March 9, 2026

Clerk of the Board
California Air Resources Board

Re: **COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS**

INTRODUCTION AND SUMMARY OF REQUESTED ACTION

The Power and Water Resources Pooling Authority ("PWRPA") respectfully submits these Comments on the proposed amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms ("Regulation") released on January 20,2026. These Comments address the Electrical Distribution Utility ("EDU") allowance allocation provisions in Appendix D-1 and Appendix D-2 as they apply to PWRPA for vintage years 2027 through 2035.

1. PWRPA requests that CARB issue 15-day amendments adjusting PWRPA's allowance allocation baseline from the current single-year figure of 7,093 allowances to 27,121 allowances which is a representative 10-year (2015–2024) historical average calculated using the outputs of CARB's own Appendix D-2 methodology, populated with PWRPA's actual CEC Power Source Disclosure ("PSD") data. Attachments 5 through 15 to these Comments are a revised Appendix D-2 and PWRPA's PSDs for 2015 through 2024.

2. PWRPA respectfully opposes the proposed changes to the 2027-2030 allowance allocations because the load assumptions are arbitrary and the proposed allocation will not protect PWRPA's ratepayers from immediate and material rate increases and would not respect long-term planning that relied on the established 2021-2030 allocation.

This proposal will provide a more accurate representation of PWRPA's expected emissions costs. PWRPA's hydro-dependent power supply makes any single-year snapshot an unreliable basis for a multi-year allocation. The proposed single-year anchor understates PWRPA's average compliance burden by nearly four-fold, and would leave PWRPA's ratepayers unprotected from Cap-and-Invest Program costs in most future years—contrary to the very purpose of the allocation and legislative intent. and direction to "minimize"

Main Address
Banta-Carbona I.D.
P.O. Box 299
Tracy, CA 95378-0299
Tel: (209) 835-4670
Fax: (209) 835-7009

Billing Address
PWRPA
P.O. Box 160
Arvin, CA 93203
Tel: (661) 854-5573
Fax: (661) 854-5213

impacts on ratepayers.[1] In the case of PWRPA, the 45-day language would have the opposite effect, leading to material rate increases.

I. PWRPA'S UNIQUE OPERATIONAL RISKS MAKE SINGLE-YEAR ANCHORING INAPPROPRIATE

A. Portfolio and Load Variability

PWRPA is a joint powers authority that operates as a publicly-owned electric utility and provides retail electric service to its public agency customers. These customers utilize electric power to pump, convey, store, treat, and distribute water for agricultural and municipal purposes. PWRPA recognizes that water-related activities and electric power consumption are directly related and that the exchange of water and electric power resources is a variable means of managing both electric power consumption and water supplies.

PWRPA has the right to receive hydroelectric energy ("Base Resource" or "BR") from the Western Area Power Administration ("WAPA") under Contract 21-SNR-02613.[2] The Base Resource varies considerably year-to-year. It is the residual output of Central Valley Project ("CVP") generation after all prior-right deductions: BR = (Gross CVP Generation − Project Use − First Preference − Reserves/Losses) × Customer BR%. PWRPA does not dispatch or control this resource. The quantity of zero-emission hydroelectric energy available to PWRPA in any given year is determined entirely by a multi-layer of factors outside PWRPA's control including hydrology, federal and state regulatory constraints on CVP operations, Endangered Species Act ("ESA") biological opinions, flood control operations, Shasta temperature management protocols, Bureau of Reclamation operational decisions and the like.[3]

Critically, PWRPA's electrical load moves inversely to its hydro supply. In drought years, surface water deliveries to its public agency customers are curtailed, forcing reliance on groundwater pumping—which increases electrical demand precisely when hydro supply is at its lowest. In wet years, abundant surface water reduces pumping at the same time hydro supply peaks. The empirical data confirms this: over the 2015–2024 period, the correlation between Large Hydro and Energy to Serve Load is −0.60 (strong negative), and between Large Hydro and the Allocation Factor is −0.83 (very strong negative).[4] In other words, load variability is a structural feature of how PWRPA's system operates.

