

WAPA-SN Public Information Forum

Western Area Power Administration
Sierra Nevada Region
Monday, August 17, 2020
9:00 AM – 12:00 PM
Web Conference

Opening Remarks

Koji Kawamura
SN Attorney-Advisor

WebEx Housekeeping Items and Agenda

Autumn Wolfe
SN Rates Manager

WebEx Housekeeping Items

- All participants are muted on entry to ensure a smooth remote meeting
- For questions during Q&A periods, please choose one of the following options:
 - Send questions to the host in the WebEx chat
 - Use the “Raise Hand” icon next to your name in participant list. The host will unmute and call on you
- Phone only participants: When prompted by the host, press *6 from device to unmute yourself on WebEx
- Some questions may be answered later in other presentations
- We will have time for additional questions at the end of the meeting
- Make sure you are not “double-muted” when attempting to talk (i.e. muted on your device in addition to the WebEx client)



Agenda

1. Opening Remarks	Koji Kawamura, SN Attorney-Advisor
2. WebEx Housekeeping Items and Agenda	
3. WAPA-SN Rates Process Timeline	
4. Overview CAISO EIM	Autumn Wolfe, SN Rates Manager
5. EIM Implementation and Ongoing Costs	
6. Allocations of EIM Charges and Benefits	
7. CAISO EIM Charges Allocation	Tong Wu, SN Settlements Manager

Agenda (cont.)

8. EIM Resource Valuation	Robert Delizo, SN Resources and Scheduling Manager
9. Proposed Formula Rates Schedules	Autumn Wolfe, SN Rates Manager
10. Sale of Surplus Products	Rosemary Jones, SN Power Marketing and Energy Services Specialist
11. EIM Generator Dispatch Ranges	Robert Delizo, SN Resources and Scheduling Manager
12. Additional Resources	Autumn Wolfe, SN Rates Manager
13. Closing Remarks	Koji Kawamura, SN Attorney-Advisor

WAPA-SN's Rates Process Timeline

Autumn Wolfe
SN Rates Manager

Rates Process Timeline

Jul 31, 2020	Proposed Federal Register Notice Published (90-Day Comment Period Begins)
Aug 17, 2020	Formal Customer Public Information & Comment Forum (WebEx only)
Oct 29, 2020	90-Day Comment Period Ends
Feb 2021	Final Federal Register Notice Published
<i>Mar 25, 2021</i>	<i>New Rate Schedules Effective Date</i>

The Formal Calendar can be found on WAPA's website at :

<https://www.wapa.gov/regions/SN/rates/Pages/Rate-Case-2021-WAPA-194.aspx>

Overview CAISO EIM

Autumn Wolfe
SN Rates Manager

Overview

- CAISO EIM is a real-time energy market, so it won't impact our day ahead program
- Allows members to buy/sell power close to the time electricity is consumed
- Finds the lowest cost resources across a larger region to meet immediate power needs, and potentially reduces the cost
- Provides economic benefits to the EIM participants as it dispatches the least costs resources
- Has full visibility of Transmission and Generation Outages and that way manages congestion better on transmission lines and provides reliability
- EIM Information can be found on WAPA's website at:
<https://www.wapa.gov/regions/SN/PowerMarketing/Pages/western-eim.aspx>

EIM Implementation and Ongoing Costs

Autumn Wolfe
SN Rates Manager

BANC EIM Costs

- BANC has had two phases for implementing EIM
 - Under Phase I, SMUD joined EIM on April 3, 2019, and paid for all the Phase I implementation costs
 - Under Phase II, WAPA made the decision to join EIM along with three other entities: City of Redding, Roseville Electric Utility, and Modesto Irrigation District. All four entities are sharing in the payment of Phase II implementation costs.
 - Since SMUD paid all EIM costs under Phase I, and the Phase II EIM participants will be using some of those systems that were paid for by SMUD, WAPA is responsible for its share of certain Phase I implementation costs.
- BANC will have annual ongoing costs associated with participating in EIM that all participating entities will share in paying

BANC EIM Cost Factors

Implementation – Start up Costs

- **SMUD Support** - SMUD manages WEIM Entity for BANC
- **OATI Software Upgrade** - to integrate WAPA-SN into BANC WEIM Entity scope
- **Settlement Software Upgrade** - to integrate WAPA-SN into BANC WEIM Entity scope
- **Utilicast Project Oversight** - PM on-site to provide project support & coordination for WAPA-SN
- **CAISO Fees** - Uplift and load related charges
- **Legal Support (BBSW)** - Legal support provided to BANC
- **Phase I Reimbursement** - WAPA-SN Share of costs incurred during Phase I for creation of WEIM Entity

Ongoing – Reoccurring Costs

- **WEIM Operation** - Staffing & software support for WEIM Entity operations
- **Stakeholder Support** - Engagement in CAISO WEIM stakeholder process
- **CAISO Fees** - Uplift and Load Related Charges
- **Legal Support (BBSW)** - Legal support provided to BANC

Allocation of BANC Implementation and Ongoing Costs

- The BANC Commission has approved a cost allocation methodology to allocate EIM implementation and ongoing costs based on a participating entity's three-year rolling average of NEL%.
 - The use of a three-year average is to mitigate for any significant changes in hydrology from year to year.
 - To memorialize the methodology for calculating the NEL%, there is a proposal to revise the BANC EIM Participation Agreement that each participant (including WAPA) has signed.
- For the allocation of implementation costs for Phase II, WAPA is one of four participating entities (City of Redding, Roseville Electric Utility, Modesto Irrigation District, and WAPA) who will share in paying the costs; therefore, WAPA's NEL% for allocating implementation costs is 24.1%.
- For the allocation of ongoing costs, WAPA is one of five participating entities (SMUD, City of Redding, Roseville Electric Utility, Modesto Irrigation District, and WAPA) who will share in paying the costs; therefore, WAPA's NEL% for allocating ongoing costs is 8.6%.

WAPA's NEL % for the Allocation of BANC Charges

The following load is included in WAPA's NEL% calculation:

- Lawrence Livermore National Lab (DOE),
- Tracy Pump Load (Project Use),
- Trinity PUD,
- SBA Losses and Station Service,
- East Contra Costa Irrigation District,
- Contra Costa Water District,
- Byron Bethany Irrigation District, and
- San Juan Water District

WAPA's Share of BANC EIM Implementation Costs

Category	Total Cost Estimate *	2019	2020 Estimate	2021 Estimate
Phase II Decision & Gap Analysis	\$51,059	\$51,059	\$0	\$0
Phase II Implementation Costs (broken out below)	\$863,536	\$125,182	\$569,056	\$169,297
SMUD Support	\$78,687	\$12,171	\$49,887	\$16,629
Settlements Support	\$79,048	\$0	\$47,429	\$31,619
Software Upgrades	\$322,940	\$0	\$260,280	\$62,660
Utilicast Project Oversight	\$285,256	\$95,177	\$148,077	\$42,001
CAISO Fees	\$49,405	\$8,435	\$32,535	\$8,435
Legal Support (BBSW)	\$48,200	\$9,399	\$30,848	\$7,953
Contingency	\$36,918	\$0	\$28,453	\$8,465
Security and Collateral	\$81,750	\$0	\$0	\$81,750
Phase 1 Reimbursement to SMUD	\$297,507	\$297,507	N/A	N/A
Total Estimate	\$1,330,770	\$473,748	\$597,509	\$259,512

* Total Implementation cost estimate is allocated over 3 years.

WAPA's Share of BANC EIM Ongoing Costs

Category	Estimated Ongoing Annual Costs
EIM Operation	\$300,917
Stakeholder Support	\$8,600
CAISO Fees	\$64,500
Legal Support (BBSW)	\$2,580
Total	\$376,597

* Ongoing costs will begin in FY 2021 when WAPA starts participating in EIM on March 25, 2021.

WAPA's EIM Implementation and Ongoing Costs

- Vendor Software Solution (all WEIM Modules)

Category	Dollars
Implementation Cost	\$545,500
Ongoing Cost	\$184,400

* Ongoing costs will begin in FY 2021 when WAPA starts participating in EIM on March 25, 2021.

Reclamation EIM Implementation Cost Factors

- USBR is anticipating the need to change the Central Valley Automated Control System (CVACS) generator control system, primarily software, to accommodate real-time dispatch signals from the EIM.
- The current plan envisions the creation of “virtual” units for each EIM aggregation area and the adaptation of the existing automatic schedule and AGC dispatch functions to integrate with the new EIM signals.
- The full scope of changes will not be known until decisions on aggregation are completed.
- Placeholder funding amounts of \$500k each year for CVACS EIM changes in FY20 and FY21 have been approved by the Technical Committee to support the project.

Total EIM Implementation and Ongoing Costs

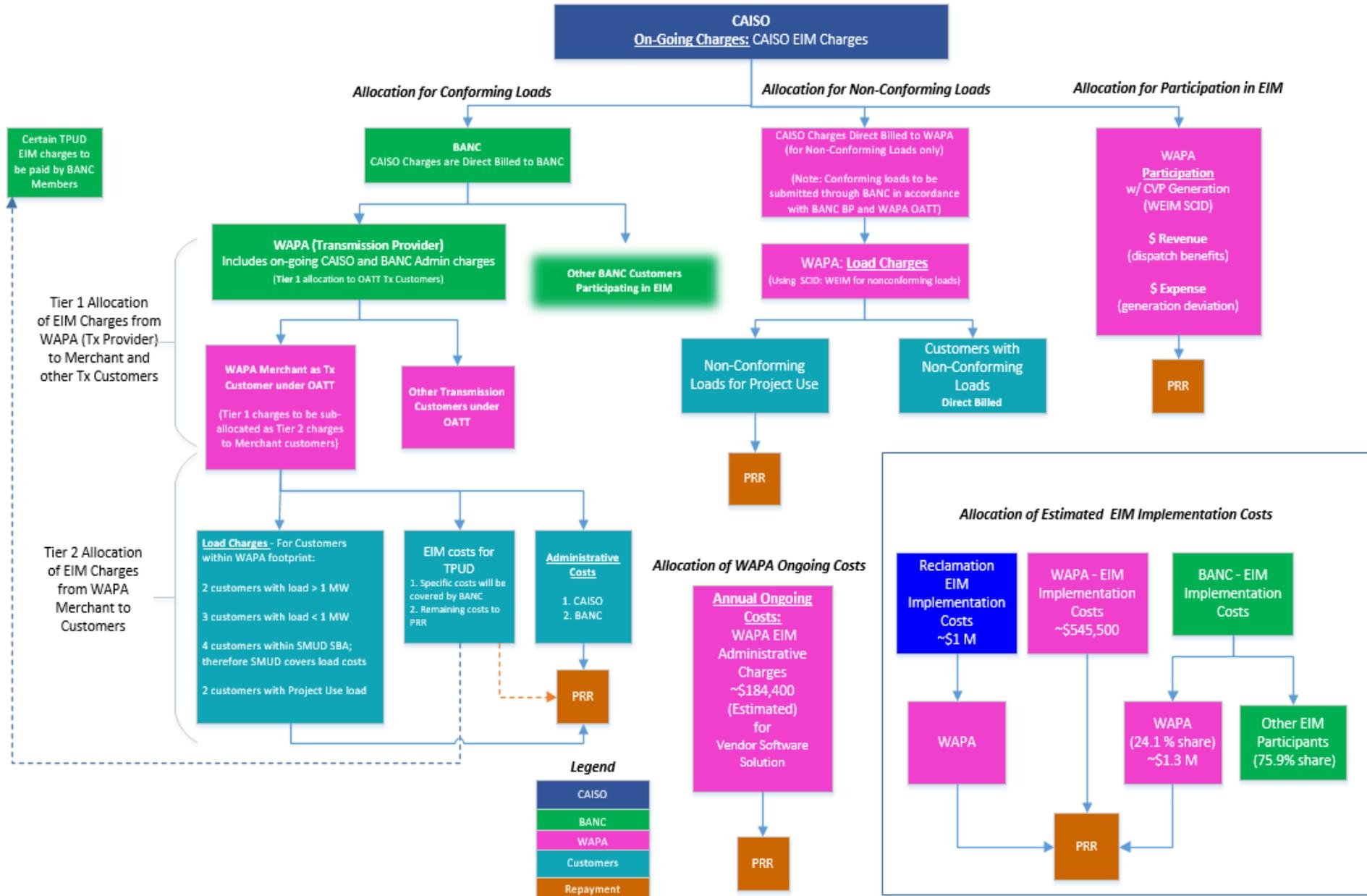
Category	2019 Actual	2020 Estimate	2021 Estimate	2022 Estimate	2023 Estimate	2024 Estimate
BANC EIM Implementation Costs (Total)	\$473,748	\$597,509	\$259,512	\$0	\$0	\$0
BANC EIM On-going Costs, Annual and WAPA's share (Total)	\$0	\$0	\$376,597	\$376,597	\$376,597	\$376,597
WAPA Implementation Costs	\$545,500	\$0	\$0	\$0	\$0	\$0
WAPA On-going Costs	\$0	\$0	\$184,400	\$184,400	\$184,400	\$184,400
USBR Implementation costs	\$0	\$500,000	\$500,000	\$0	\$0	\$0
Totals	\$1,019,248	\$1,097,509	\$1,320,509	\$560,997	\$560,997	\$560,997
Implementation and Administrative On-going Costs – Percent Increase to Annual O&M						
O&M – Forecast	\$113,288,016	\$116,445,492	\$117,431,801	\$120,082,971	\$125,680,345	\$129,112,179
Percent Increase in Cost	+0.91%	+ 0.95%	+1.14%	+0.47%	+0.45%	+0.44%
Implementation and Administrative On-going Costs – Percent Increase to Annual PRR						
PRR - Forecast	\$68,812,862	\$68,774,525	\$72,652,482	\$75,926,983	\$80,554,388	\$83,069,864
Percent Increase	N/A	N/A	+1.85%	+0.74%	+0.70%	+0.68%

Some of the administrative costs may increase if CAISO or BANC increases their costs in the future. Implementation and on-going administrative costs will be included in the annual O&M on the PRR.

