



Western
Area Power
Administration

Arizona Tribal Energy Association



February 18, 2021

Tim Vigil
Senior Vice President and CRSP
Manager

New CRSP Power Rate WAPA -190



ATEA Meeting, February 18, 2021

New Rate Effective October 1, 2020

	Old Rate October 1, 2015 – September 30, 2020	New Rate October 1, 2020 – September 30, 2025
Rate Schedule	SLIP-F10	SLIP-F11
Energy (mills/kWh)	12.19	11.43
Capacity (\$/kWmonth)	5.18	4.85
Composite (mills/kWh)	29.42	27.45
Work Plan	FY 2017	FY 2021

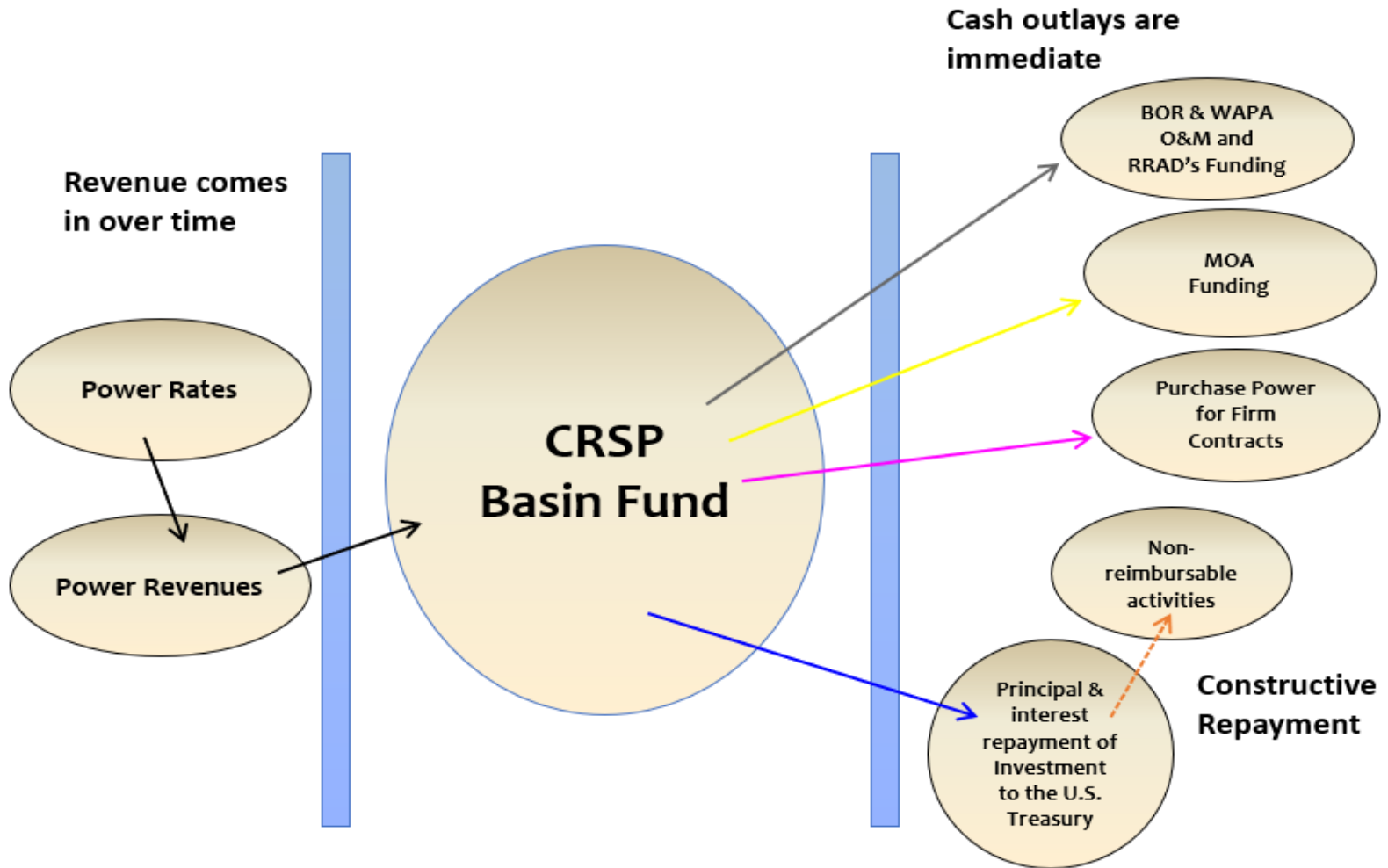


CRSP Operations, Operating Needs, and Cash Outlays

1. Annual Operations & Maintenance (O&M)
2. Replacement, Retirements, Additions, and Deletions (RRAD's) – Capital projects (Amortized)
3. Memorandum of Agreement (MOA)
4. Purchase Power and Wheeling (PPW)
5. Emergency Expenditures
6. Returns to Treasury



Basin Fund Cash Flow



Glen Canyon Electrical Production

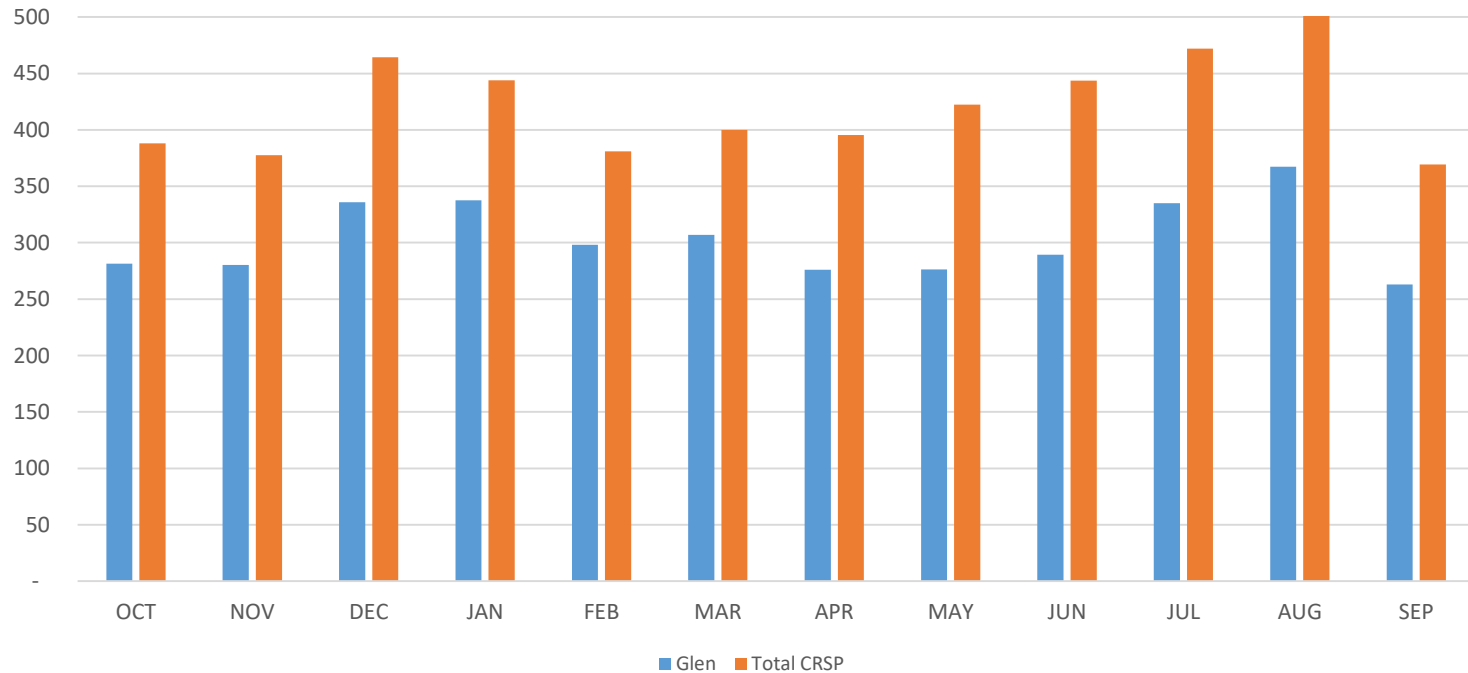


ATEA Meeting, February 18, 2021

WY 2020 Electrical Production Glen Canyon Dam & Total CRSP

TOTAL GCD = 3,823,966 MWhs

WY 2020 Electrical Production
GCD & CRSP
TOTAL GCD = 3,647 GWhs



How Does WY 2020 GCD Electrical Production Compare With 2019?