The result is that, using the Appendix D-2 methodology with a 55% RPS in all years, PWRPA's annual allowance need would have ranged from 6,511 to 78,196 over the past decade—**a factor of twelve**. PWRPA is not aware of any other EDU in the Cap-and-Invest Program that experiences anything comparable in terms of year-to-year variability. In the face of worsening climate change

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[1] Cal. Health and Safety Code Sec. 38562.

[2] WAPA Base Resource Contract 21-SNR-02613 Amendment 3.

[3] See Attachment 1: Multi-layer BR Constraint Framework: Variability leads to the difficulty in forecasting Base Resource generation.

[4] The terms Large Hydro, Energy to Serve Load and Allocation factor are used as defined in ISOR, Appendix D-2.

conditions, PWRPA expects its load to become even more variable as drought conditions are expected to occur for extended periods of time in the future.

B. The Downside in Dry Years Far Exceeds the Upside in Wet Years

PWRPA prepared detailed multi-layer constraint analyses for every water year from 2015 through 2025—eleven consecutive years spanning critically dry, dry, below normal, above normal, and wet conditions.[5] These eleven analyses, applying a consistent twelve-layer constraint framework to each water year's specific facts, demonstrate three structural features that make PWRPA's compliance burden fundamentally different from other EDUs:

1. **The distribution is asymmetric.** The constraint stack caps CVP generation at approximately +36% above average in the best year (Water Year ("WY")2017, Wet) while permitting the downside to reach −56% below average in the worst (WY2022, Critically Dry). The upside is only 64% as large as the downside. Surplus wet years cannot compensate for deficit dry years.
2. **Constraints cascade in drought and cap in wet years.** In drought years, every constraint layer amplifies every other: low storage reduces hydraulic head; depleted cold-water pools trigger temperature restrictions; ESA protections intensify; fixed project use loads consume a growing share of shrinking generation. By example, in WY2021, Reclamation took the unprecedented step of completely bypassing the Shasta powerplant to preserve cold water, sacrificing generation entirely. Then, in WY2022, this cascading failure diminished generation to only 44% of average. By contrast, even in the record Wet year of WY2017, flood control and ESA constraints capped generation at 136%—well below what unconstrained hydrology could have supported.
3. **Regulatory constraints ratchet in one direction.** Constraints tightened during droughts do not relax proportionally during wet years. For example, WY2017, the wettest year in a decade, saw the worst fall-run Chinook return on the Trinity system in recorded history—the legacy of drought-year reproductive failure. WY2019, also a Wet year, achieved only a 75% south-of-Delta allocation because biological opinion export restrictions remained binding despite abundant water. WY2025, despite the most aggressive federal water supply posture in CVP history under Executive Order 14181, produced only marginally better allocations than the prior year (55% vs. 50%). The constraint stack proved substantially immune to executive action.

[5] See Attachments 2-3: Representative Water Year Constraint Analyses for WY2022 and WY2024.

The following table summarizes the eleven-year constraint analysis portfolio:

Water Year	Classification	S-of-D Alloc.	Est. CVP Gen.	Dev. from Avg	Key Constraint Dynamic
WY2015	Critically Dry	0%	~53%	**–47%**	Compound catastrophe; all buffers depleted; 97.9% winter-run mortality
WY2016	Below Normal	5%	~78–89%	**~–20%**	Recovery trap: El Niño rains trapped by drought-legacy constraint ratchet
WY2017	Wet	100%	~136%	+36%	Flood control ceiling caps generation; Oroville spillway crisis
WY2018	Below Normal	50%	~80–85%	**~–18%**	Reversion trap: single dry year erases wet-year surplus
WY2019	Wet	75%	~122%	+22%	Regulatory ceiling: BiOp export limits cap deliveries despite abundant water
WY2020	Dry	20%	~78–89%	**~–18%**	Hinge year; first year under 2019 BiOps; masked fragility
WY2021	Critically Dry	0%	~55%	**–45%**	Unprecedented Shasta power bypass; warm water released to save cold pool
WY2022	Critically Dry	0%	~44%	**–56%**	Cascading constraint failure; worst 3-year drought on record
WY2023	Wet	100%	~130–145%	+35%	Record snowpack; IOP still constrained Delta exports
WY2024	Above Normal	50%	~100%	~0%	IOP/regulatory suppression despite good hydrology; 3 regulatory regime changes
WY2025	Above Normal	55%	~100–105%	~+3%	Executive power paradox: EO 14181 produced only marginal improvement

