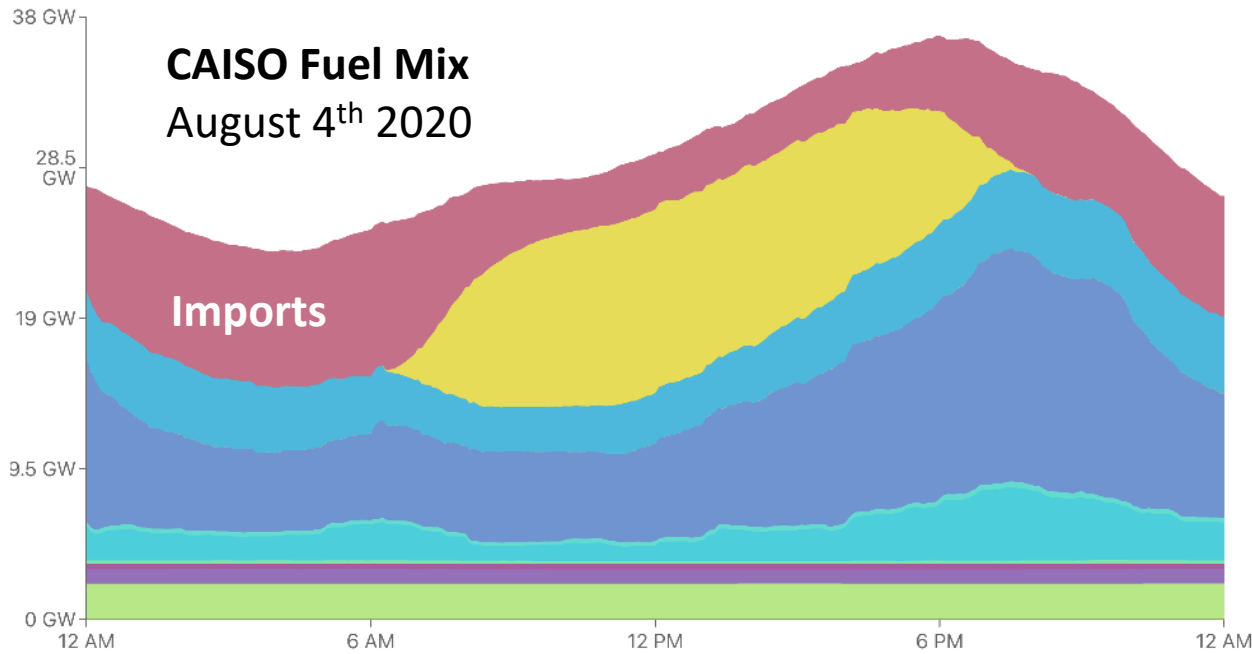
- Non-CAISO source products developed in 2021 and 2022 to avoid curtailment issues
 - CAISO 2021 FERC Tariff exacerbated distrust between DSW + Hydro marketers and CAISO
 - 80% of DSW utilities said they had procured Non-CAISO source products since 2020
- Looking ahead, we believe these contracts are unlikely to be cost-effective for the risk reduction they provide

CAISO leads the West in dispatchable capacity additions

- Strong support from the CPUC for new capacity additions
 - June 2021 – 11.5 GW new capacity
 - February 2023 – 4 additional GW Net Qualifying Capacity
 - 5199 MW storage in CAISO vs. 546 MW in rest of WECC (Q1 2023)
- Capacity within CAISO might become critical for the rest of the Western Interconnection's RA goals



CAISO has become occasional exporter during afternoon ramp



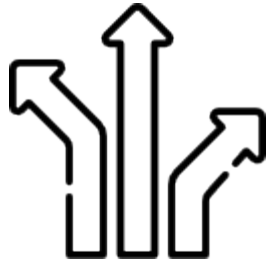
- While CAISO is likely to remain a net importer, CAISO-source market products will provide useful, cost-effective capacity for the rest of WECC
- Export rules under FERC Tariff should provide adequate risk characterization of these products
- Non-CAISO source products are unlikely to substantially improve risk profile

Specified Power Purchases – Conclusion

- We identified a shift to contract specification for reliability purposes throughout the West
 - Southwest – Most significant, in reaction to August 2020 blackouts
 - Northwest – Slower transition, but ongoing reaction to new market paradigm
 - Mountain West – Largely already in place due to isolation from major markets, accelerating for similar reasons
- Ultimately, this change is a sensible reaction to a market that is short on capacity
- We believe this transition will continue in light of WRAP and state emissions reduction programs, but should be guided by policy that ensures efficient market function

Consequences of a More Irregular Use of Gas Units

Gas Hedging Strategies



Vary significantly between utilities



Taking into consideration outcomes from previous trades



Depending on utility's risk management policy and instructions from regulators to hedge to a greater or lesser extent

Decorrelation between gas and power prices is seen as a major, but long-term issue