GCD Electrical Production: 2020 vs 2019		
2019	3,823,966	MWhs
2020	3,647,451	MWhs
Difference (2020 - 2019)	(176,515)	MWhs
Percentage Difference	-4.62%	



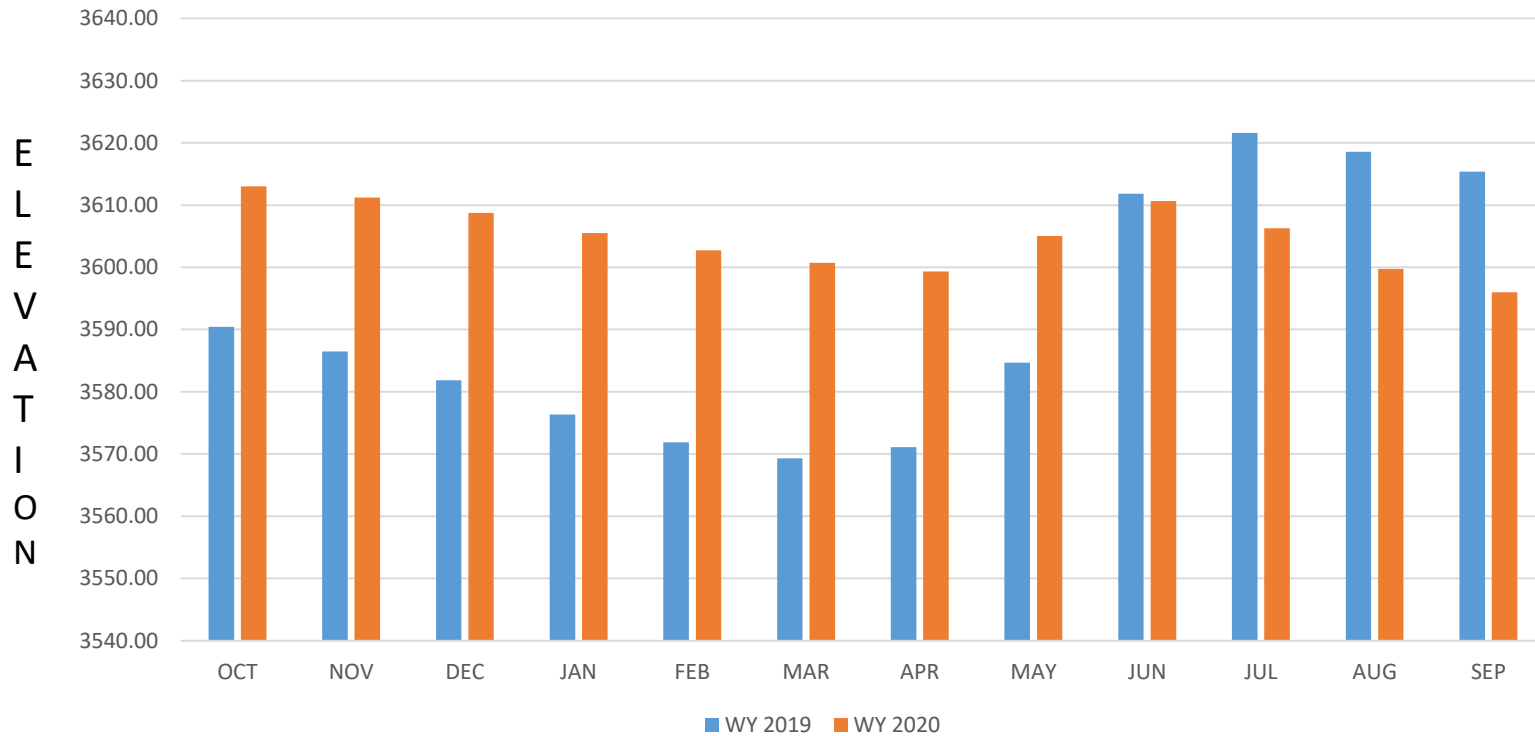
Changes in Hydropower Head Affect the Efficiency of Electrical Production