Allocations of EIM Charges and Benefits

Autumn Wolfe
SN Rates Manager

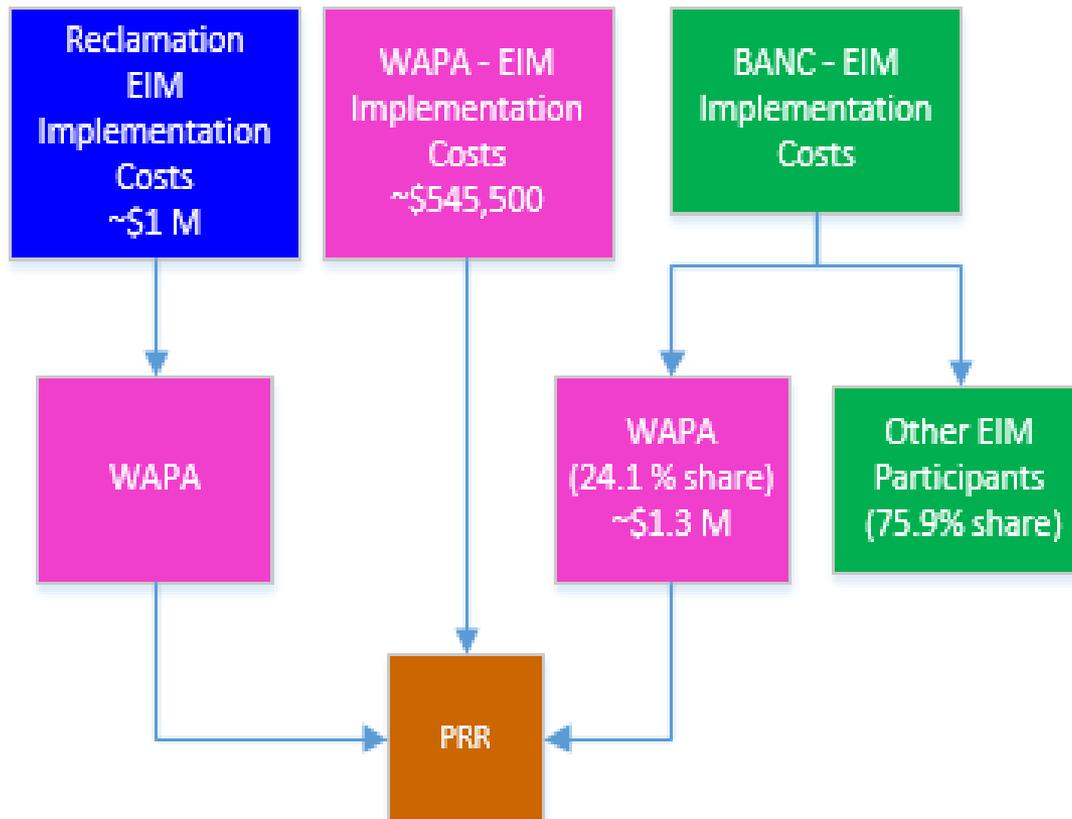
Allocation of EIM Charges and Benefits



Allocation of EIM Implementation Costs

- There are implementation costs required for participating in the EIM market for BANC, WAPA, and Reclamation
- The current proposal is for EIM implementation costs to flow through to the Power Revenue Requirement (PRR) for payment
 - This proposal is based on the understanding that any benefits of WAPA participating in the EIM market will also flow through to the PRR

Allocation of Estimated EIM Implementation Costs



Allocation of EIM Ongoing Charges

- There will be ongoing EIM charges for BANC and WAPA while participating in the EIM market
- The proposed process for allocating EIM charges depends on whether the charges are for conforming loads or non-conforming loads
 - For conforming loads, the proposal is to allocate WAPA's share of EIM charges to Transmission customers who are subject to WAPA's tariff, including WAPA Merchant, based on load ratio share percentages
 - Also, for conforming loads, there is a Tier 1 and a Tier 2 allocation for allocating EIM charges and benefits
 - For non-conforming loads, the proposal is to directly allocate EIM charges to the customer with the non-conforming load
- For EIM charges related to Project Use, WAPA has a statutory obligation to provide generation to project use customers first; therefore, under the current proposal, load costs and benefits for project use will be allocated to the PRR for payment

Conforming vs. Non-Conforming Loads

Conforming Loads

- This type of load is usually associated with a weather-based element which is somewhat predictable based on the given conditions.
- Conforming loads within the WAPA footprint will be submitted to CAISO by BANC, using BANC's Scheduling Coordinator ID.

Non-Conforming Loads

- Load that changes abnormally or different than the conventional load pattern, such as a factory which consumes high demands intermittently throughout a given time period.
- Non-Conforming Loads within the WAPA footprint will be submitted to CAISO directly by WAPA, using our own Scheduling Coordinator ID.

Tier 1 vs. Tier 2 Allocation

Tier 1 Allocation

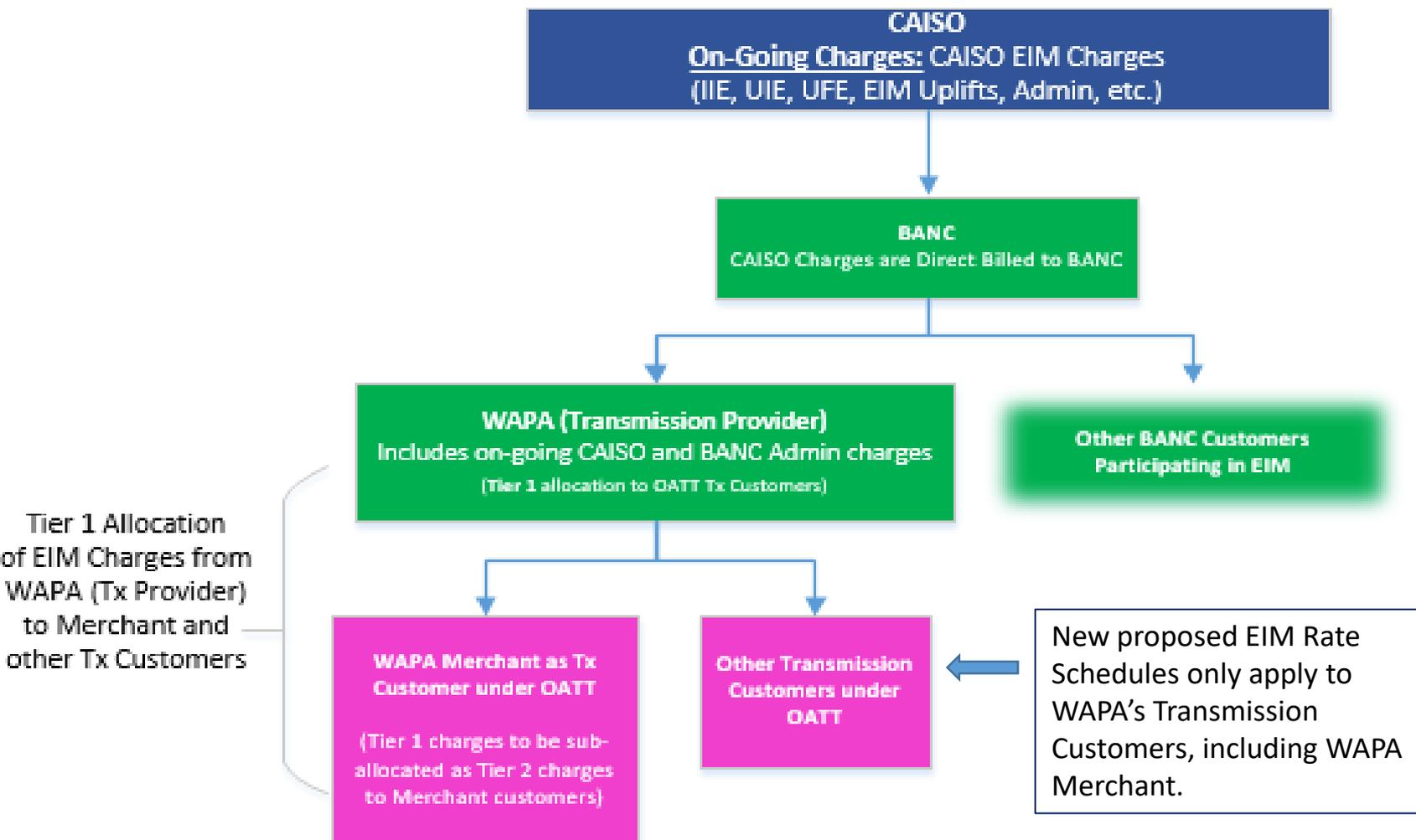
- Is the allocation of WAPA's share of CAISO and BANC charges to WAPA's Transmission Customers, including WAPA Merchant
- Requires new EIM Rate Schedules
 - The new EIM Rate Schedules only apply to WAPA's Transmission Customers, including WAPA Merchant

Tier 2 Allocation

- Is the sub-allocation of CAISO and BANC charges from WAPA Merchant to the annual PRR that First Preference and Base Resource customers pay

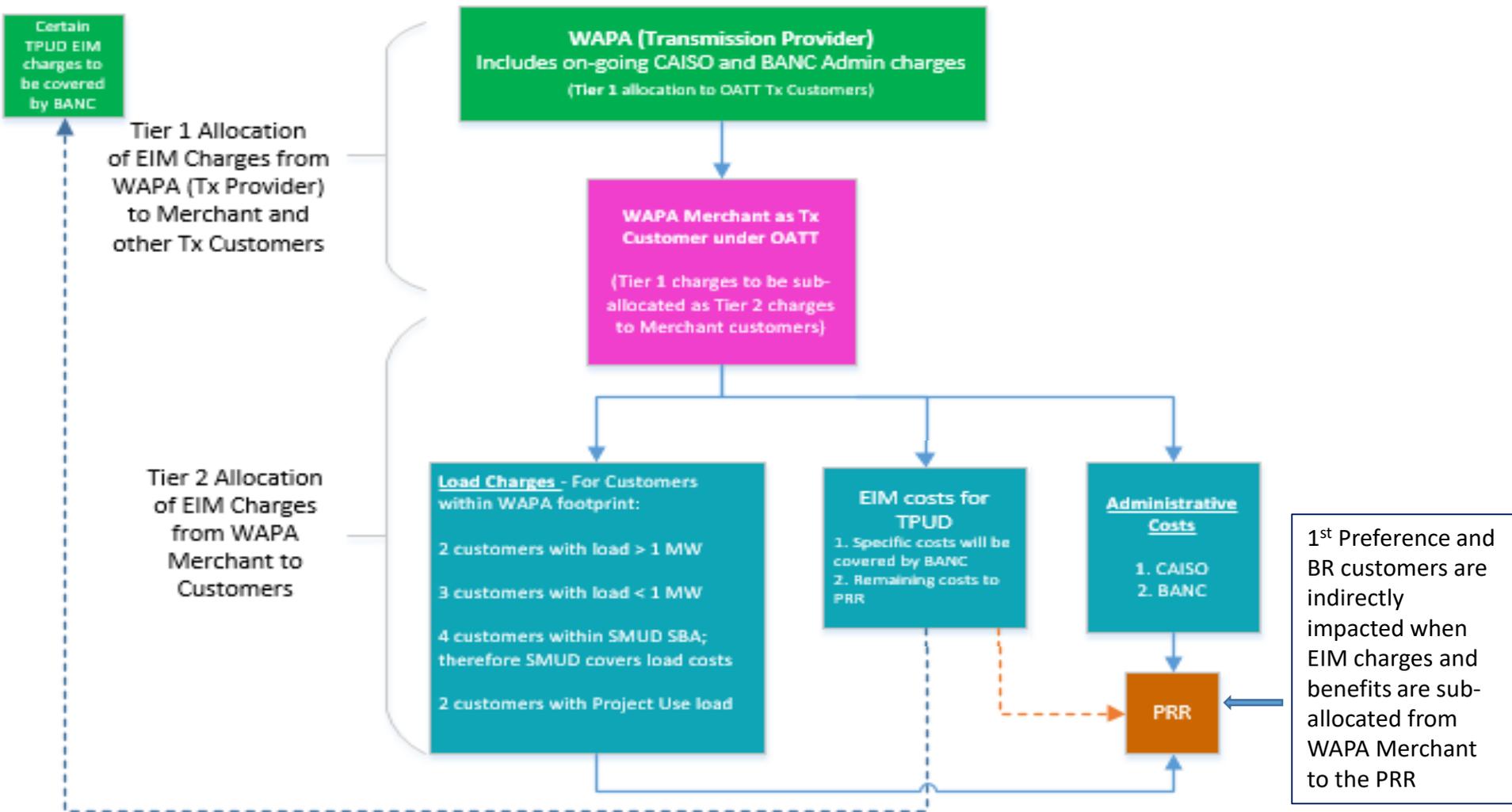
Conforming Loads: Tier 1 Allocation of EIM Charges and Benefits