- As renewable penetration increases, gas units are less and less often the marginal ones to get dispatched
- The decorrelation between power price and gas prices is making it more difficult to hedge power price risk with gas
- This phenomenon is already occurring and expected to worsen
- In the foreseeable future, it is impossible to do without dispatchable resources
- Few alternatives to gas units currently available



Increase of peak uses of gas units will put a strain on infrastructure

- Gas production and demand are relatively constant in the short term
- Increasingly irregular uses of these resources will make balancing supply more difficult and push the infrastructure to its limit
- Storage and regional coordination will become crucial

Guaranteeing cost-recovery of dispatchable units will be necessary for reliability purposes

- As utilization rate drops, conventional resources are receiving less and less revenue from the energy market
- Yet, these are still required for resource adequacy
- How to guarantee cost-recovery and incentivize investment?
- Potential solutions: capacity markets, FERC subsidies, long-term RA contracts...

Risk incurred by grid operators regarding gas units on the short-term is primarily political

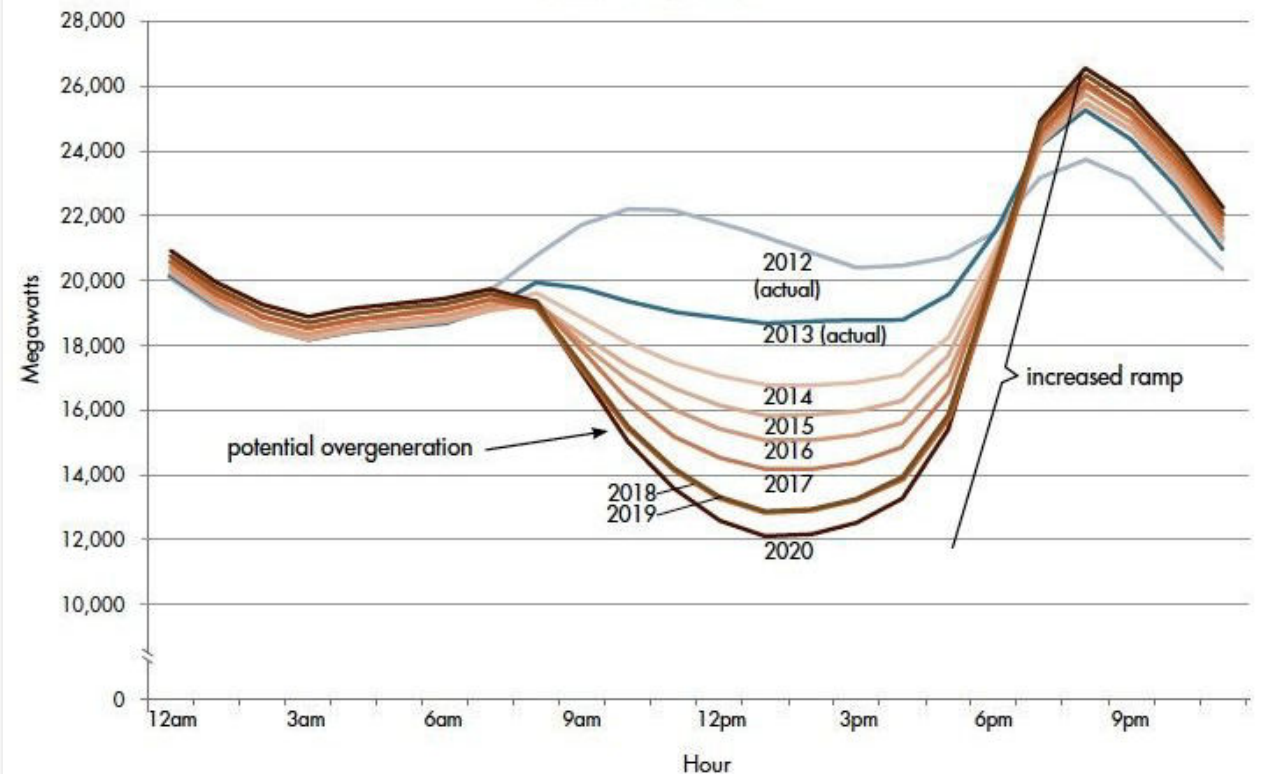
- Gas units appear to be essential to run the grid for the foreseeable future, particularly during crucial peak hours
- All the more as renewable penetration increases
- Legislation limiting use of gas units can make the grid much harder to run



Increased Need for Superpeak Products

Current contracts' delivery time does not match utilities' needs

- 2 block products:
 - On-peak: 7am-11pm
 - Off-peak: 11pm-7am
- With renewable penetration, net load is far from being constant over the on-peak block (duck curve)
- Uncertainty associated with renewable generation
- Need for hourly-shaped products, especially in the day-ahead market
- Particularly for needle/superpeak hours (5pm-10pm)
- Need for more flexible and dispatchable resources (batteries, hydro, gas, coal...)