hydropower head = elevation of Lake Powell – elevation of GCD tailrace

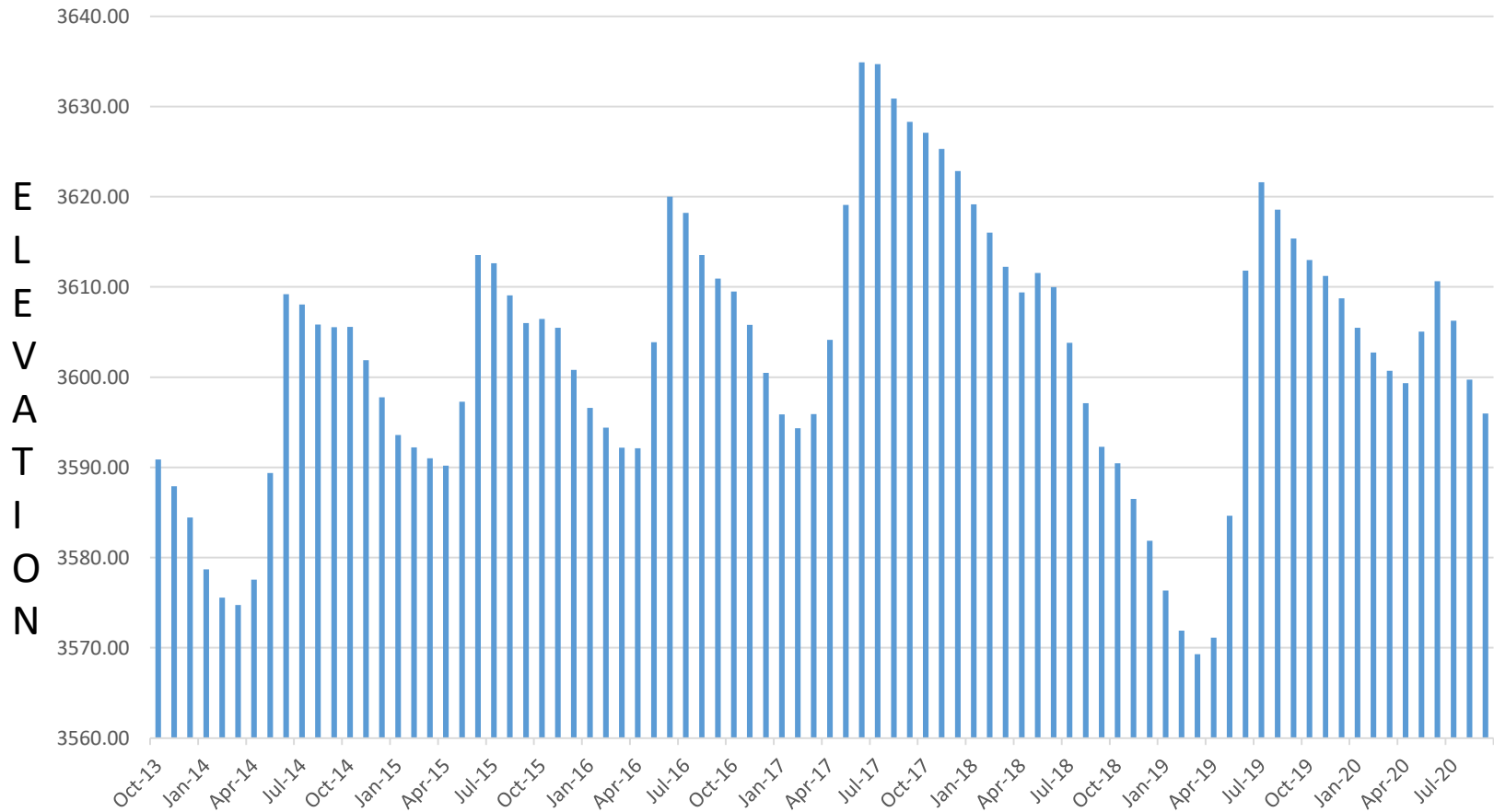


Lake Powell elevation 2019 vs 2020

Lake Powell Elevation
WY 2019 vs WY 2020



Lake Powell Elevation: 2014-2020



Purchased Power



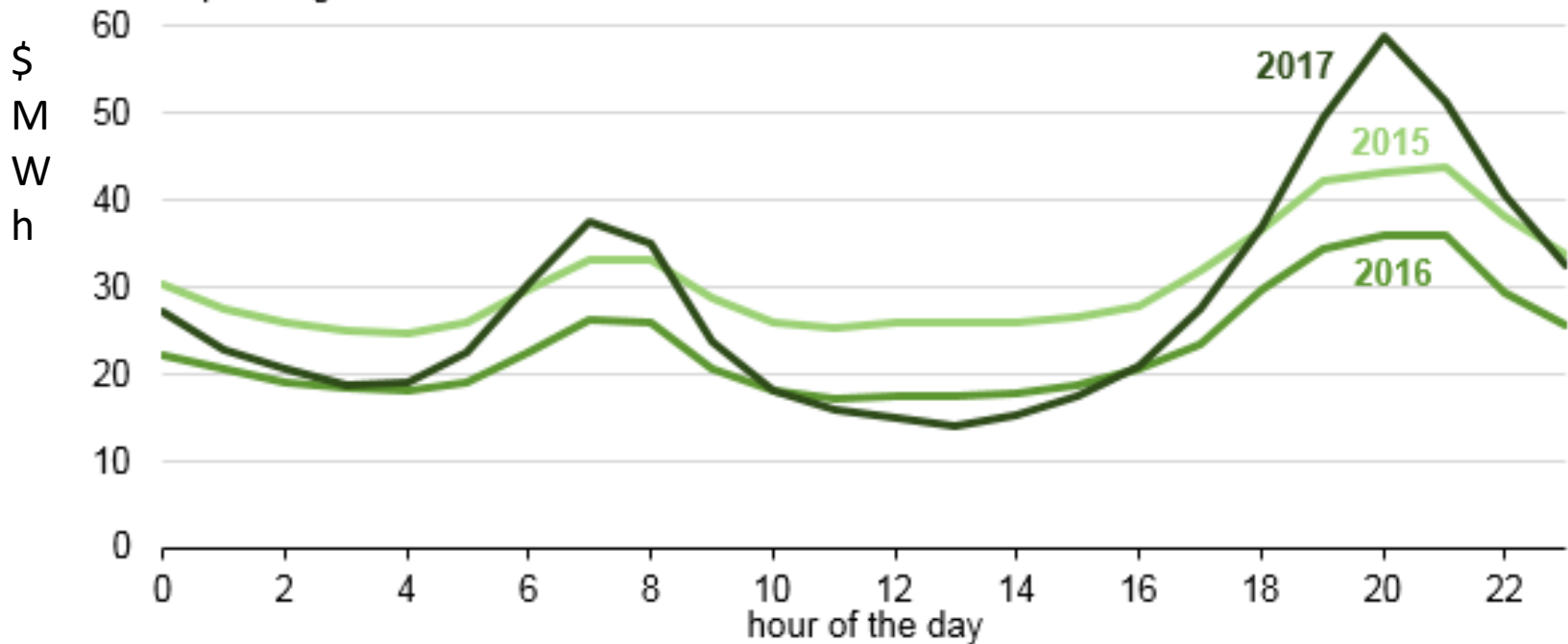
Wholesale electrical prices had been falling. Recent prices are up.

- Decrease in market-wide average wholesale prices since 2008 is largely due to changing natural gas prices
- 2020 has seen increasing wholesale electrical prices in the West. Is this a new trend or just a blip?
- The most valuable times of day for electrical generation are changing
 - Significant additions to wind and solar generation are having a more consequential impact on temporal and geographic pricing patterns

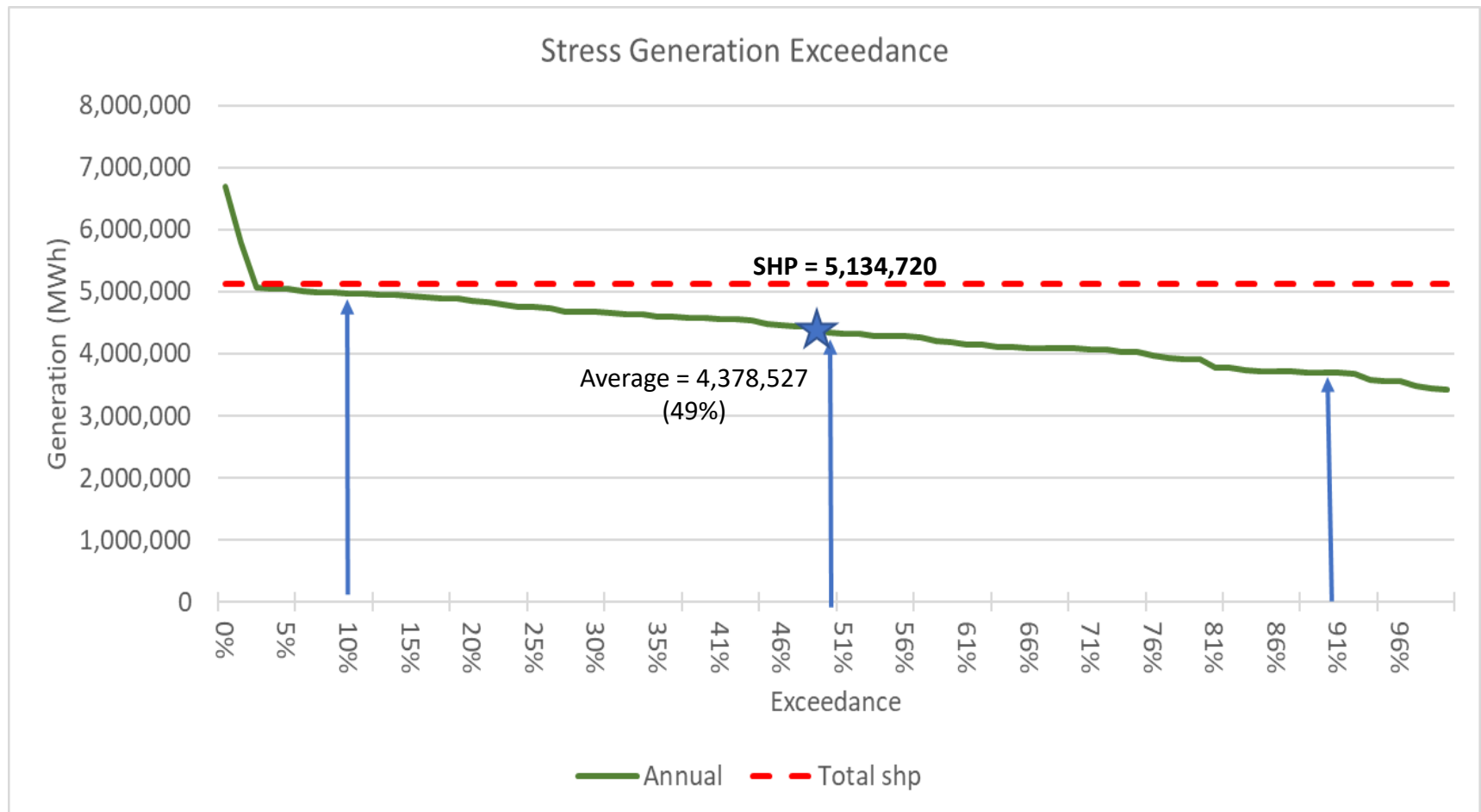


Impact of “Duck Curve” on Electrical Market Prices

California Independent System Operator average hourly day-ahead energy market prices
January through June average
dollars per megawatthour



Annual Generation Exceedance 8 Modelled “Stress” Hydrology Traces



Hydrology and Purchase Power

- 8.23 MAF releases from Glen Canyon in 2020
- 8.23 MAF releases from Glen Canyon in 2021
- 8.23/7.48 MAF releases from Glen Canyon in 2022