Allocation from CAISO to BANC to WAPA Tx



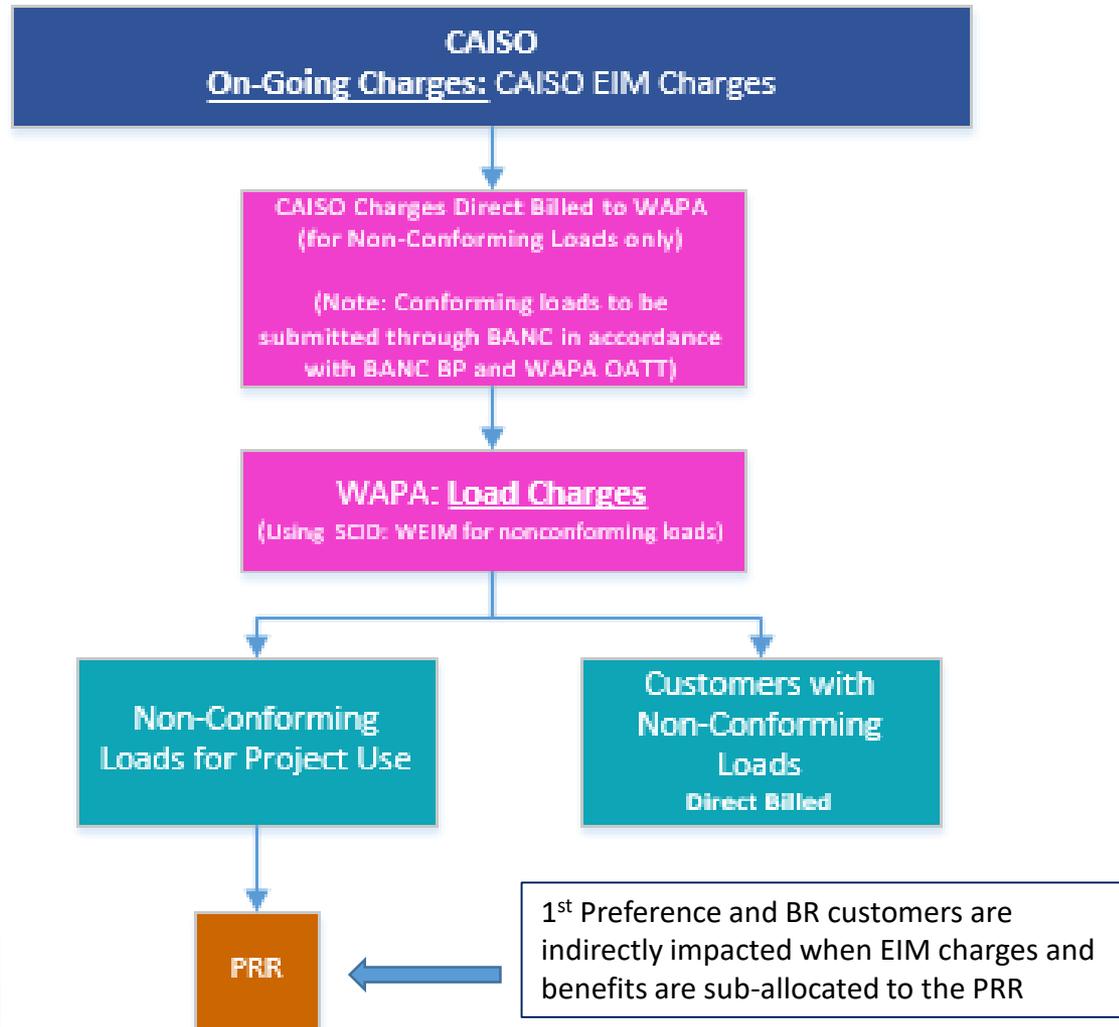
Conforming Loads: Tier 2 Allocation of EIM Charges and Benefits

Allocation from WAPA Tx to WAPA Merchant to Customers



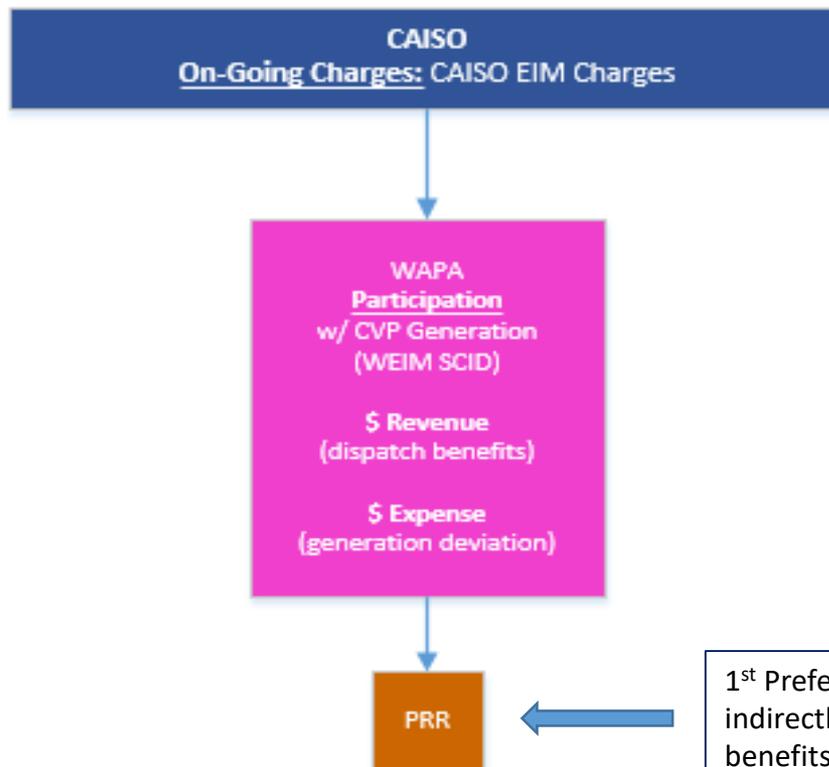
Non-Conforming Loads: Allocation of EIM Charges and Benefits

Allocation from CAISO to WAPA



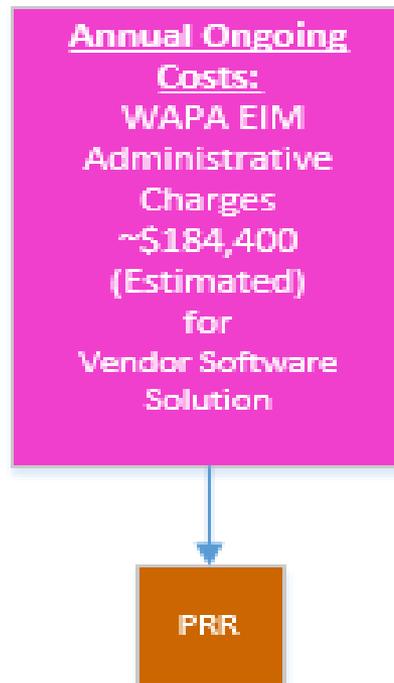
Cost/Benefit Allocation of WAPA's Participation in EIM Market

Allocation from CAISO to WAPA



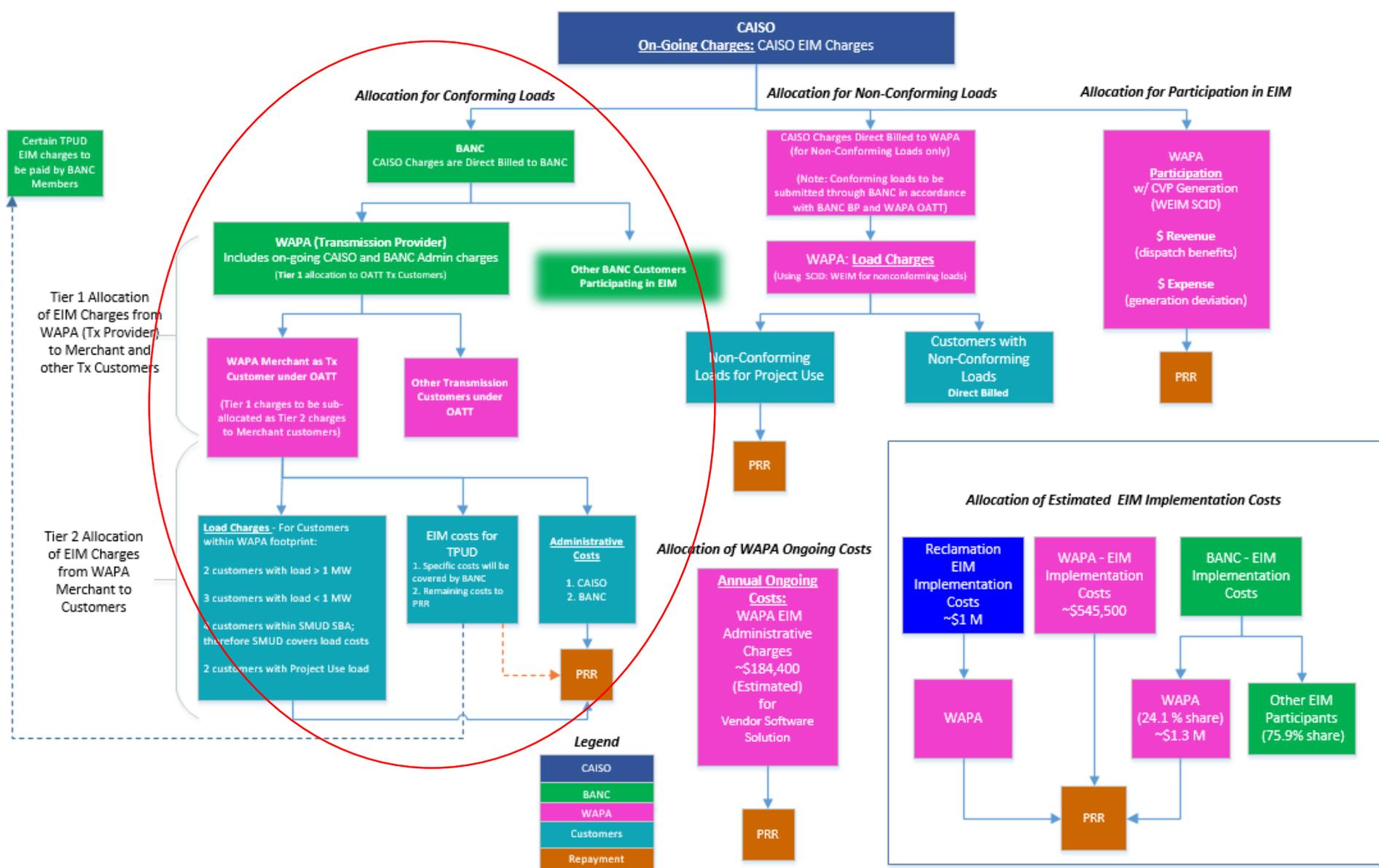
1st Preference and BR customers are indirectly impacted when EIM charges and benefits are sub-allocated to the PRR