Table 1: *Eleven-Year Constraint Analysis Portfolio (WY2015–WY2025)*

C. Why the Past Is the Best Available Forecast of the Future

CARB's Initial Statement of Reasons ("ISOR") acknowledges the risk of forecast divergence: when allocations are set in advance based on projected conditions, actual outcomes may differ.[6] For most EDUs, this risk is manageable because load and supply are relatively predictable. For PWRPA, it is the central challenge. The many constraint analyses demonstrate that **no single year can be**

[6] ISOR, p. 50: "when allowance allocations are calculated in advance based on projected supply, load, and resulting cost burden…there is a risk that the load projections will be too high or too low or that the supply projections would not reflect the actual generation mix."

forecast in advance. If the future cannot be predicted from policy and operational actions, and it cannot be predicted from hydrology alone (WY2019's 75% allocation in a Wet year proves that), then the only responsible approach is to use the empirical record of what has actually happened to inform future allocations.

The 2015–2024 decade provides exactly the kind of data needed to inform an appropriate allocation of allowances. It spans the full range of California's hydrological cycle: two critically dry years, two below-normal years, one dry year, two above-normal years, and three wet years. It includes the worst three-year drought on record (WY2020–2022) and one of the snowiest years in history (WY2023). It captures operations under three different regulatory regimes including the 2008/2009 Biological Opinions ("BiOps"), the 2019 BiOps, and the court-ordered Interim Operations Plan.

A 10-year average of the actual allocation outcomes across this period is the best available approximation of what PWRPA will face going forward—not because the future will replicate any particular past year, but because the average captures the structural dynamics (the asymmetry, the cascading constraints, the ecological ratchet, the regulatory ceiling) that will continue to govern CVP operations regardless of which specific years recur. Additionally, DWR modeling projects higher frequency of critical and below-normal years and greater precipitation volatility. If anything, the 10-year average *understates* PWRPA's future compliance burden because the proportion of drought years in the historical record may be lower than what the future holds.

II. THE PWRPA ALLOCATION IN THE 45-DAY LANGUAGE IS ARBITRARY AND DOES NOT MEET STATUTORY REQUIREMENTS OR CARB'S OWN POLICIES

A. The Proposed Allocation Would Not Protect PWRPA's Ratepayers

The Cap-and-Invest Regulation is clear: allowances allocated to EDUs must be "for the primary benefit of retail electricity ratepayers," and the allocation must be "based on [each EDU's] anticipated Cap-and-Invest Program compliance costs or cost burden."[7]

The proposed amendments must also be evaluated in light of the policy direction established by California Assembly Bill (AB) 1207, which emphasizes that implementation of California's climate programs should prioritize energy affordability and minimize impacts to utility customers. Consistent with this directive, CARB should ensure that allowance allocation methodologies preserve allowance value for load-serving entities that serve retail customers and avoid shifting compliance costs onto ratepayers. Any revisions to the allocation methodology that materially reduce allowance value available to POUs risk undermining AB 1207's affordability objectives and should be reconsidered to better protect POU customers from unnecessary rate impacts.

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[7] ISOR, p. 49; Appendix D-1, p. 3. CARB allocates free allowances to EDUs "to benefit their ratepayers, consistent with the goals of AB 32." The number of allowances allocated to each EDU is based on its "anticipated Cap-and-Invest Program compliance costs or cost burden."

An allocation of 7,093 allowances when PWRPA's 10-year average compliance burden could be 27,121 does not approximate PWRPA's anticipated cost—it understates it nearly four-fold. The shortfall transfers the full cost directly to PWRPA's customers who, in turn, must pass those costs through to municipal and agricultural water ratepayers. In a critically dry year like WY2022, the shortfall between the proposed allocation and actual need would be approximately 71,100 allowances. At the ISOR's projected allowance price, that single-year shortfall represents approximately $4.8 million in unprotected compliance costs flowing directly to PWRPA's public agency water purveyors.[8] The purpose of the allocation is to protect ratepayers from Program costs, however, an allocation that covers only 26% of the average cost—and only 9% of the cost in severe drought years—does not achieve that purpose.