FY 20 – Net Energy Purchase

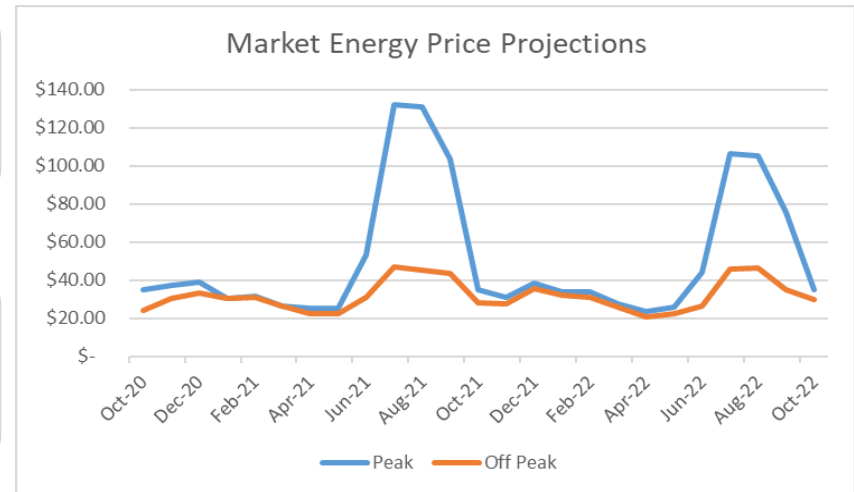
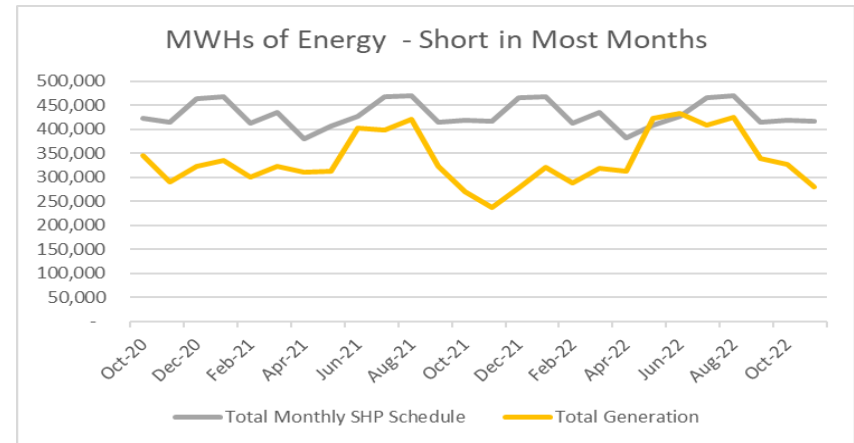
• 432 GWh @ \$12.3 M

FY '21 – Net Energy Purchase (Projection)

• 1,108 GWh @ \$47.7 M

FY '22 – Net Energy Purchase (Projection)

• 1,135 GWh @ \$44-52 M



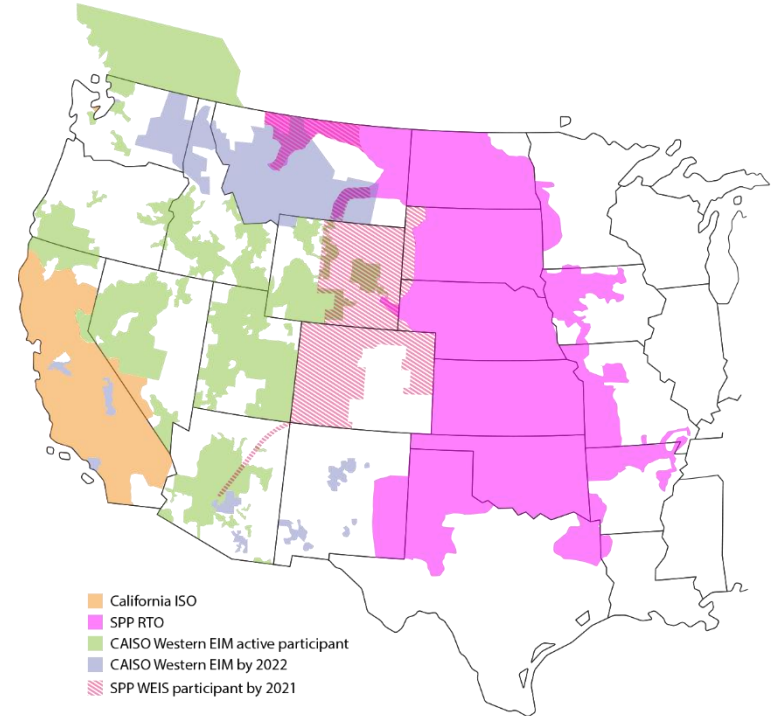
Energy Imbalance Markets and RTOs



ATEA Meeting, February 18, 2021

BAs in the Western Interconnection

- WAPA-Upper Great Plains East Region joined SPP RTO in 2015
- WAPA-Colorado River Storage Project, Rocky Mountain Region, and Upper Great Plains West joined SPP Western Energy Imbalance Service (WEIS) on February 1, 2021
- WAPA Sierra Nevada Region to join CAISO Western Energy Imbalance in April 2021



There are two types of markets:

- Energy Imbalance Market (“market light”)
 - Only operates in real time
 - Impacts ~5% of generation and load (demand) in the market footprint
- 2. Regional Transmission Organization (full market)
 - Operates in day ahead and real time
 - Schedules and optimizes most generation for the entire next day

*There is a hybrid version – the California Independent System Operator’s proposed “Extended Day-Ahead Market”



How does an *energy imbalance* market work?

- Absent an Energy Imbalance Service market, all transactions in day ahead and hourly energy markets are bilateral (negotiated on the phone between traders)

The energy imbalance service market only operates in real time (5 minute intervals) while day ahead and hourly bilateral transactions continue.

The market dispatches generation to make up for power plants that aren't following schedule and to make up for load (demand) forecast error. It also manages transmission congestion by redispatching power plants out of economic order to relieve overloads and adds this cost to market clearing prices at different locations across market footprint.



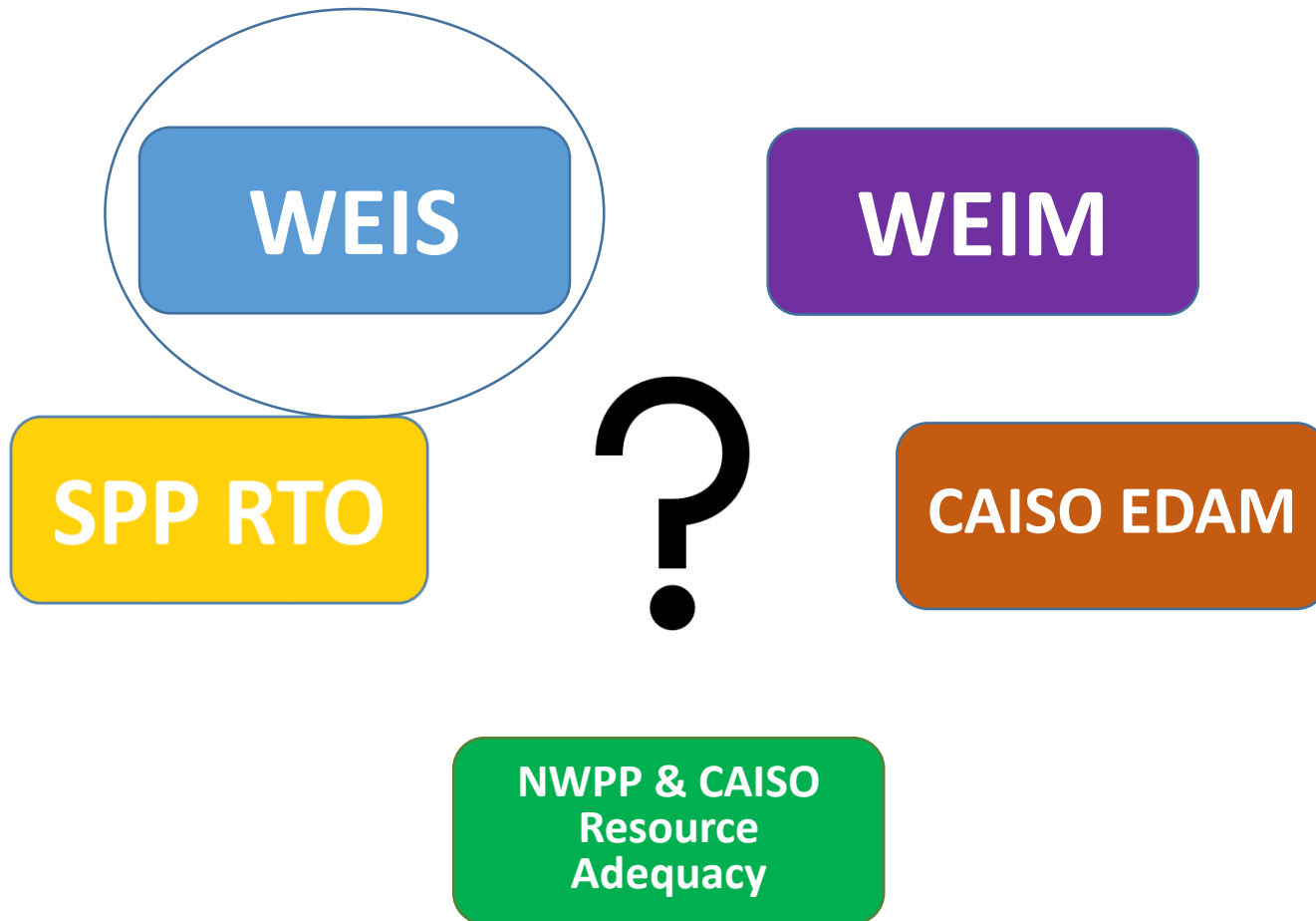
Why are there *RTOs* and what do they do?