Allocation of WAPA's Ongoing EIM Costs

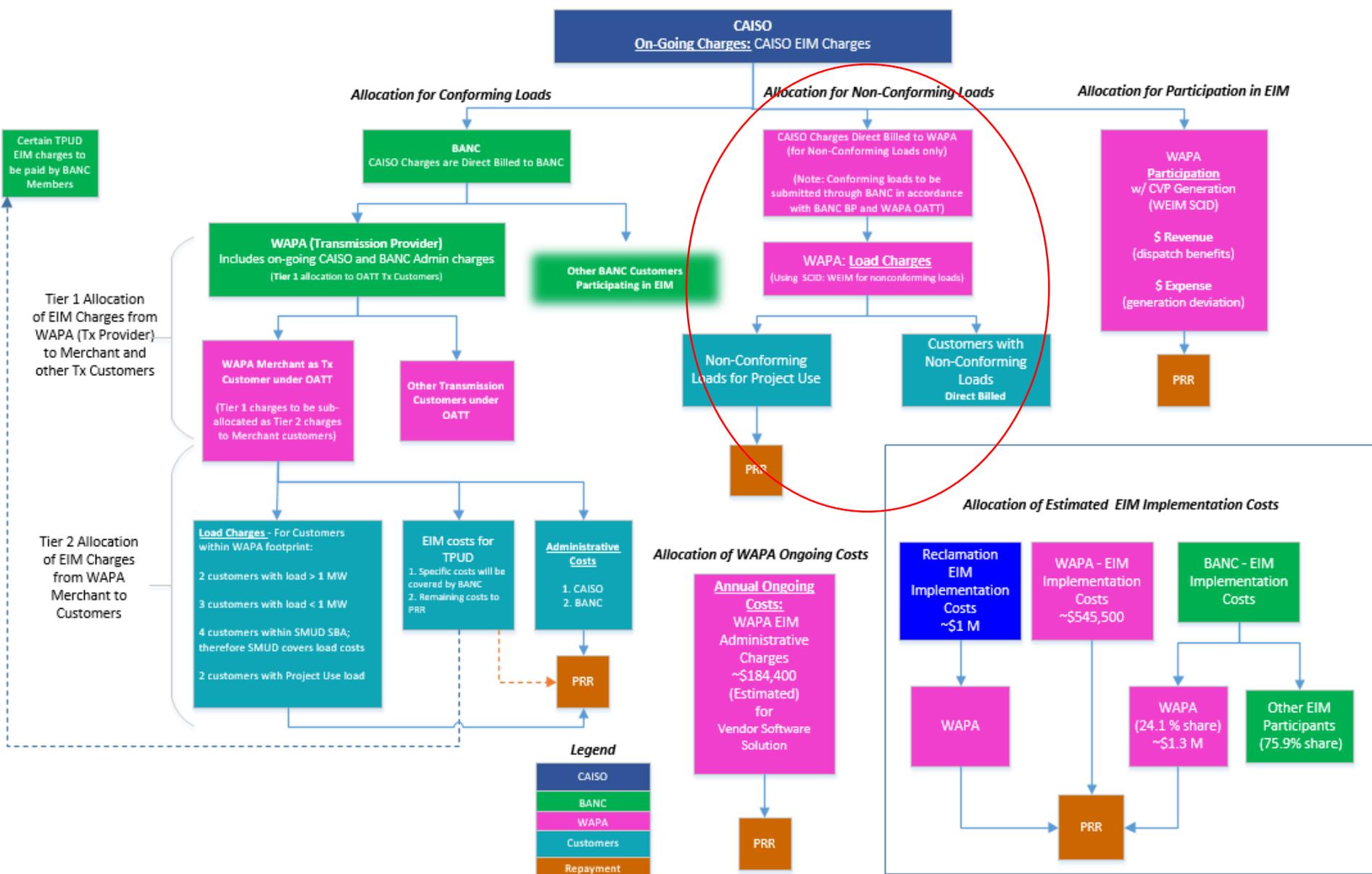


* WAPA's ongoing EIM costs will be included in WAPA's annual O&M on the PRR

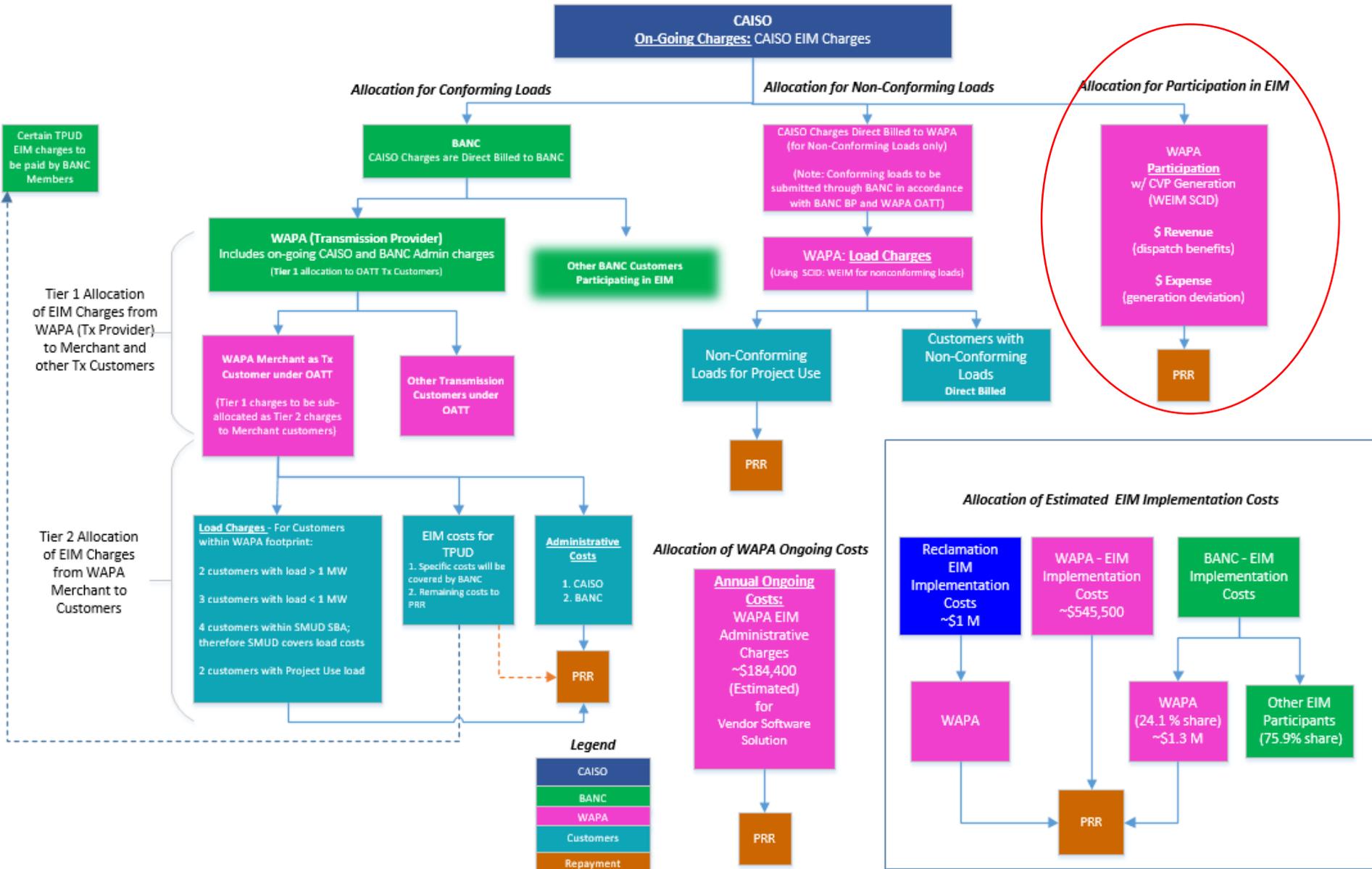
Allocation of EIM Charges and Benefits for Conforming Loads From BANC



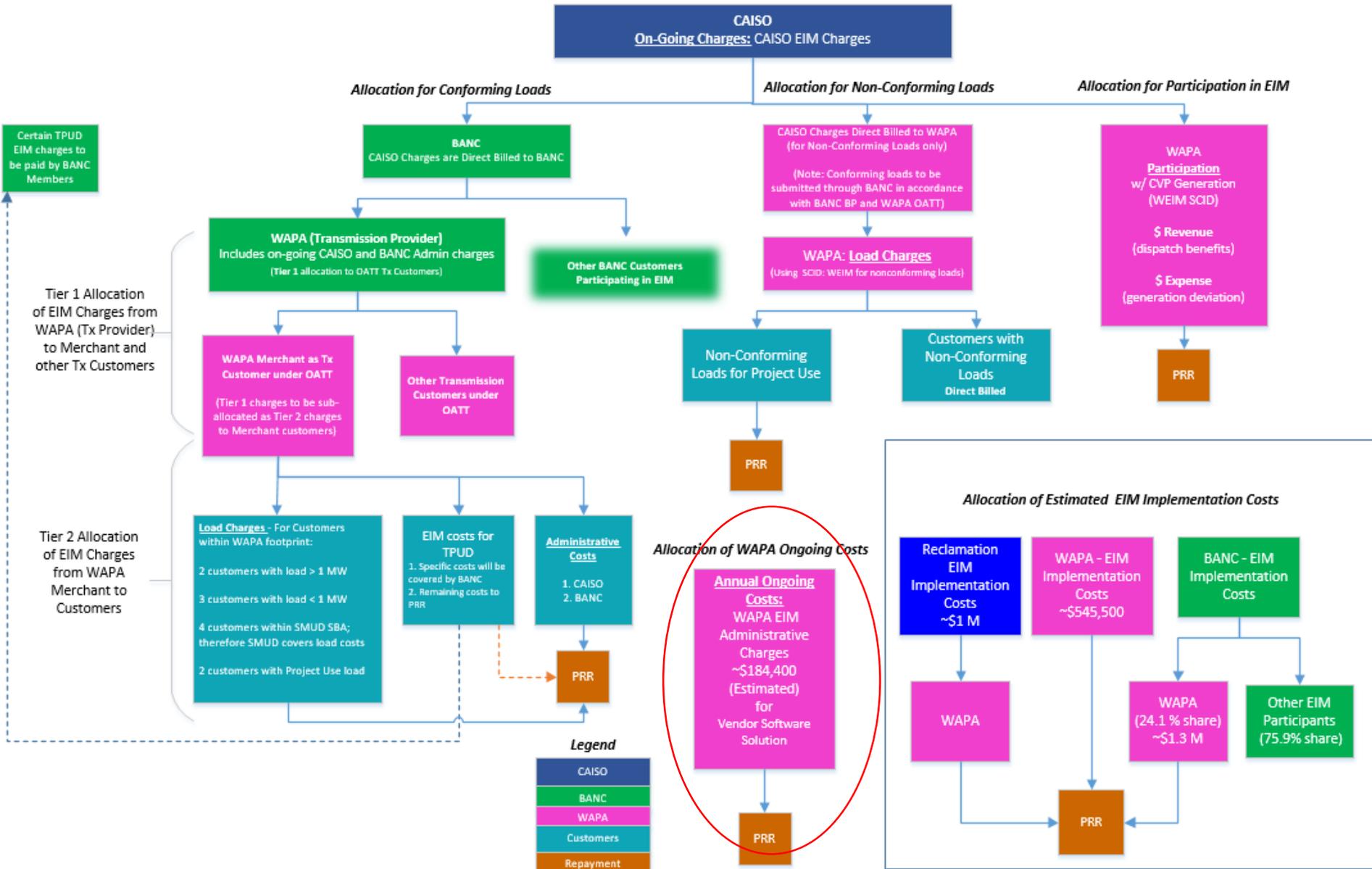
Allocation of EIM Charges and Benefits for Non-Conforming Loads from CAISO



Allocation of EIM Charges and Benefits for WAPA's Participation in EIM



Allocation of WAPA's Ongoing EIM Costs



CAISO EIM Charges Allocation

Tong Wu
SN Settlements Manager

Overview

- *BANC EIM Entity Tier-1 Allocation:*
 - WAPA Operations allocates the settlement amounts it receives from BANC EIM Entity to its transmission customers (i.e., WAPA SNR Merchant, and others.)
- *BANC EIM Entity Tier-2 Allocation:*
 - WAPA SNR Merchant allocates the settlements amounts it receives from WAPA SNR Operations to its load customers (e.g., TPUD, and others) and PRR
- *WEIM Participating Resource SC Allocation:*
 - WAPA SNR Merchant allocates the settlements amounts it receives from CAISO to its participating resources and PRR

BANC EIM Charge Allocation – Tier 1 Summary

Terminology: Charges can be +/-

Direct Assignment for Intertie Transaction (identified by information on eTag):

- FMM and RTM Instructed Imbalance Energy (IIE)

Metered Demand (i.e., Load Ratios) for

- All other Charges

BANC EIM Charge Allocation – Tier 1 Examples

Charge Code	Description	Proposed Allocation
4564	GMC-EIM Transaction Charge	Load Ratio
4575	Scheduling Coordinator ID	Load Ratio
64600 64700	FMM and RTM Instructed Imbalance Energy	Interchange activity (e-Tag)
64750	Real Time Uninstructed Imbalance Energy (UIE)	Load Ratio
64740	Unaccounted for Energy (UFE)	Load Ratio
67740, 69850, 64770	RT Congestion Offset EIM, RT Marginal Losses Offset EIM, RT Imbalance Energy Offset EIM	Load Ratio
6194, 6196 6294 6296, 6478	Spin and Non-Spin obligation and neutrality	Load Ratio
7070, 7076 7077 7078, 7087,7088	Flexible Ramp Up & Down, Forecast Movement and Uncertainty	Load Ratio
6045, 6046	Over-scheduling and Under-scheduling Charge, Over/Under Scheduling Allocation	Load Ratio
66200, 66780, 6478	RT Bid Cost Recovery EIM, RT Bid Cost Recovery Allocation, RT System Imbalance Energy Offset	Load Ratio

BANC EIM Charge Allocation – Tier 1 by Charge Codes

- See Attached Table in Separate Document.

BANC EIM Entity Settlement Allocation Summary

BANC Allocation Charge Code		BANC Allocation Basis	WAPA 1 st Tier Allocation	WAPA 2nd Tier Allocation		Allocation Granularity	Applicable Rate Schedule
				TPUD to BANC	Others		
100*	BANC Balancing Account	BANC Daily Load Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	N/A
101*	BANC PTB Charge	Custom Allocated or by default, Daily Load Ratio.	Load Ratio	Load Ratio	WAPA PRR	Daily	N/A
102*	BANC Miscellaneous Charge	Custom Allocated	Load Ratio	Load Ratio	WAPA PRR	Daily	N/A
2999	Default Invoice Interest Payment	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Monthly	4S
3999	Default Invoice Interest Charge	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Monthly	4S
4564	GMC-EIM Transaction Charge	BANC EIM Participant Hourly Load and Intertie Absolute Imbalance Ratio	Load Ratio	Load Ratio	WAPA PRR	Hourly	1S
4575	Scheduling Coordinator Identification Charge	BANC EIM Participant Fixed Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Monthly	4S
5024	Invoice Late Payment Penalty	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S
5025	Collateral Late Payment Penalty	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S
5900	Shortfall Receipt Distribution	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S
5901	Shortfall Receipt	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S
5910	Shortfall Allocation	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S
5912	Default Allocation	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S

BANC EIM Charge Allocation – Tier 2 Summary

Direct assignment for intertie transactions (identified by information on eTag):

- FMM and RTM Instructed Imbalance Energy (IIE)

All other charges allocated based Load Ratio

- TPUD Portion allocated to BANC (excluding uninstructed deviation)
- WAPA Portion allocated to PRR

BANC EIM Entity Settlement for TPUD – Charge Allocation

- Since TPUD is a First Preference Customer, WAPA will be responsible for real-time deviation charge codes:
 - 64750 Real Time Uninstructed Imbalance Energy EIM Settlement
 - 64600 FMM Instructed Imbalance Energy EIM Settlement
 - 64700 Real Time Instructed Imbalance Energy EIM Settlement
- BANC will be responsible for all other charge codes allocated to TPUD based on metered load.