B. The D-2 Assumptions for PWRPA are Arbitrary and Inconsistent with the Empirical Record

The 45-day language arbitrarily anchors PWRPA's allocation to a single Above Normal water year (2024) and applies flat assumptions through 2035.[9]

D-2 Assumption	Assumed Value	Actual 10-Year Range (2015–2024)
Large Hydro	170,000 MWh (flat, all years)	56,380 – 282,114 MWh (factor of 5)
Allocation Factor	0.0218 $MTCO_2e$/MWh (flat)	0.0218 – 0.1573 (factor of 7)
Growth Factor	0.00% (permanent)	Load is hydrology-correlated; varies annually

Those assumptions lock PWRPA into the compliance profile of a single favorable year with no possibility of correction. The proposed allocation would have been materially wrong in at least seven of the past ten years, with shortfalls of up to 71,100 allowances in one representative year.

C. Averaging the Outputs of CARB's Own Methodology Is Statistically Robust and Supported by the Record in this Rulemaking

PWRPA proposes that CARB calculate the D-2 allocation for each year 2015 through 2024 using PWRPA's actual CEC-filed data, **and then take the arithmetic mean of the resulting allowance allocations**. This approach is consistent with CARB's statutory mandate, CARB's own precedent, and California law for four reasons:

First, it approximates the anticipated compliance cost. For an EDU whose annual compliance burden ranges from 6,511 to 78,196, the average of actual annual costs is the most statistically robust approximation of the cost PWRPA will actually face over any multi-year period. The alternative—averaging the raw inputs and running them through the formula once—produces only approximately 13,200 allowances because the D-2 formula is nonlinear and the averaging process

[8] At the ISOR's projected weighted average allowance price of $68 per allowance (ISOR Table 21, p. 320).

[9] Appendix D-2, PWRPA tab: Allocation Factor = 0.0218 $MTCO_2e$/MWh; Large Hydro = 170,000 MWh (flat); Growth Factor = 0.00%.

destroys the correlation between PWRPA's inputs that drives its compliance burden. This is not a policy judgment; it is a mathematical property of the formula.[10]

Put simply: PWRPA's drought-year compliance costs are very large, and its wet-year costs are very small. The average of these costs is dominated by the drought years. But if one averages the underlying conditions first and then calculates a single "average year" cost, the result is an artificially moderate number that corresponds to a year that never actually occurs—it is neither a drought year nor a wet year, and it dramatically understates the expected costs of compliance that PWRPA will face.

Second, CARB already uses 10-year averaging for WAPA. In the Appendix D-2 WAPA tab, CARB uses a "10-year average of large hydroelectric supply provided by WAPA."[11] PWRPA receives its power from the same CVP system through the same WAPA Base Resource contract. The rationale for multi-year averaging applies to PWRPA with equal—if not greater—force, because unlike WAPA (whose other D-2 inputs are stable CEC forecasts), all three of PWRPA's D-2 inputs (ETSL, Retail Sales, and Large Hydro) are volatile and correlated. Consistent treatment requires averaging at the output level for PWRPA. Treating PWRPA differently from WAPA would create an arbitrary distinction and would undermine the program's goal of equitably protecting public power ratepayers.

Third, California law recognizes PWRPA's volatility and requires averaging. Cal. Pub. Util. Code § 399.30(i) mandates that PWRPA's RPS procurement obligation "shall be based on the authority's average retail sales over the previous seven years."[12] The Legislature enacted this provision because PWRPA's annual retail sales are too volatile for single-year measurement. Critically, the statute averages the outcome measure directly—it does not average the underlying factors and then recalculate. The same principle applies to allowance allocation.

Fourth, CARB's framework already authorizes alternate data sources. Appendix D-1 states that CARB includes alternate data sources when data are missing or unavailable, and CARB has already exercised this authority for PWRPA.[13] The 10-year average of EDU-Specific Emissions is simply a more accurate alternate data source than a single-year snapshot. It uses CARB's own D-2 methodology and PWRPA's own CEC-filed data—the only difference is that it uses ten years of data instead of one.