- Typically, a market operator will start with an Energy Imbalance Service market first when electric utilities show interest.

The market operator will then convert the energy imbalance market to an RTO, or full “day 2” market that operates both a day ahead and the existing real time market using the same method of economical dispatch. Most bilateral markets go away.

These RTOs also plan transmission upgrades and build out to relieve long term congestion from load growth and to facilitate market footprint expansion.



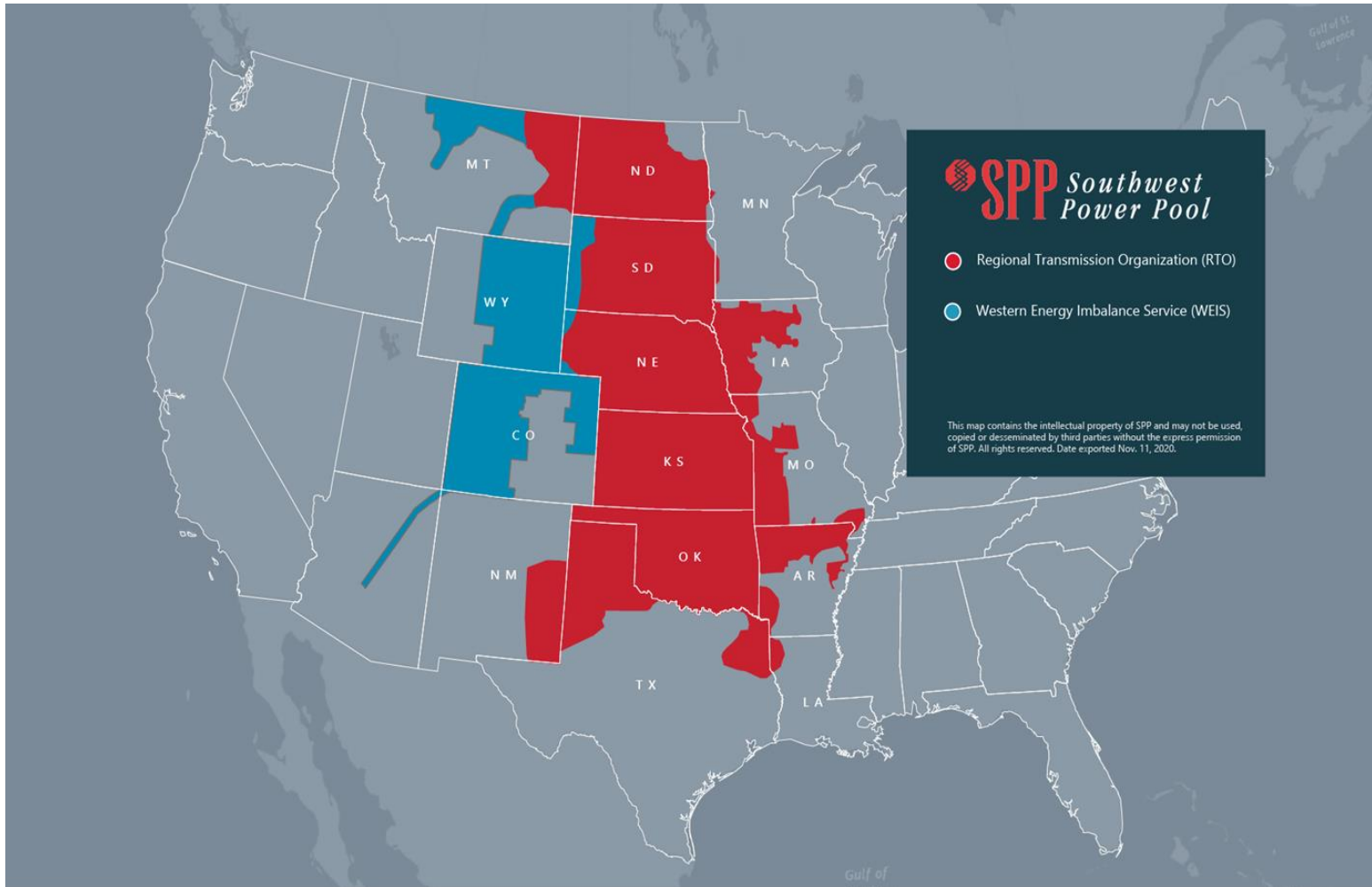


First... the “why”

- The industry is undergoing a dramatic shift from large coal generators to natural gas generators and renewable resources including wind and solar.
 - The high voltage transmission system was built around coal generators. Switching to a larger number of smaller generators changes transmission operations.
 - Electricity markets in most of the West are currently hourly. Wind and solar behave much differently than traditional generators within an hour, so markets need to change too.
- In response, centralized electricity markets are developing rapidly in the West.
 - Centralized markets with large footprints offer significant reliability benefits in a world with significant renewable (but variable) generators.
 - WAPA buys and sells significant amounts of wholesale electricity. Reductions in bilateral trading partners are a significant risk.



WEIS Market Effective Feb. 1, 2021



What won't change with CRSP entering into WEIS?

- Primary mission will not change.
 - EIM is only about 5% of WAPA's business.
- Hydropower and our transmission system are still highly valuable in the energy market
- Transmission Operations will not change
- No impact on Reserve Sharing Groups



Other initiatives in the West

- CAISO Extended Day-Ahead Market (EDAM)
 - Initiative to add a day-ahead market to the EIM.
 - WAPA participating in the stakeholder process.
 - On hold pending further progress on 2021 Summer readiness.
- CAISO 2021 Summer Readiness/Resource Adequacy
 - Multiple initiatives to address generation shortages in the CAISO.
 - These activities are a priority for the CAISO.
- SPP WEIS Participants exploring SPP RTO expansion in West
 - Includes Several SPP WEIS members including WAPA-Rocky Mountain Region and WAPA Upper Great Plains West.
 - Would add day ahead market to existing real time market.

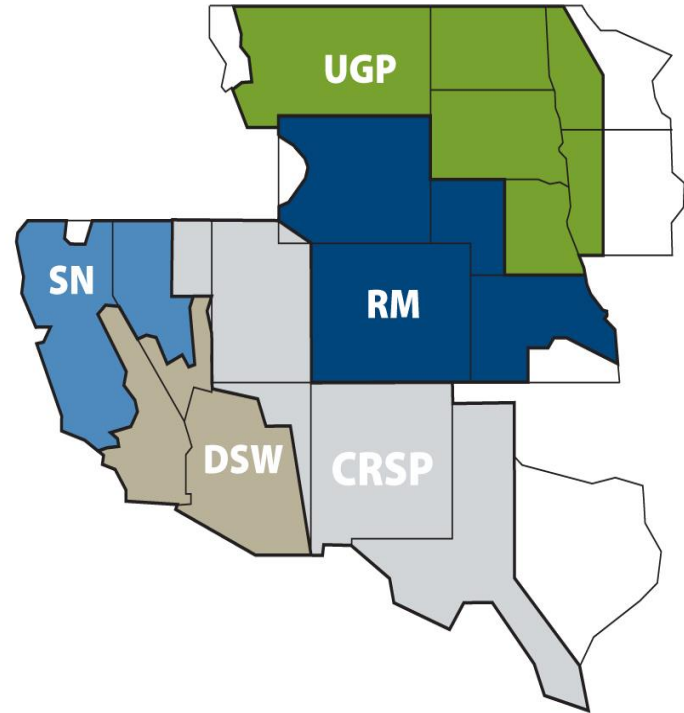


WAPA's position

Each region is unique.