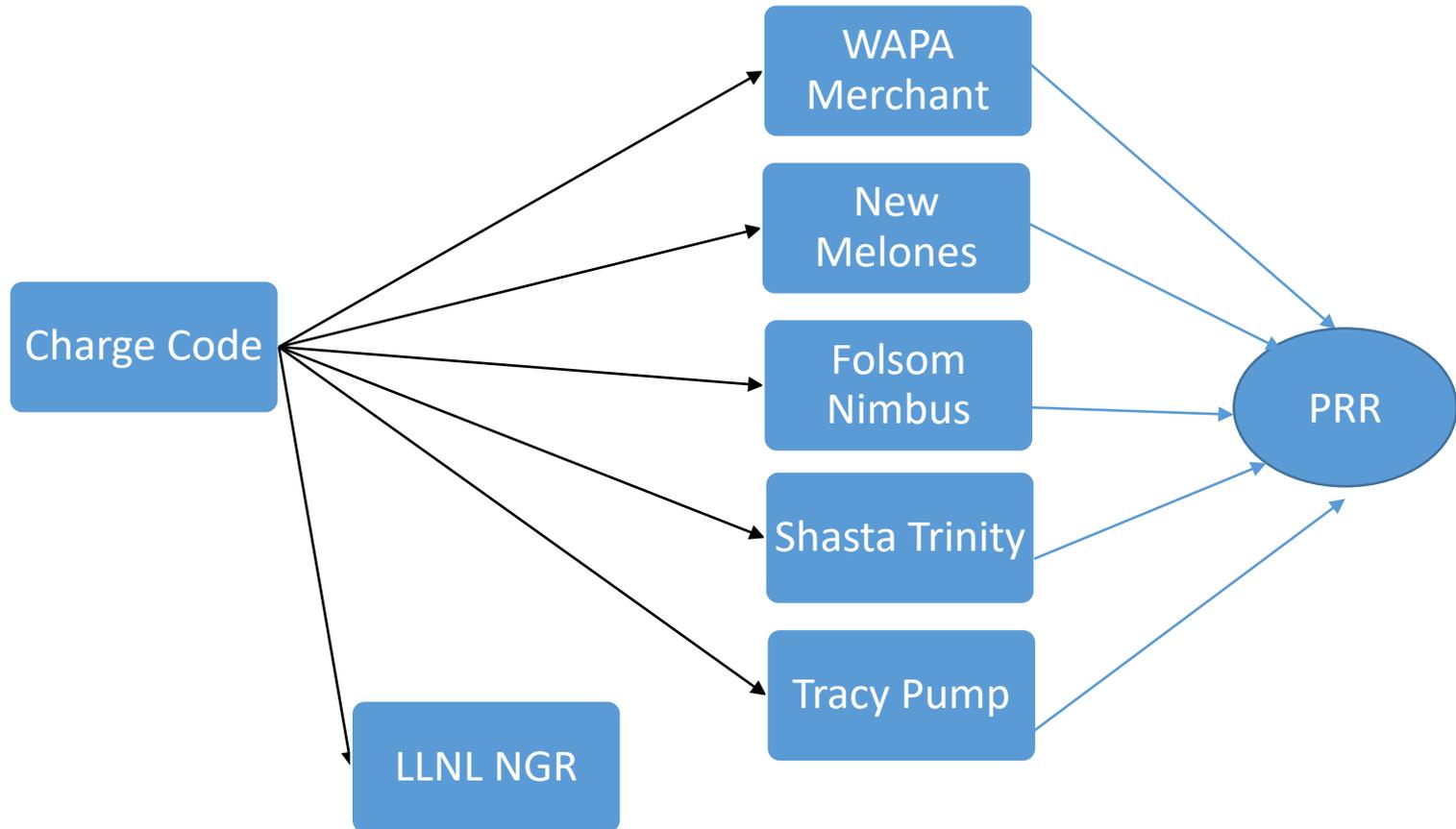
BANC EIM Entity Settlement for Trinity Public Utilities District (TPUD) – Proposed Process

1. BANC will perform daily calculation of TPUD allocations on each BANC Charge assessed to WAPA.
 - a. Calculate WAPA portion and assign to WAPA.
 - b. Calculate TPUD portion and assign to BANC.
2. Monthly invoice WAPA for WAPA's portion of the charges.
3. Monthly invoice BANC for TPUD's portion of the charges.
4. BANC will track TPUD's portion of the charges.

WEIM - Scheduling Coordinator ID

Customer	Resource ID	Resource Type	Resource Description
WAPA SNR Merchant CVP	MELONP_7_UNITS	G	New Melones Aggregation (pseudo tie)
	FOLSOM_7_UNITS	G	Folsom and Nimbus Aggregation
	SHASTRD_7_UNITS	G	Shasta and Trinity River Division Aggregation
	TRCYPP_7_PUMPSNGR	NGR	Tracy Pumps Load Resource
Lawrence Livermore National Lab (LLNL)	LLNL_7_LDNGR	NGR	LLNL Load, modeled as an NGR

WEIM Allocation Overview



WEIM Allocation Methods

- By Resource ID
 - instructed and uninstructed deviations
- By Number of Resource, i.e., equal share
 - CC4575 - SCID charge, $\$1000/5 = \200 per resource
- By Resource's Meter Ratio Shares
 - absolute values of metered energy quantity
 - in hourly, daily and monthly granularity
- WAPA merchant (PRR)

CAISO Charge Code	Charges Allocated by Resource ID	Allocation Granularity
64600	FMM Instructed Imbalance Energy EIM Settlement	5 Minute
64700	Real Time Instructed Imbalance Energy EIM Settlement	5 Minute
64750	Real Time Uninstructed Imbalance Energy EIM Settlement	5 Minute

CC	Charges Allocated by Meter Ratio Shares	Granularity
1592	Enforcement Protocol Penalty Allocation Payment	Monthly
4564	GMC-EIM Transaction Charge	Hourly
7077	Daily Flexible Ramp Up Uncertainty Award Allocation	Daily
7078	Monthly Flexible Ramp Up Uncertainty Award Allocation	Monthly
7087	Daily Flexible Ramp Down Uncertainty Award Allocation	Daily
7088	Monthly Flexible Ramp Down Uncertainty Award Allocation	Monthly
7989	Invoice Deviation Interest Distribution	Daily
7999	Invoice Deviation Interest Allocation	Daily
8526	Generator Interconnection Process GIP Forfeited Deposit Allocation	Daily

CC	Charges Allocated to WAPA	Allocation Granularity
2999	Default Invoice Interest Payment	Monthly
3999	Default Invoice Interest Charge	Monthly
4515	GMC Bid Transaction Fee	Daily
5024	Invoice Late Payment Penalty	Daily
5025	Financial Security Posting (Collateral) Late Payment Penalty	Daily
7070	Flexible Ramp Forecast Movement Settlement	Hourly
7071	Daily Flexible Ramp Up Uncertainty Capacity Settlement	Daily
7081	Daily Flexible Ramp Down Uncertainty Capacity Settlement	Daily
66200	Bid Cost Recovery EIM Settlement	Daily

EIM Resource Valuation

Robert Delizo

SN Resources and Scheduling Manager

EIM Resource Assumptions

- Use historical Spinning Reserve hourly capacity available as proxy resource for EIM, apply 50 MW cap
- Use +/-50 MW flexibility from base schedules
- Apply 300 MWh cap for cumulative hourly dec bids and 300 MWh for cumulative hourly inc bids in one operating day
- Apply +/-600 MWh cap for cumulative daily MWh in one operating week (starting on Mondays)
- Load matches EIM resource base schedule

SBA Resources and Demand in EIM

SBA Position Components under EIM

SBA Resources

Imports 80 MW
New Melones 205 MW
Folsom + Nimbus 110 MW
North Area 365 MW

SBA Demand

Exports 567 MW
NGR 113 MW
COTP loss 30 MW
Load 50 MW

SBA Generation

New Melones 205 MW
Folsom + Nimbus 110 MW
North Area 365 MW

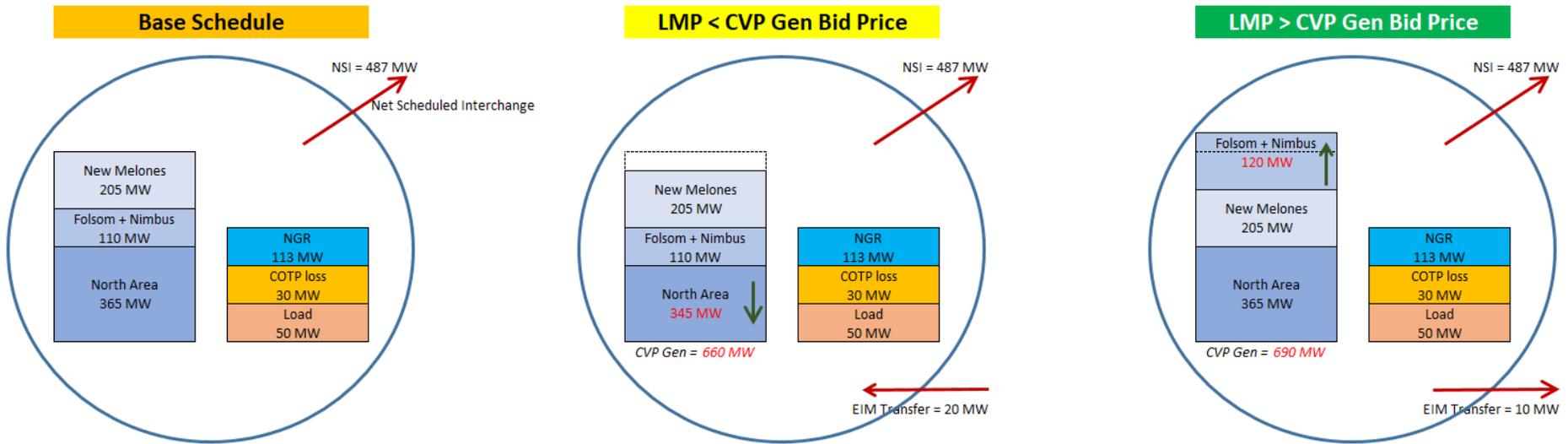
SBA Demand

Net Exports 487 MW
NGR 113 MW
COTP loss 30 MW
Load 50 MW

NGR – Non-Generator Resource
- Used for non-conforming loads

Schedules in EIM

Base Schedules and Dispatch Examples



$$\text{EIM NSI} = \text{EIM Transfer} + \text{NSI}$$

EIM Resource Bidding Strategies

- Use bid pricing strategy to balance dec dispatch (Sub-Balancing Authority Area/SBA to import energy) with inc dispatch (SBA to sell energy) in one operating day
 - Dec when LMP < bid price
 - Inc when LMP > bid price
- Awards in the Fifteen Minute Market (FMM) and Real Time Dispatch (RTD) 5-minute dispatches incremental (or decremental) to FMM awards

Scenarios to achieve low-cost purchases and high-value sales while ensuring adequate water management in the operating day