D. The Empirical Record Confirms the Under-Allocation

Table 2 compares the proposed allocation of 7,093 against PWRPA's calculated compliance need for each of the past ten years using the Appendix D-2 methodology and 55% RPS:

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[10] The mathematical basis is Jensen's Inequality: for a convex function f and any random variable X, $E[f(X)] \geq f(E[X])$.

[11] Appendix D-2, WAPA tab: "10-year average of large hydroelectric supply provided by WAPA" (511,618 MWh).

[12] See Attachment 4: Cal. Pub. Util. Code § 399.30(i); 20 CCR § 3204(b)(1).

[13] Appendix D-1, Table 1: "PWRPA's supply information for hydroelectric in the 2024 S-2 does not separate small and large hydroelectric" and "the percentage of large hydroelectric supply was provided by PWRPA."

Year	WY Type	Actual Need	Proposed (7,093)	Surplus/(Shortfall)	Result
2015	Crit. Dry	57,838	7,093	**(−50,745)**	**UNDER-ALLOCATED**
2016	Bel. Normal	39,550	7,093	**(−32,457)**	**UNDER-ALLOCATED**
2017	Wet	7,835	7,093	**(−742)**	**UNDER-ALLOCATED**
2018	Bel. Normal	7,375	7,093	**(−282)**	**UNDER-ALLOCATED**
2019	Wet	6,753	7,093	+340	Over-allocated
2020	Dry	9,536	7,093	**(−2,443)**	**UNDER-ALLOCATED**
2021	Crit. Dry	51,035	7,093	**(−43,942)**	**UNDER-ALLOCATED**
2022	Crit. Dry	78,196	7,093	**(−71,103)**	**UNDER-ALLOCATED**
2023	Wet	6,511	7,093	+582	Over-allocated
2024	Ab. Normal	6,576	7,093	+517	Over-allocated
10-YEAR TOTAL		**271,206**	**70,930**	**(−200,276 net)**	**7 of 10 years short**

Table 2: *Year-by-Year Shortfall Analysis — Proposed Allocation vs. Actual Need (2015–2024)*

The proposed allocation would leave PWRPA under-allocated in seven of the past ten years, with a cumulative net shortfall of 200,276 allowances. The worst single-year shortfall (71,103 in WY2022) exceeds the total cumulative surplus from all three over-allocated years combined (1,439) by a factor of 49. Even if PWRPA could bank every surplus allowance from every wet year, a single severe drought would consume the entire bank and leave PWRPA tens of thousands of allowances short. This is not a marginal discrepancy—it is a fundamental mismatch between allocation and need.

III. REQUESTED 15-DAY AMENDMENTS

PWRPA respectfully requests that CARB issue 15-day amendments adjusting PWRPA's allowance allocation for post-2030 using a 10-year (2015–2024) average of the output of CARB's own D-2 methodology.

A. Proposed Allocation Calculation

The calculation runs CARB's D-2 formula for each year 2015 through 2024 using PWRPA's actual CEC-reported Allocation Factors standardized to the 55% RPS factor, and then takes the arithmetic mean of the resulting annual EDU-Specific Emissions.

Parameter	CARB Proposed (Single-Year 2024)	PWRPA Proposed (10-Year Average)
Large Hydro Assumption	170,000 MWh (flat)	168,834 MWh (actual avg)
Allocation Factor (2030)	0.0218	0.0574
2030 Allocation	**7,093**	**27,121**
2031–2035 Annual Allocation	~7,140 / year	27,121 / year
Growth Factor	0.00%	0.00%

Table 3: *CARB Proposed vs. PWRPA Proposed Allocation*

B. Specific Requested Appendix D-2 Revisions

PWRPA requests that the PWRPA tab in Appendix D-2 be revised to set the 2030 EDU-Specific Emissions and Annual Allocation to 27,121 (the 10-year PSD-based average), and that the 2031–2035 PWRPA row be set to 27,121 per year with a 0.00% growth factor applied to that baseline. If CARB prefers not to override totals directly, the same result can be achieved by inserting the PSD-based 10-year average emissions into the PWRPA tab's 2030 calculation, with a note identifying the multi-year PSD dataset as the alternate data source.