Multiple market constructs are “on the table” and are actively being evaluated or implemented.

WAPA is committed to staying strategic, proactive and in alignment with our mission.



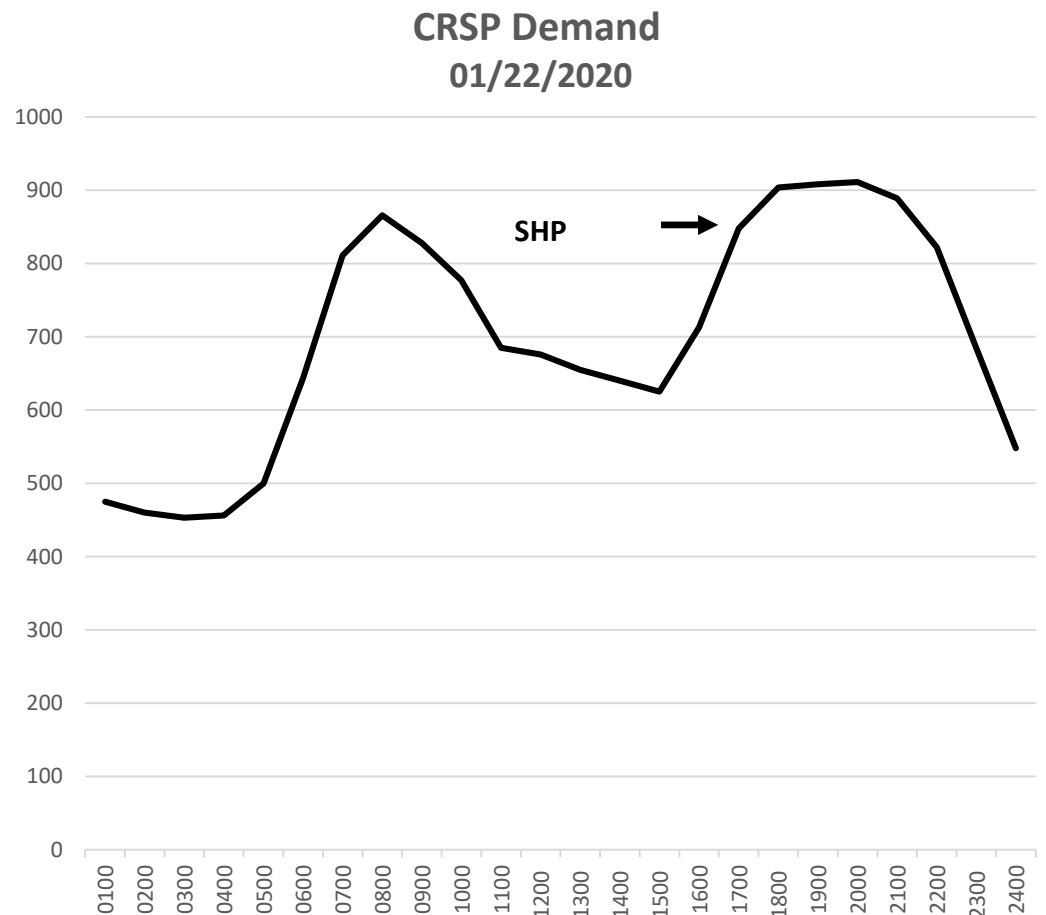
Scheduling of CRSP Resources Against Customer Schedules Submitted



ATEA Meeting, February 18, 2021

To Begin – SHP Demand

- CRSP Firm Electric Service load input into the Energy Management and Marketing Office Customer Portal
- X-axis = hour
- Y-axis = MWs

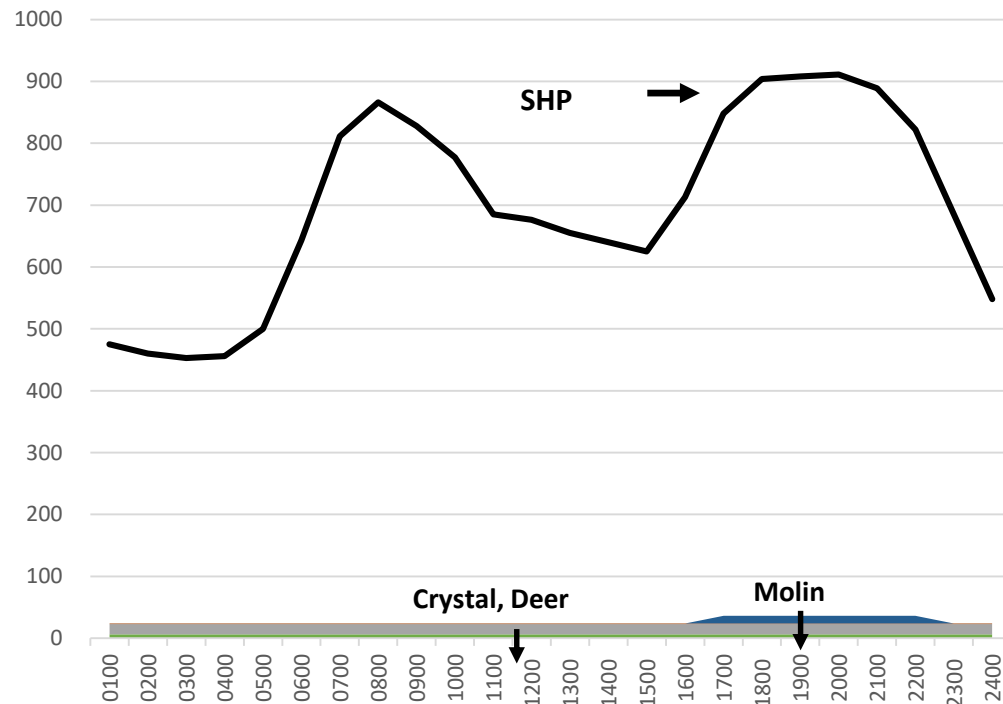


Base Loaded Resources

Crystal, Deer Creek and Fontenelle
• Flat profile 24x7 per BOR release

Molina
• Peaking capable but must follow BOR directed daily acre-foot release.
• Not variable – 0 mw/hr or 12 mw/hr block
• Placed in the peak demand hours

CRSP Generation vs Demand
01/22/2020



Glen Canyon Dam

GCD Operating Limits:

- GCD daily change is limited depending on monthly volume
- Sets the minimum and maximum flow