Case 1: HE 1-24 at CVP breakeven cost

Case 2: HE 1-24 at \$0/MW

Case 3: HE 1-12 at \$0/MW, HE 13-24 at 0.5 CVP breakeven cost

Case 4: HE 1-12 at \$0/MW, HE 13-24 at CVP breakeven cost

CVP breakeven cost = Weighted Average Effective Rate (2006-2019)
= \$30.92/MWh

ELAP LMP and Dispatch – Case 3

Inc (1) when LMP > bid price, Dec (-1) when LMP < bid price



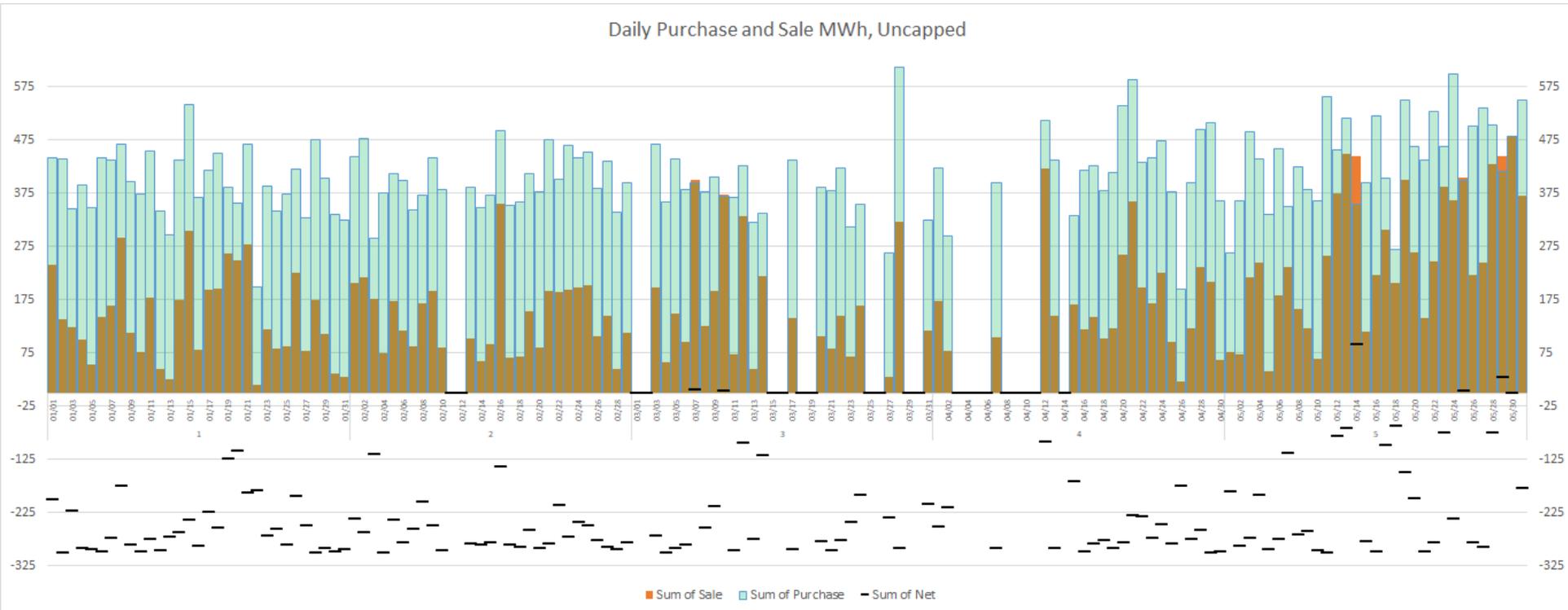
ELAP LMP and Dispatch – Case 4

Inc (1) when LMP > bid price, Dec (-1) when LMP < bid price



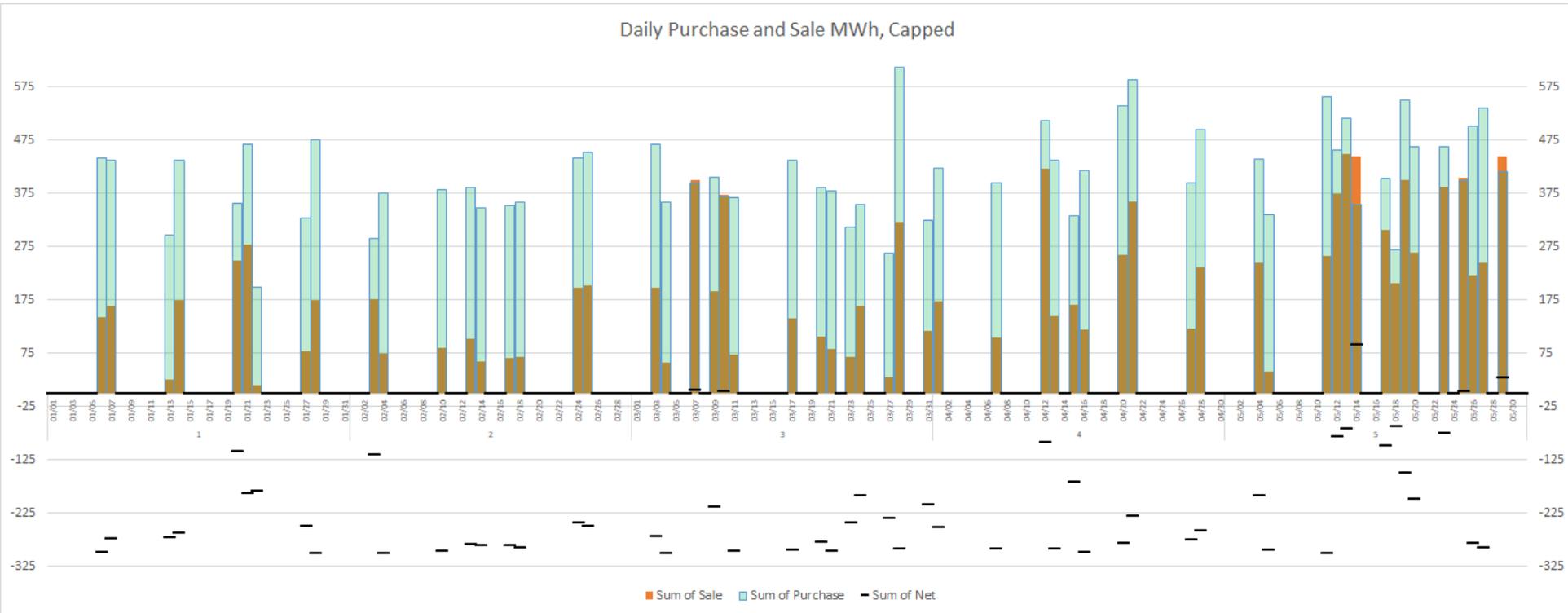
Purchase and Sale MWh, Uncapped

• January – May 2020



Purchase and Sale MWh, Capped

• January – May 2020



Valuation Results

- 300 MWh cap for cumulative hourly Dec bids and 300 MWh for cumulative hourly inc. bids in one operating day
- **+/-600 MWh cap for cumulative daily MWh in one operating week (starting on Mondays)**

Cumulative Energy Imported or Exported, MWh

Period	Imported MWh	Exported MWh
Jan - Dec 2017	31,116	12,571
Jan - Dec 2018	58,205	30,271
Jan - Dec 2019	77,345	49,023
Jan - May 2020	23,471	11,467
Total	190,137	103,332

Counts of Days with Energy Imported or Exported, days

Level of MWh	Days with Imports	Days with Exports	Days with Net	Days with Net
Over 200 MWh	469	212	239	10
100 MWh - 200 MWh	98	191	146	15
Up to 100 MWh	40	195	151	46

Valuation Results

- 300 MWh cap for cumulative hourly Dec bids and 300 MWh for cumulative hourly inc. bids in one operating day
- **+/-600 MWh cap for cumulative daily MWh in one operating week (starting on Mondays)**

EIM Dispatch Benefits

Period	Purchase Benefits*, \$				Sale Benefits, \$			
	Case 1	Case 2	Case 3	Case 4	Case 1	Case 2	Case 3	Case 4
Jan - Dec 2017	547,492	456,712	465,413	488,975	1,079,665	995,502	995,652	1,080,531
Jan - Dec 2018	762,418	466,116	500,489	561,951	2,615,059	2,336,798	2,346,901	2,628,196
Jan - Dec 2019	883,852	554,244	624,815	671,127	3,688,920	3,319,424	3,312,071	3,697,653
Jan - May 2020	248,394	90,091	112,582	134,812	565,035	685,173	679,625	696,170
Total	2,442,156	1,567,163	1,703,299	1,856,865	7,948,679	7,336,897	7,334,250	8,102,550

* Purchase benefits represent cost savings

Total EIM Dispatch Benefits = Purchase Benefits + Sale Benefits, \$

Period	Case 1	Case 2	Case 3	Case 4
Jan - Dec 2017	1,627,157	1,452,215	1,461,065	1,569,506
Jan - Dec 2018	3,377,477	2,802,914	2,847,390	3,190,147
Jan - Dec 2019	4,572,772	3,873,668	3,936,886	4,368,780
Jan - May 2020	813,428	775,264	792,207	830,981
Total	10,390,835	8,904,060	9,037,549	9,959,415

Case 1: HE 1-24 at CVP breakeven cost

Case 2: HE 1-24 at \$0/MW

Case 3: HE 1-12 at \$0/MW, HE 13-24 at 0.5 CVP breakeven cost

Case 4: HE 1-12 at \$0/MW, HE 13-24 at CVP breakeven cost

Comparison with Spinning Reserve Sales

- Assuming WAPA-SNR participated in EIM for the period January 2017 and onward

EIM Dispatch Benefits vs. Spinning Reserve Revenues

Period	Total EIM Dispatch Benefits = Purchase Benefits + Sale Benefits, \$				Spinning Reserve Revenues, \$
	Case 1	Case 2	Case 3	Case 4	
Jan - Dec 2017	1,627,157	1,452,215	1,461,065	1,569,506	544,829
Jan - Dec 2018	3,377,477	2,802,914	2,847,390	3,190,147	926,614
Jan - Dec 2019	4,572,772	3,873,668	3,936,886	4,368,780	1,099,254
Jan - May 2020	813,428	775,264	792,207	830,981	154,160
Total	10,390,835	8,904,060	9,037,549	9,959,415	2,724,857

Net EIM Dispatch Benefits, \$

Period	Case 1	Case 2	Case 3	Case 4
Jan - Dec 2017	1,082,329	907,386	916,236	1,024,677
Jan - Dec 2018	2,450,863	1,876,300	1,920,776	2,263,533
Jan - Dec 2019	3,473,518	2,774,414	2,837,632	3,269,526
Jan - May 2020	659,269	621,104	638,048	676,822
Total	7,665,977	6,179,203	6,312,692	7,234,557

Simulation with Average Historical Data

Cumulative Energy Imported or Exported, MWh

Period	Imported MWh	Exported MWh
FY Average	49,810	19,478

EIM Dispatch Benefits

	Case 1	Case 2	Case 3	Case 4
Purchase Benefits*, \$	310,674	69,592	106,813	138,349
Sale Benefits, \$	1,888,668	1,993,838	1,997,881	2,070,884
FY Average	2,199,341	2,063,430	2,104,694	2,209,233

* Purchase benefits represent cost savings

EIM Dispatch Benefits vs. Spinning Reserve Revenues

Period	Total EIM Dispatch Benefits = Purchase Benefits + Sale Benefits, \$				Spinning Reserve Revenues, \$
	Case 1	Case 2	Case 3	Case 4	
FY Average	2,199,341	2,063,430	2,104,694	2,209,233	554,800

Net EIM Dispatch Benefits, \$

Period	Case 1	Case 2	Case 3	Case 4
FY Average	1,644,541	1,508,629	1,549,893	1,654,433

Case 1: HE 1-24 at CVP breakeven cost

Case 2: HE 1-24 at \$0/MW

Case 3: HE 1-12 at \$0/MW, HE 13-24 at 0.5 CVP breakeven cost

Case 4: HE 1-12 at \$0/MW, HE 13-24 at CVP breakeven cost

Potential Future Net EIM Benefits

Estimated EIM Net Benefits, \$

Period	Case 1	Case 2	Case 3	Case 4
Estimated FY Average Dispatch Benefits	\$1,644,541	\$1,508,629	\$1,549,893	\$1,654,433
Estimated Annual Ongoing EIM Costs	<\$560,997>	<\$560,997>	<\$560,997>	<\$560,997>
Estimated EIM Load Based Costs	<\$50,000>	<\$50,000>	<\$50,000>	<\$50,000>
Estimated Total Net EIM Benefits	\$1,033,544	\$897,632	\$938,896	\$1,043,436

- Preliminary calculations show there could be net EIM benefits applied to the PRR
- The amounts of dispatch benefits are a result of the interplay of the historical Spin capacity available, the bid price, historical LMPs, as well as the EIM dispatch caps that were used.
- The levels of EIM dispatch benefits may not be representative of the future EIM dispatch benefits and WAPA cannot determine with certainty the quantitative EIM dispatch benefits until we are participating in the market

Proposed Formula Rate Schedules

Autumn Wolfe
SN Rates Manager

Proposed Rate Schedules

- Proposed EIM Rate Schedules
 - EIM Administrative Charges (CV-EIM1S)
 - EIM Energy Imbalance Service (CV-EIM4S)
 - EIM Generator Imbalance Service (CV-EIM9S)
- Proposed Revisions to Existing Rate Schedules
 - Energy Imbalance Service (CV-EID5)
 - Generator Imbalance Service (CV-GID2)
- Proposed Sale of Surplus Products Rate Schedule
 - Sale of Surplus Products (CV-SSP1)
- All proposed Rate Schedules can be found on WAPA's website at: <https://www.wapa.gov/regions/SN/rates/Pages/Rate-Case-2021-WAPA-194.aspx>

Structure of Proposed Formula Rate

- **Component 1** - Formula Rate or Penalty
- **Component 2** - Regulatory charges or credit passed through to relevant customer when possible or through Component 1 – **Standard language in all Rate Schedules**
- **Component 3** - Balance Authority charges or credits passed through to relevant customer when possible or through Component 1 – **Standard language in all Rate Schedules**

All Proposed Rate Schedules

- Component 2

Any charges or credits associated with the creation, termination, or modification to any tariff, contract, or rate schedule accepted or approved by the Federal Energy Regulatory Commission (FERC) or other regulatory bodies will be passed on to each relevant customer. The FERC's or other regulatory bodies' accepted or approved charges or credits apply to the service to which this rate methodology applies. When possible, WAPA-SN will pass through directly to the relevant customer FERC's or other regulatory bodies' accepted or approved charges or credits in the same manner WAPA-SN is charged or credited. If FERC's or other regulatory bodies' accepted or approved charges or credits cannot be passed through directly to the relevant customer in the same manner WAPA-SN is charged or credited, the charges or credits will be passed through using Component 1 of the formula rate.

All Proposed Rate Schedules

- Component 3

Any charges or credits from the Host Balancing Authority (HBA) applied to WAPA-SN for providing this service will be passed through directly to the relevant customer in the same manner WAPA-SN is charged or credited to the extent possible. If the HBA's costs or credits cannot be passed through to the relevant customer in the same manner WAPA-SN is charged or credited, the charges or credits will be passed through using Component 1 of the formula rate.

EIM Administrative Charges Proposed Rate Schedule CV-EIM1S

- Component 1

The EIM Administrative Service Charge shall be sub-allocated to WAPA-SN's Transmission Customers based on load ratio share for the time period in which WAPA-SN incurs EIM administrative costs.

EIM Energy Imbalance Service Proposed Rate Schedule CV-EIM4S

- Component 1

EI service is the deviation of the Transmission Customer's metered load compared to the load component of the Base Schedule settled as Uninstructed Imbalance Energy (UIE) for the period of the deviation at the applicable Load Aggregation Point (LAP) price where the load is located.

Unless such charges are allocated to the Transmission Customer directly by Balancing Authority of Northern California (BANC) as the EIM Entity, a Transmission Customer shall be responsible for any pass-through charges/credits associated with applicable EI service charges allocated to WAPA-SN, as Transmission Provider, for its participation in the EIM, in accordance with this rate schedule. WAPA-SN will sub-allocate load charges based on a Transmission Customer's load ratio share.

EIM Generator Imbalance Service Proposed Rate Schedule CV-EIM9S

- Component 1

Unless such charges are allocated to the Transmission Customer directly by BANC as the EIM Entity, a Transmission Customer shall be responsible for any pass-through charges/credits associated with applicable GI service charges allocated to WAPA-SN, as Transmission Provider, for its participation in EIM, in accordance with this rate schedule. Such charges may include those due to operational adjustments of any affected Interchange. WAPA-SN will direct assign charges and/or sub-allocate charges based on the Transmission Customer's load ratio share.

No Incremental Transmission Charge for EIM

Unless subsequently imposed by CAISO as the Market Operator (MO) as part of the MO Tariff and promulgated by WAPA through rate proceedings, there shall be no incremental transmission charge assessed for transmission use related to the EIM. Transmission Customers must have transmission service rights, as set forth in Attachment S of WAPA's Tariff.