The revised Appendix D-2 is included as Attachment 5. It uses the data from PWRPA's PSDs for 2015 through 2024 which are included as Attachments 6 through 15.

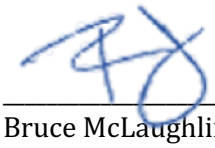
IV. CONCLUSION

PWRPA's compliance cost burden is structurally driven by hydrology, ESA and Delta regulatory constraints, federal operational decisions, and hydrology-correlated agricultural load. Eleven years of detailed constraint analyses demonstrate that this burden cannot be forecast from any single year's conditions—it can only be approximated by observing what has actually happened across a full hydrological cycle. The proposed 45-day language would allocate PWRPA 7,093 allowances based on a single-year snapshot that understates PWRPA's 10-year average compliance burden by nearly four-fold. This result is:

- Inconsistent with CARB's statutory mandate to protect ratepayers from Program costs;
- Inconsistent with CARB's own treatment of WAPA, which receives power from the same CVP system and for which CARB already uses a 10-year average;
- Inconsistent with California law's express recognition of PWRPA's volatility (Cal. Pub. Util. Code § 399.30(i));
- Inconsistent with the mathematical properties of the D-2 formula, which require output averaging to produce an unbiased result; and
- Contradicted by a decade of empirical data showing the proposed allocation would leave PWRPA short in seven of ten years by a cumulative 200,276 allowances.

PWRPA respectfully requests that CARB issue 15-day amendments adopting a **10-year historical average of EDU-Specific Emissions (27,121 allowances)** as the basis for PWRPA's post-2030 allocation and as the starting point for the 2031–2035 period. This approach uses CARB's own D-2 methodology, PWRPA's actual CEC-filed data, the same multi-year averaging logic CARB already applies to WAPA, and produces a statistically robust estimate of PWRPA's anticipated compliance cost burden. PWRPA appreciates the opportunity to submit these comments and stands ready to provide any additional data CARB staff may need to ensure that PWRPA's allocation is supported by the record and meets the statutory objectives of minimizing costs to electricity ratepayers.

Respectfully submitted,



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Bruce McLaughlin, General Manager
Power & Water Resources Pooling Authority

V. ATTACHMENTS SUBMITTED FOR THE RULEMAKING RECORD

PWRPA requests that the following attachments be included in the official rulemaking record in support of these comments:

Attachment 1: Multi-layer BR Constraint Framework: Variability leads to the difficulty in forecasting Base Resource generation.

Attachment 2: WY2022 BR Constraint Analysis — Applying the Multi-Layer Constraint Framework to CVP Base Resource Availability.

Attachment 3: WY2024 BR Constraint Analysis — Applying the Multi-Layer Constraint Framework to CVP Base Resource Availability.

Attachment 4: California RPS laws pertaining to PWRPA.

Attachment 5: PWRPA Variable Load Model Revising ISOR Appendix D-2.

Attachment 6: PWRPA 2015 Power Source Disclosure filed with the California Energy Commission ("CEC").

Attachment 7: PWRPA 2016 Power Source Disclosure filed with the CEC.

Attachment 8: PWRPA 2017 Power Source Disclosure filed with the CEC.

Attachment 9: PWRPA 2018 Power Source Disclosure filed with the CEC.

Attachment 10: PWRPA 2019 Power Source Disclosure filed with the CEC.

Attachment 11: PWRPA 2020 Power Source Disclosure filed with the CEC.

Attachment 12: PWRPA 2021 Power Source Disclosure filed with the CEC.

Attachment 13: PWRPA 2022 Power Source Disclosure filed with the CEC.

Attachment 14: PWRPA 2023 Power Source Disclosure filed with the CEC.

Attachment 15: PWRPA 2024 Power Source Disclosure filed with the CEC.

ATTACHMENT 1

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Multi-layer BR Constraint Framework:
Variability leads to the difficulty in forecasting Base Resource generation

FOUNDATIONAL EQUATION

Gross CVP Hydropower Generation − **Project Use Loads** (pumps + losses) = **Net Generation to WAPA** → First Preference Customers are served first → **remainder = Base Resource**

Actually forecasting the amount of hydropower that will be generated is difficult because it is highly dependent upon variables that may change on a seasonal or even daily basis. Every variable discussed below ultimately feeds into how much power the CVP eventually delivers as Base Resource to end-use customers. As a result, the best form of forecasting Base Resource is looking to the past and using historical amounts.