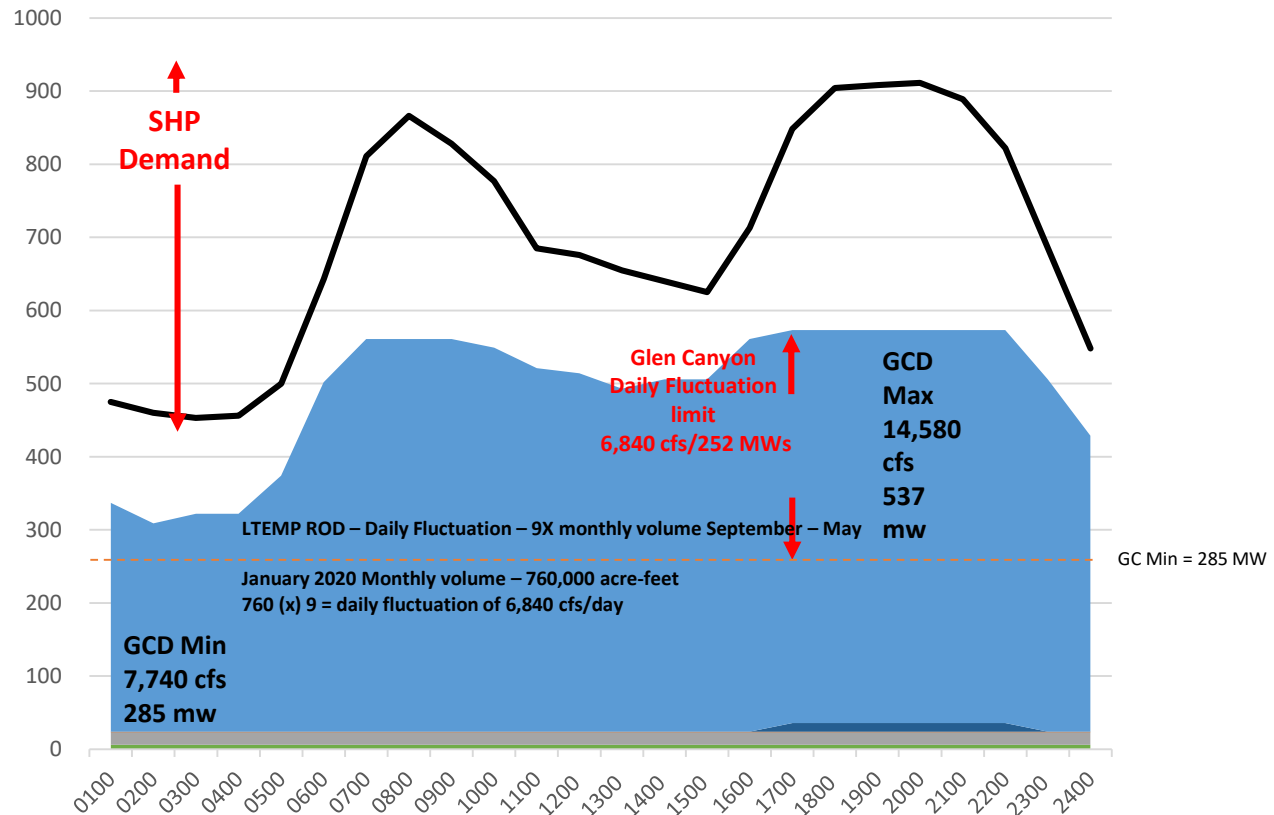
Glen Canyon cannot “swing” in a day as much as demand changes:

Within day demand change: 458 MW

Within day GCD change: 252 MW

Note: Base loaded units raise the GCD graph by 24 MW

CRSP Generation vs Demand 01/22/2020



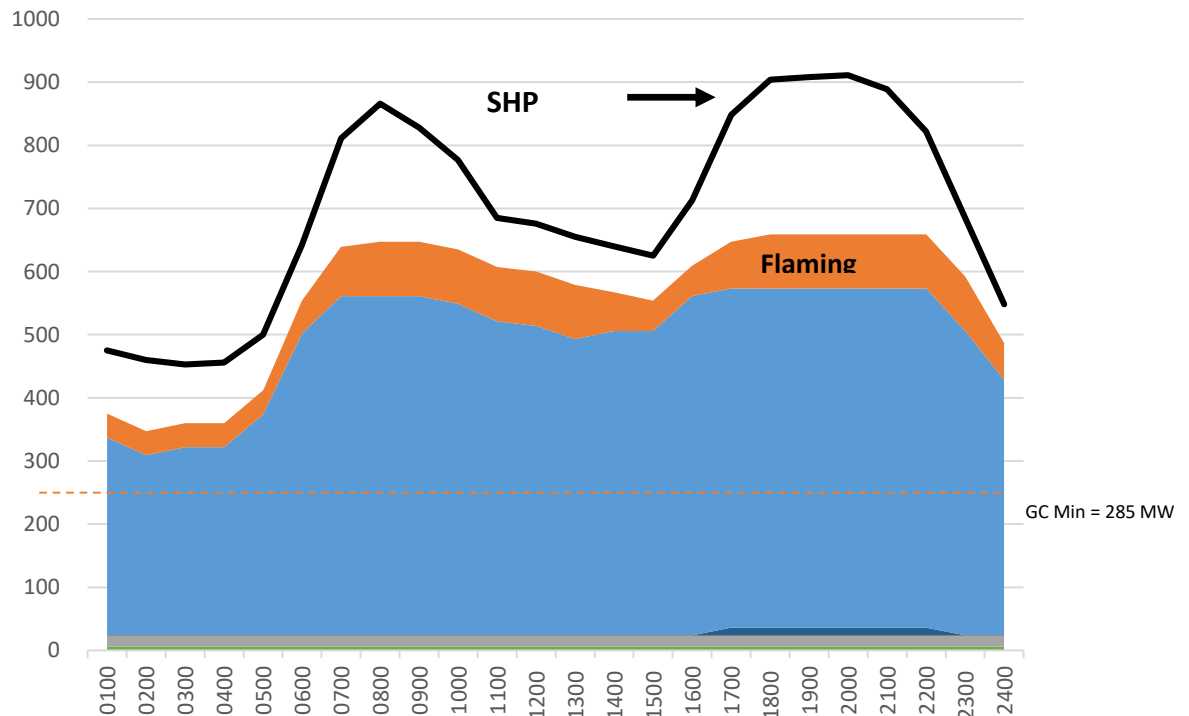
Flaming Gorge Dam

The Flaming Gorge pattern is developed using the following inputs:

- FG EIS requirements
 - Base flows
 - Jensen gage
- Yampa projected inflow
- Price shaping based on load and Index energy price projections

Note: Base loaded units raise the graph by 24 MW

CRSP Generation vs Demand
01/22/2020



Aspinall Units

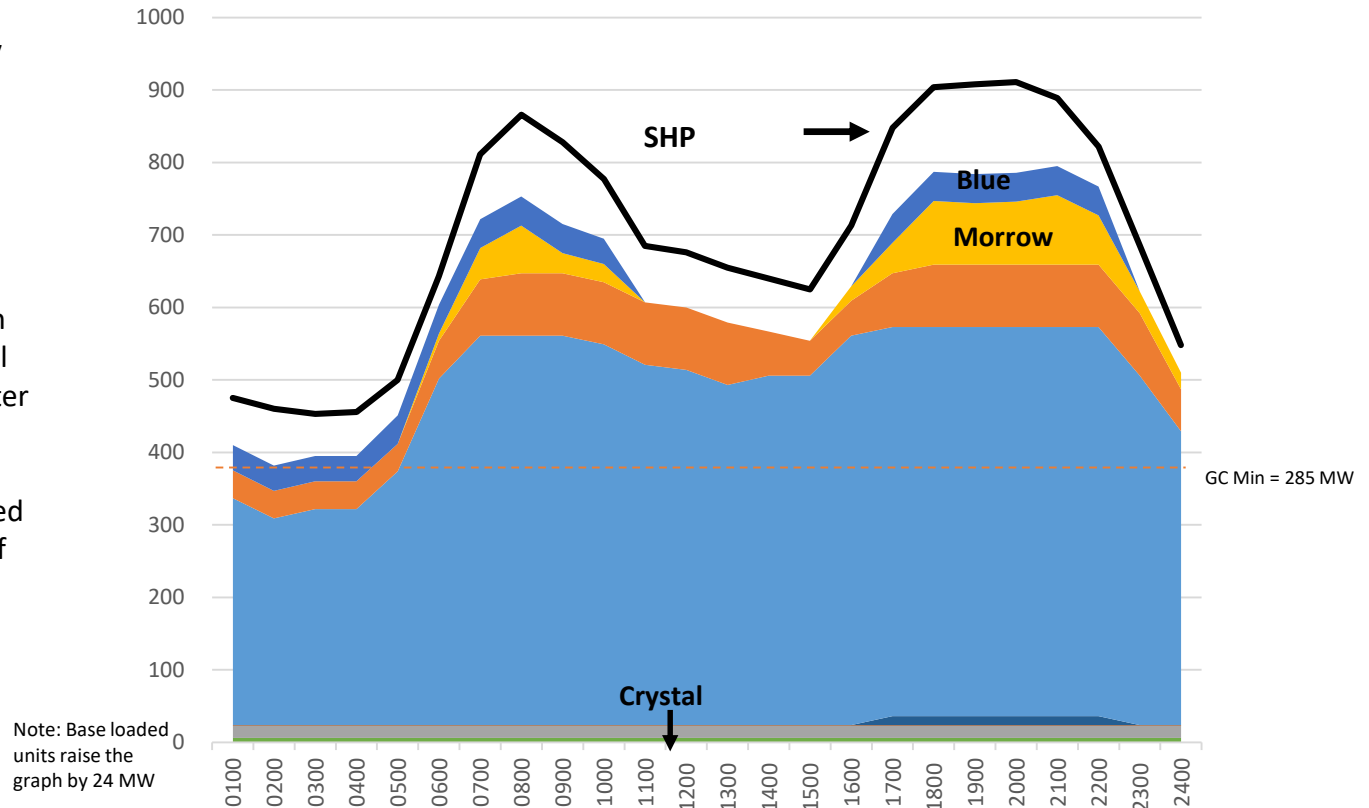
Blue Mesa and Morrow Point considered our most flexible units