Formula for Proposed EIM Rate Schedules

Schedule	Formula	Type of Charges
Schedule CV-EIM1S	Sub-allocated based on Load Ratio Share	EIM Administrative Service
Schedule CV-EIM9S	Direct Assign and/or Sub-allocate based on Load Ratio Share	<u>Interchange Operational Adjs:</u> Instructed Imbalance Energy
Schedule CV-EIM4S	Sub-allocated based on Load Ratio Share	<u>Load:</u> Uninstructed Imbalance Energy Unaccounted for Energy Under-and Over-Scheduling Load Uplifts and Offsets Bid Cost Recovery Flexible Ramping Product Operating Reserves

BANC EIM Tier 1 Charge Allocation by Charge Codes with Rate Schedules

BANC EIM Entity Settlement Allocation Summary

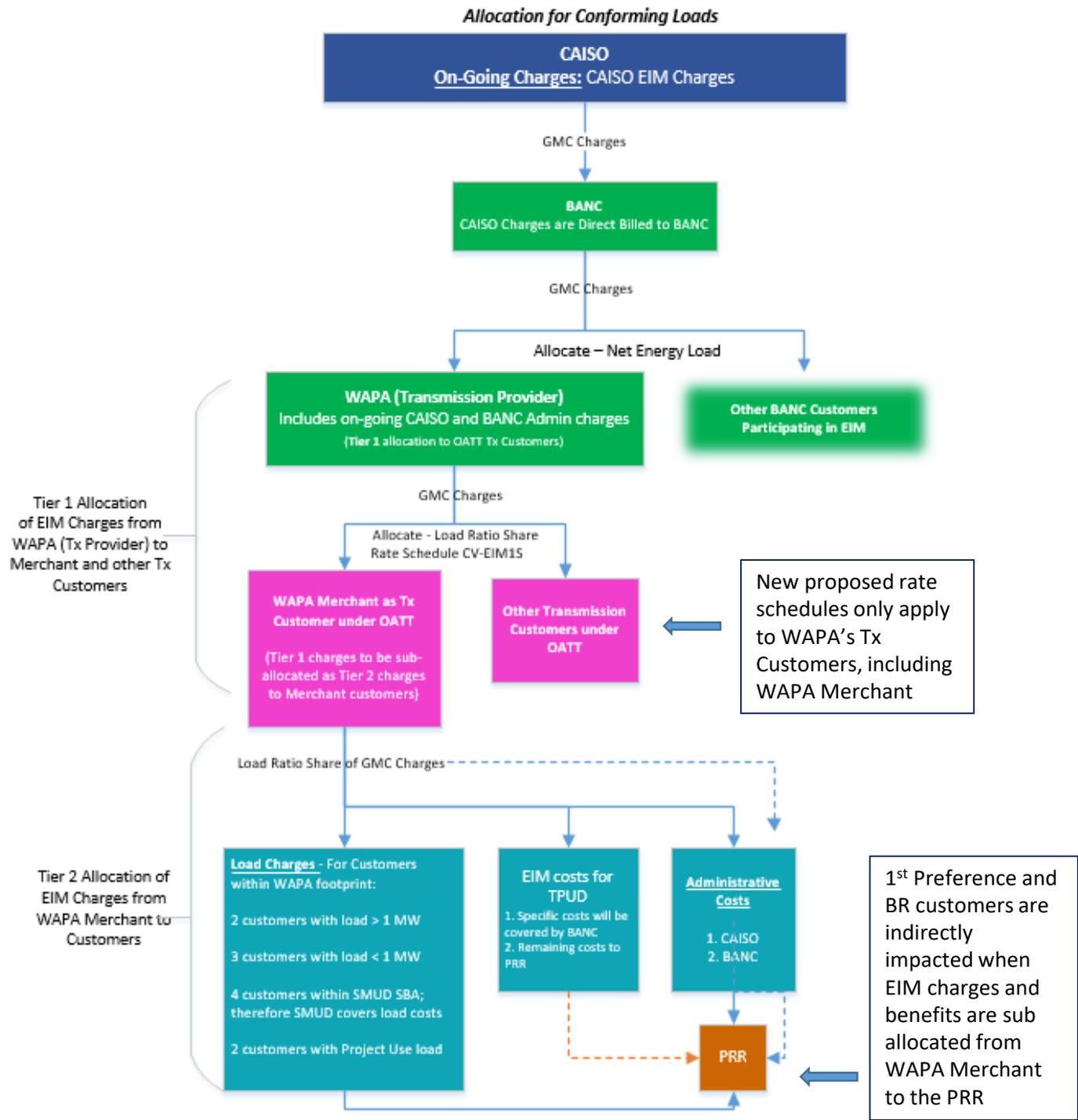
BANC Allocation Charge Code		BANC Allocation Basis	WAPA 1 st Tier Allocation	WAPA 2 nd Tier Allocation		Allocation Granularity	Applicable Rate Schedule
				TPUD to BANC	Others		
100*	BANC Balancing Account	BANC Daily Load Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	N/A
101*	BANC PTB Charge	Custom Allocated or by default, Daily Load Ratio.	Load Ratio	Load Ratio	WAPA PRR	Daily	N/A
102*	BANC Miscellaneous Charge	Custom Allocated	Load Ratio	Load Ratio	WAPA PRR	Daily	N/A
2999	Default Invoice Interest Payment	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Monthly	4S
3999	Default Invoice Interest Charge	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Monthly	4S
4564	GMC-EIM Transaction Charge	BANC EIM Participant Hourly Load and Intertie Absolute Imbalance Ratio	Load Ratio	Load Ratio	WAPA PRR	Hourly	1S
4575	Scheduling Coordinator Identification Charge	BANC EIM Participant Fixed Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Monthly	4S
5024	Invoice Late Payment Penalty	BANC Cost Allocation Ratio	Load Ratio	Load Ratio	WAPA PRR	Daily	4S

The complete Allocation Summary Table can be found on WAPA's website at:

<https://www.wapa.gov/regions/SN/rates/Pages/Rate-Case-2021-WAPA-194.aspx>

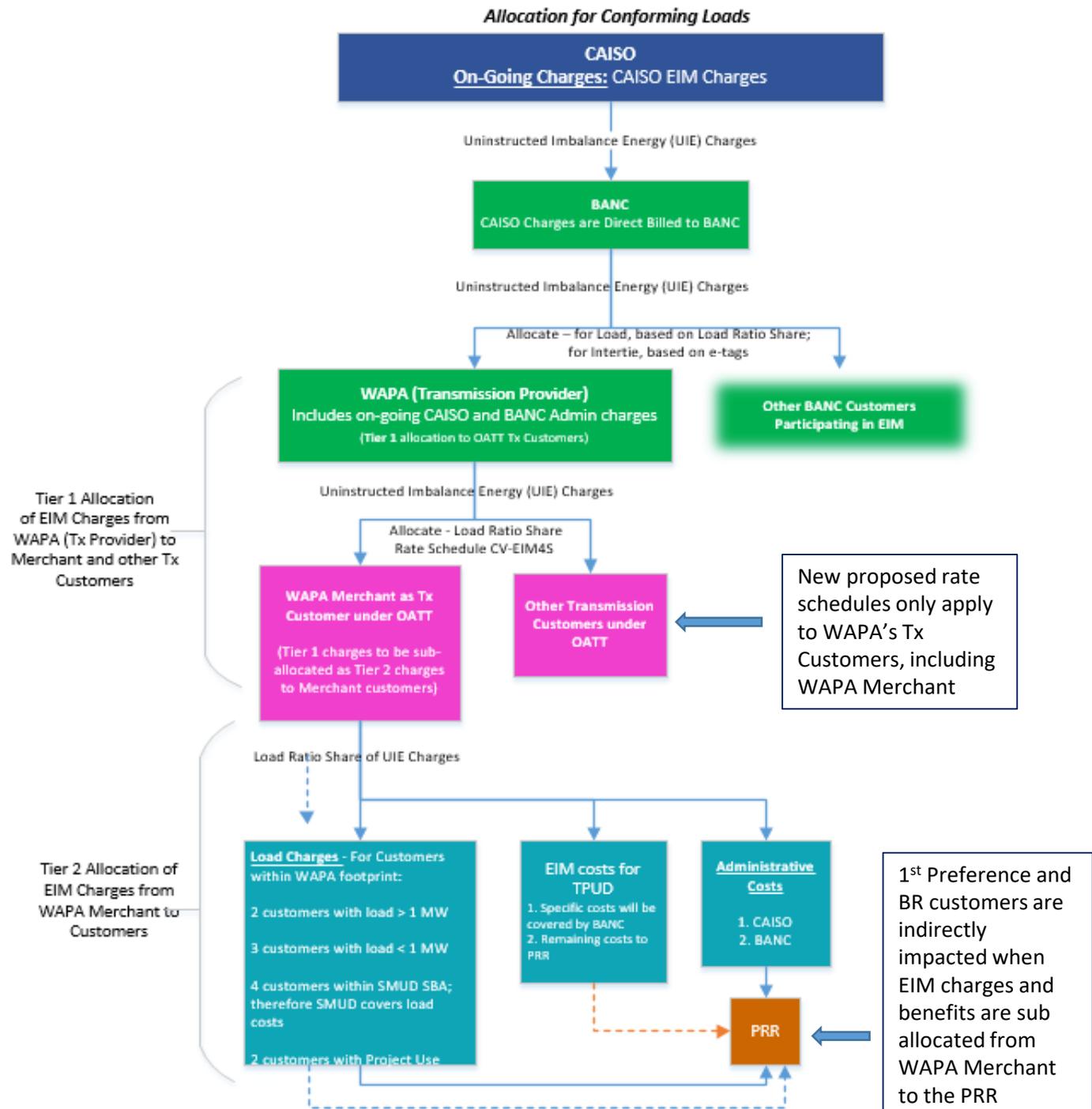
Example:

Allocation of EIM Admin Charges



Example:

Allocation of Energy Imbalance Charges



Revisions to Existing Rate Schedules

- New CV-EIM4S and CV-EIM9S will enable cost recovery of EIM associated Energy Imbalance (EI) and Generator Imbalance (GI) Service costs incurred during EIM participation.
- WAPA will also need to retain existing EI and GI Rate Schedules to allow cost recovery of such services provided outside of EIM, should EIM be suspended.
- Existing EI and GI Rate Schedules (CV-EID4 and CV-GID1) currently allow for EI and GI settlement through energy returned in-kind.
- WAPA is proposing to revise these existing Rate Schedules to require financial settlement.
 - Proposed as CV-EID5 and CV-GID2

Energy Imbalance Service Proposed Rate Schedule CV-EID5

Existing Component 1

El service is applied to deviations as follows: (1) for deviations within the bandwidth, **there will be no financial settlement,** unless otherwise dictated by contract or policy; rather, El will be tracked and settled with energy...

Proposed Component 1

El service is applied to deviations as follows **unless otherwise dictated by contract or policy:** (1) deviations within the bandwidth **will be tracked and settled financially,** at the greater of the California Independent System Operator market price, or WAPA-SN's actual cost...

Generator Imbalance Service Proposed Rate Schedule CV-GID2

Existing Component 1

GI is applied to deviations as follows: (1) for deviations within the bandwidth, **there will be no financial settlement**, unless otherwise dictated by contract or policy; rather, GI will be tracked and settled with energy...

Proposed Component 1

GI is applied to deviations as follows **unless otherwise dictated by contract or policy**: (1) deviations within the bandwidth **will be tracked and settled financially**, at the greater of the California Independent System Operator market price or WAPA-SN's actual cost...

Sale of Surplus Products

Rosemary Jones

SN Power Marketing and Energy Services Specialist

Sale of Surplus Products

- Sale of Surplus Products is grouping mechanism used in Rates across WAPA
- Surplus sales only happen if:
 - There is a Rates Schedule
 - Product or program design does not factor into amount available or otherwise impact base resource
 - Product occurs after 2-day ahead and, therefore, may not always be available
- Reclamation and WAPA strive to be water neutral each day when providing surplus products

Sale of Surplus Products

Proposed Rate Schedule CV-SSP1

- Component 1

WAPA-SN shall determine the charge for each product at the time of sale to be the greater of WAPA-SN's cost or market rates, to include transmission charges. WAPA-SN shall use a separate agreement(s) to specify the terms of sale(s). The customer may be responsible for acquiring additional transmission service necessary to deliver the product(s), for which a separate charge may be incurred from the transmission provider.

Products

Surplus Products are available after all operating and marketing requirements are met with all available forecasted generation.

Products	Customer Purchasing Groups	Availability	Scheduling Period	Net Benefits	Year
Energy	WSPP Entities or Markets	Daily or Hourly	Day Ahead, Real Time, EIM	\$44,000,000	2006
Reserves Spinning	BAAs or Markets	Daily	Day Ahead	\$4,300,000	2011
Regulation Pilot – Reg Up	Markets	Hourly	Day Ahead, EIM	\$700,000	2018
Frequency Response	BAA's or Markets	Daily	Day Ahead	n/a	2021
Resource Sufficiency	Direct Connect Customers	Hourly	EIM	n/a	2021

Frequency Response Reserve

- With the expected retirement of BAL-002-WECC-2a, Requirement 2 that mandates 50% of an entity's Contingency Reserves are held as Spinning Reserves, BANC, working in collaboration with the WAPA SBA, developed a new approach for meeting the BA's reserve obligation
- BANC including WAPA are participating in trials starting in November
- Failing NERC FRR would result in the BA being penalized.

FRR Attributes

- SN will continue with requirement to maintain sufficient reserve capacity to recover from the loss of the MSSC remains intact.
- BA's continue with requirement to maintain Spinning Reserve capacity on their generation.

CURRENTLY	
MSSC	100 MW
Spin	50 MW
Non-Spin	50 MW

FRR	
MSSC	100 MW
FRR	11 MW
Contingency Reserves	89 MW

FRR Implementation

- CVP units can provide FRR
- FRR will be offered the same as Spinning Reserve today
- Implementation is expected in April 2021.
- May implement sooner if testing shows generator response adequate to meet requirements.
- USBR requested accelerating implementation to conserve water this year.