CAISO's net load on March 31, from 2012 to 2020

Lack of standardized hourly products

- On-peak and off-peak continue to be the most liquid markets
- Nominal liquidity years in advance due to exposure; rather in dispatchable resources in the day-ahead market
- Currently, utilities have several options:
 - Buy on-peak most of the time, hence paying for energy they do not need
 - Resort to capacity products, but pay a monthly charge for a few hours is also cost prohibitive
 - Negotiate for super peak hours at fixed price or as a percentage of daily index, through bilateral structured transactions (more and more liquidity on ICE)
 - Bid into CAISO's MRTU hourly market for utilities neighboring California
 - In real-time, bid into imbalance markets

Recommendations

1. Regulators and policymakers should encourage the industry to work with WSPP to develop a WRAP-compliant Resource Adequacy contract

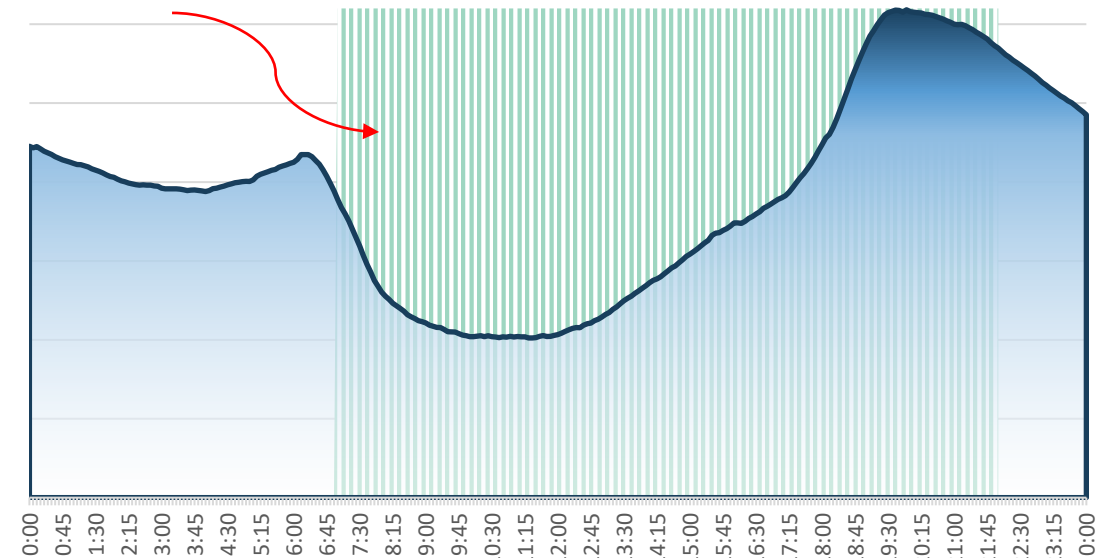
- Utilities are contracting for resource adequacy, but are doing so using specified contracts that often have significant variation
 - Customization will always have a role in the market, but liquidity and visibility is damaged when everything must be negotiated
 - Contracts that require negotiation tend to push entities towards counterparties they are experienced with, potentially missing economically efficient transactions
- A new WSPP schedule or exhibit within Schedule C that provided WRAP-compliant RA would be a huge asset to buyers and sellers
- WSPP needs large majority present at meetings to make introduce schedule or exhibit to agreement

Integration with Day-Ahead Market

- Seasonal block products providing RA conflicts with market expansion proposals
- Proposed product could allow for optimized dispatch in the day-ahead market, while still providing RA guarantee

Procuring block contracts to meet peak load can be inefficient

Excess power will generally be sold at a loss



2. Regulators and policymakers should encourage the use of fixed-for-float contracts as day-ahead market expansion approaches

- Financially settled contracts are especially important in organized market designs
 - Incentivize generating companies and/or utilities to bid units into the day ahead market at their marginal cost up to the amount of power they have agreed to sell
- Many utilities do not currently engage in financially settled forward contracts due to guidance from their PUCs or established practice
- PUC should consider re-evaluating their policies towards the use of fixed-for-float contracts in light of day ahead market proposals
- Utilities who are able to engage in financially settled markets but currently refrain should consider studying how they might employ these contracts in a day ahead market scenario

3. Regulators and policymakers should conduct further research into the consequences of gas units running more irregularly

- Highly complex topic that deserves a more quantitative approach than we have been able to apply
- As gas use becomes more irregular, more strain is put on the gas transportation system to provide flex capacity
- Gas units may be incentivized to stay in the market for reliability purposes
- Dynamic is not here in the majority of the west yet, but could arrive within the decade depending on renewable additions, retirements
- PUCs are well positioned to lead research into effect on combined gas and power system

4. Regulators and policymakers should encourage region-wide data sharing efforts

- Useful quantitative data for the bilateral markets is extremely hard to find – ICE price history is expensive and inconclusive for most projects
- RTOs are able to provide basic, daily information on prices, resource mixes, load profiles with adequate anonymization
- A standardized approach to data collection of this nature throughout the West would be a valuable resource



Western Interstate Energy Board

Thank you!
Q&A