- Don't have the capacity of Glen – but have peaking capability

Crystal – Base loaded

- River regulating unit with release based on Aspinall ROD targets at Whitewater gage
- Elevation change is limited – therefore the degree of which we use Aspinall is limited by season

CRSP Generation vs Demand
01/22/2020



Putting it all Together

Term Purchases

- Block purchases on/off peak 2-3 months in advance
- Hedged to anticipate changes in hydrology and energy prices

Day Ahead purchases

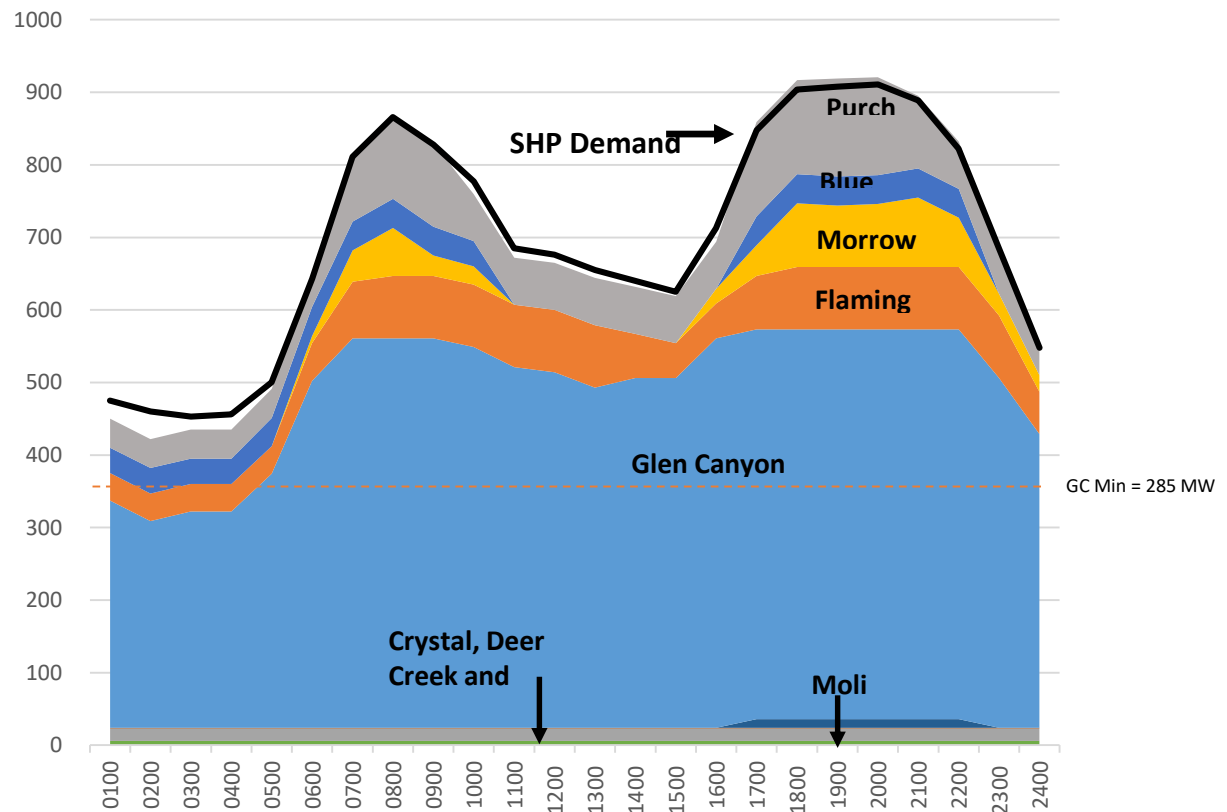
- Using current BOR and energy pricing, purchase to cover SHP schedules not covered by CRSP resources

Real Time purchases

- If any changes to AHP due to curtailments

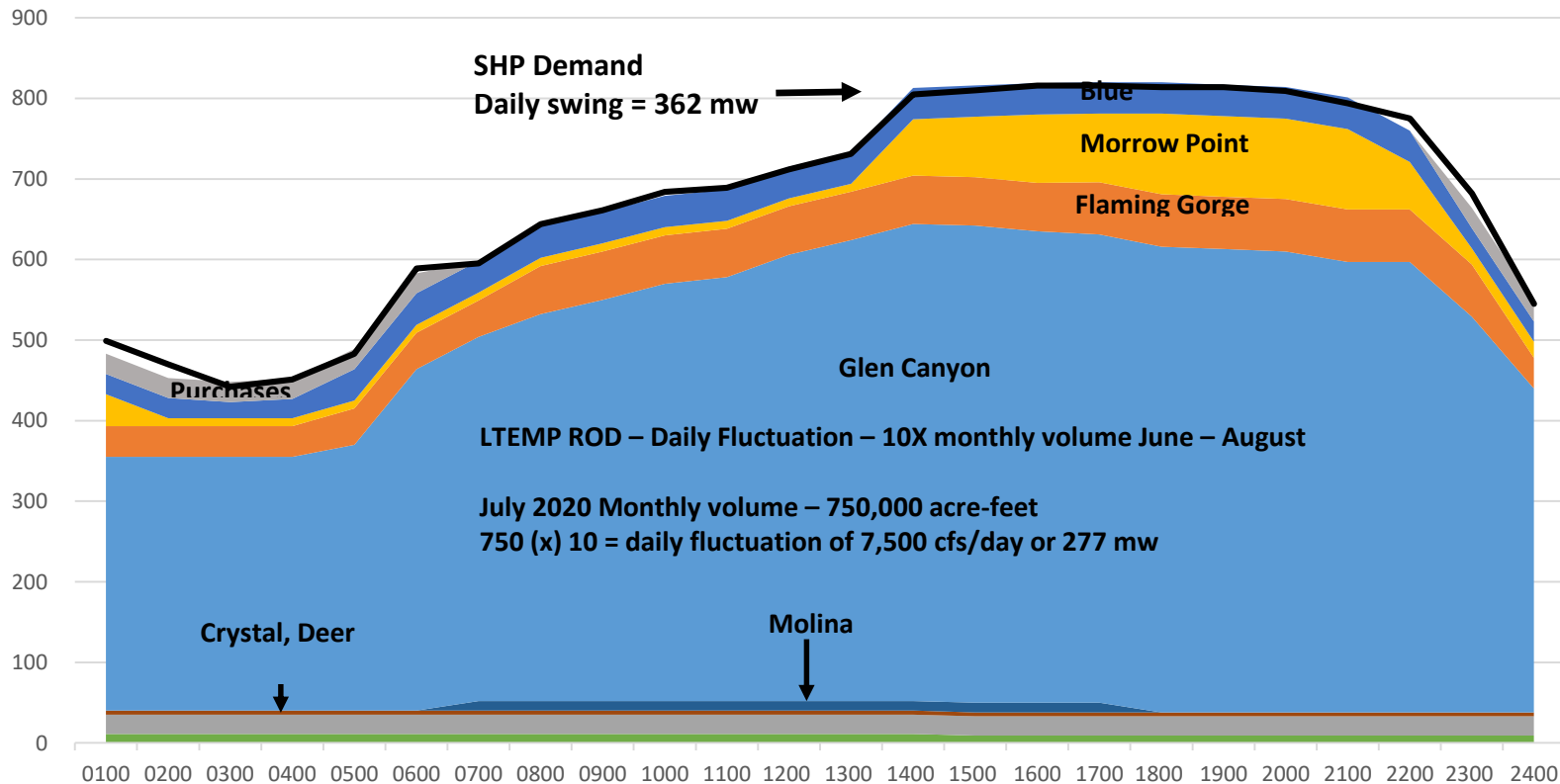
Note: Base loaded units raise the graph by 24 MW

CRSP Generation vs Demand
01/22/2020



Similar Process and Results July 2020

CRSP Generation vs Demand
07/23/2020



Questions?

Tim Vigil

tvigil@wapa.gov

970-252-3005