Resource Sufficiency

- Refining the Product
 - To be marketable the product must handle the Balancing and Flexible Ramp tests.
- Surplus will be from current surplus products as available, i.e.- spin and regulation
- Impact to current beneficial programs
 - Moving some capacity from Day Ahead to EIM is expected to be revenue neutral; EIM market activity could increase overall benefits to all customers
- If energy bids are awarded in EIM, WAPA and USBR have options to ensure water neutrality

Resource Sufficiency Balancing Test

- EIM Balancing test demonstrates each BAA has capability of balancing their own area for each operating hour
- Resource Sufficiency balance resource-to-load, this product has no effect on Resource Adequacy
- Failing final balancing test could expose loads to over- or under-scheduling penalties
- Goal is to be benefit neutral on capacity and bid energy in at a similar level as energy behind other surplus products like Spin

Resource Sufficiency Flex Ramp Test

- EIM Flex Ramp test demonstrates each BAA has capability of handling load increases and decreases every 15 minutes.
 - Failure stops participation until next time BAA passes
- Flex Ramp looks at capacity for energy bids, up and down, from base schedule
- Capacity sold can only be for Balancing or Flex Ramp in the same hour, and can vary according to need every hour

EIM Generator Dispatch Ranges

Robert Delizo

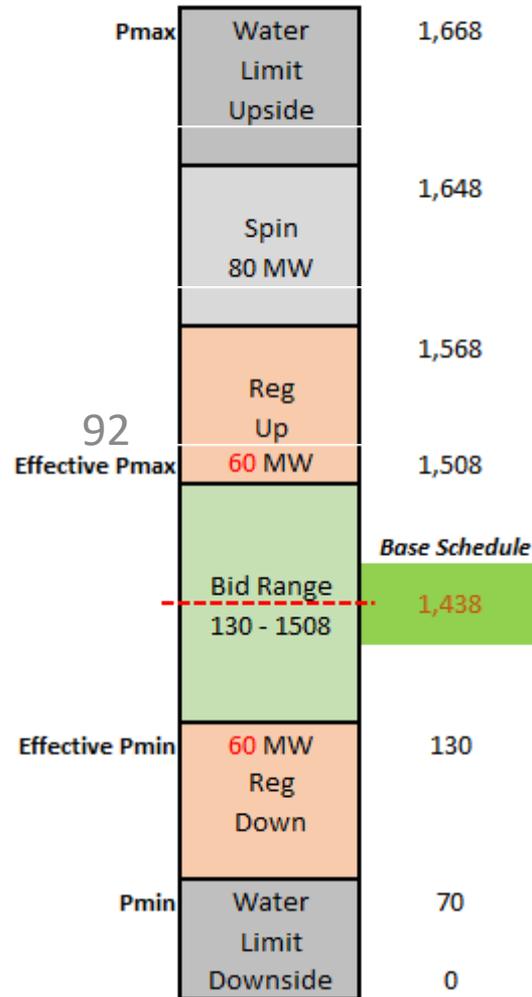
SN Resources and Scheduling Manager

EIM-PRSC Generation MW Capacities

EIM Resource	Plant	2DA, MW	High, MW	Low, MW
Shasta and Trinity River Division Aggregation	Shasta	536	568	0
	Trinity	100	130	10
	Carr	140	140	0
	Spring Creek	160	180	0
	Keswick	50	50	50
Folsom and Nimbus Aggregation	Folsom	180	210	0
	Nimbus	10	10	10
New Melones Aggregation	New Melones	300	380	0
Total		1,476	1,668	70

Customer Schedules

Load, Full Requirements	Interchange	1,188
	Load	28
	Loss	79
DDR		143
		1,438

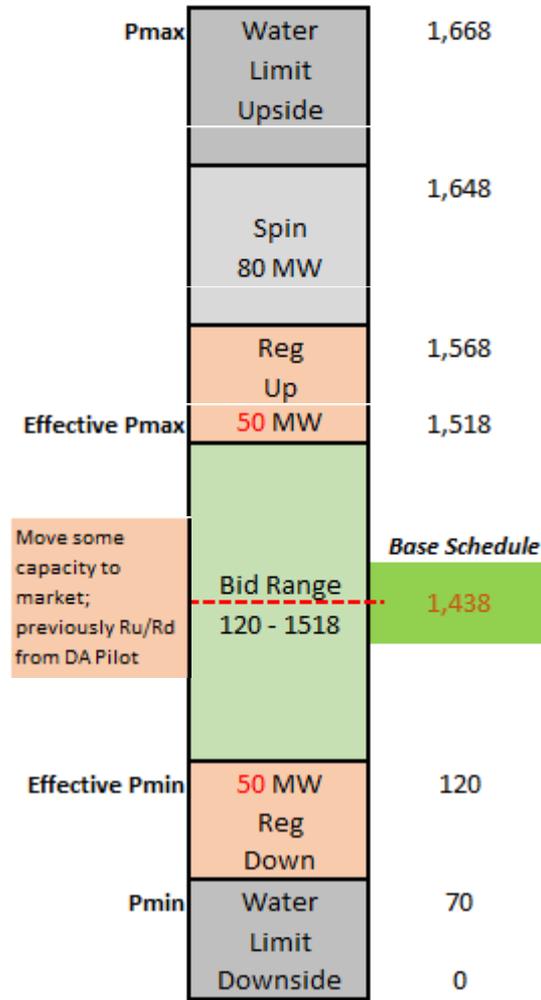


OUTAGE CARD=20 Reclamation cannot run generators full out
EIM Spin/Non-Spin Base Schedule. Submitted to CAISO.
EIM Reg-Up Base Schedule. Submitted to CAISO.
EIM Market Dispatch Range -- Base Schedule MW must fall within. -- DOTs always within (except ABC). -- EIM Gen Bid can drive DOT within.
EIM Reg-Down Base Schedule. Submitted to CAISO.
OUTAGE CARD=70 Reclamation must run generators

EIM-PRSC Generation MW Capacities

Capacity for the Resource Sufficiency Product

EIM Resource Plant	2DA, MW	High, MW	Low, MW	
Shasta and Trinity River Division Aggregation	Shasta	536	568	0
	Trinity	100	130	10
	Carr	140	140	0
	Spring Creek	160	180	0
	Keswick	50	50	50
Folsom and Nimbus Aggregation	Folsom	180	210	0
	Nimbus	10	10	10
New Melones Aggregation	New Melones	300	380	0
Total	1,476	1,668	70	



OUTAGE CARD=20 Reclamation cannot run generators full out
EIM Spin/Non-Spin Base Schedule. Submitted to CAISO.
EIM Reg-Up Base Schedule. Submitted to CAISO.
EIM Market Dispatch Range -- Base Schedule MW must fall within. -- DOTs always within (except ABC). -- EIM Gen Bid can drive DOT within.
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OUTAGE CARD=70 Reclamation must run generators

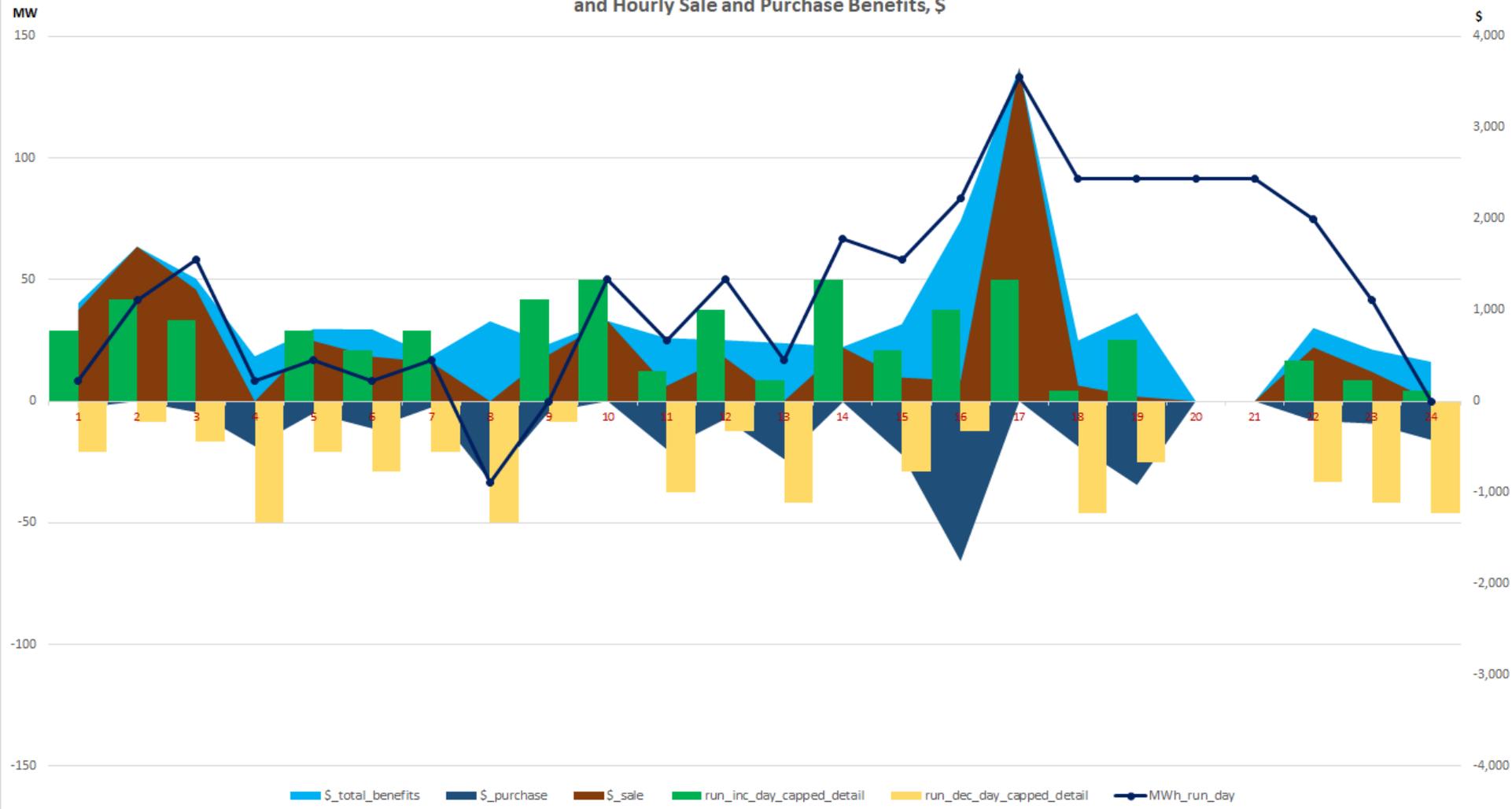
Customer Schedules	Value	
Interchange	1,188	
Load, Full Requirements	Load	28
	Loss	79
	DDR	143
	1,438	

Move some capacity to market; previously Ru/Rd from DA Pilot

EIM Dispatches, Sale and Purchase Benefits

Proxy Resource

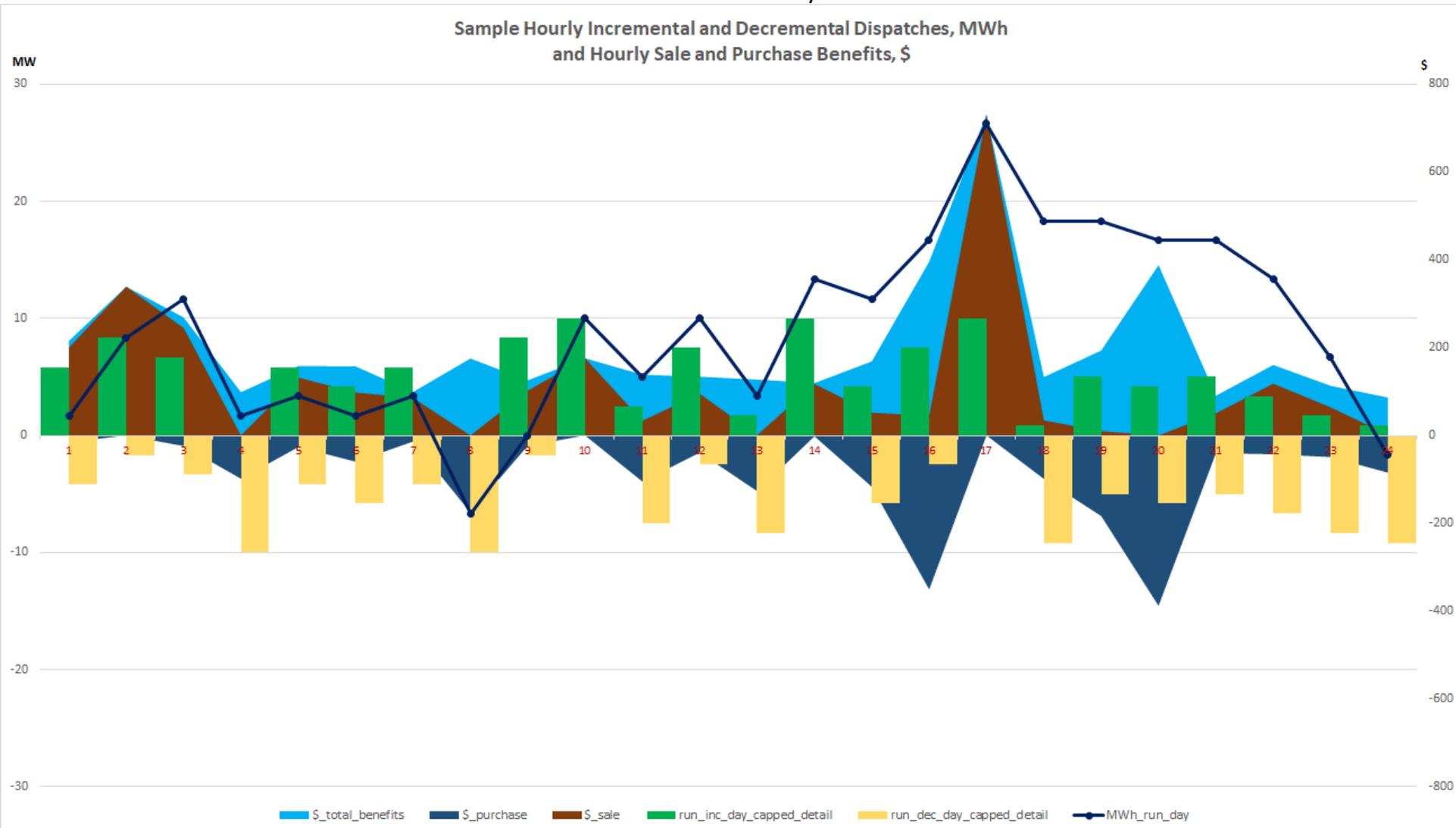
Sample Hourly Incremental and Decremental Dispatches, MWh
and Hourly Sale and Purchase Benefits, \$



EIM Dispatches, Sale and Purchase Benefits

Resource Sufficiency Product

Sample Hourly Incremental and Decremental Dispatches, MWh
and Hourly Sale and Purchase Benefits, \$



Additional Resources

Autumn Wolfe
SN Rates Manager

Additional Resources

Additional information can be found on WAPA's Website:

WAPA Rate Case:

<https://www.wapa.gov/regions/SN/rates/Pages/Rate-Case-2021-WAPA-194.aspx>

SNR EIM Information:

<https://www.wapa.gov/regions/SN/PowerMarketing/Pages/western-eim.aspx>

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Closing Remarks

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