LAYER 1: HYDROLOGY — The Starting Point

This is the most obvious driver. Snowpack, rainfall, and runoff into CVP reservoirs determine how much water is physically available. WAPA's BRC Section 6.1 acknowledges this directly by requiring forecasts based on "high, average, and low hydrological conditions." Shasta Lake alone accounts for roughly 41% of CVP stored water. In critically dry years (like 2014–2015 and 2021), reservoir levels can drop so low that they constrain not just water deliveries but the physical ability to generate power—reservoir head drops, and turbine efficiency degrades or generation ceases entirely. But, hydrology is only the beginning.

LAYER 2: FEDERAL ENVIRONMENTAL LAW — The Endangered Species Act and Biological Opinions

This is perhaps the single most consequential non-hydrological variable. The ESA, administered through Biological Opinions (BiOps), has reshaped CVP operations fundamentally since the early 1990s.

The key BiOps affecting CVP generation are issued by two agencies for different species. The U.S. Fish and Wildlife Service (USFWS) issues BiOps primarily concerning Delta smelt, while the National Marine Fisheries Service (NMFS) issues BiOps concerning winter-run Chinook salmon, spring-run Chinook, Central Valley steelhead, and green sturgeon. The operational consequences of these BiOps include restrictions on Old and Middle River (OMR) flows (limiting how aggressively the CVP and SWP can pump from the Delta), Delta Cross Channel gate closures to protect migrating salmon (which reduces freshwater flow into the south Delta and constrains pumping), required minimum Delta outflows to maintain the low-salinity zone (X2 position) for smelt habitat, and seasonal export curtailments during fish migration windows.

The history of these opinions is important because it is not static. The 2008 USFWS BiOp found that CVP/SWP operations would jeopardize Delta smelt and imposed significant pumping restrictions. The 2009 NMFS BiOp imposed parallel restrictions for salmon. The 2019 Trump-

era BiOps relaxed some of these restrictions with a "no jeopardy" finding, but these were challenged in court and ultimately vacated or superseded. A new BiOp was expected in 2024, and as of early 2025, an Executive Order was issued directing Reclamation to maximize water deliveries—creating direct tension with species protections. A December 2025 USGS report documented structured decision-making workshops where participants found that the management actions ranking highest for water exports performed worst for Delta smelt, illustrating the zero-sum nature of these tradeoffs.

Every change in a BiOp's Reasonable and Prudent Alternatives (RPAs) ripples through to how much water passes through generators versus being held in storage, bypassed, or released for environmental flows.

LAYER 3: THE CVPIA — Section 3406(b)(2) "Salmon Doubling" Water

The Central Valley Project Improvement Act of 1992 (Public Law 102-575, Title 34) was a landmark shift. It elevated fish and wildlife restoration to equal priority with irrigation and domestic use—and directly carved out 800,000 acre-feet of annual CVP yield for environmental purposes. This (b)(2) water is used for instream flows to support anadromous fish spawning and migration, Delta outflow augmentation, and pumping curtailments to reduce fish entrainment.

Critically, the way (b)(2) water is *accounted for* has been hotly contested. An independent 2008 peer review was, in its own words, "flabbergasted" to discover that much of the 800,000 AF was being credited through accounting offsets (like counting pump curtailments already required under the BiOps) rather than actual new water releases. Regardless of the accounting disputes, the practical effect is clear: a significant chunk of CVP yield is dedicated to environmental purposes and is unavailable for power generation—or more precisely, it may pass through turbines on its way downstream, but the timing and volume of those releases are dictated by fish needs, not power market optimization.

Additionally, Section 3406(b)(3) established the Water Acquisition Program, which acquires water from willing sellers for wildlife refuges (incremental Level 4 supplies) and instream flows—further drawing from the CVP yield pool.

LAYER 4: STATE WATER BOARD — Decision 1641 and the Bay-Delta Water Quality Control Plan

SWRCB Revised Decision 1641 (adopted 1999, revised 2000) implements the 1995 Bay-Delta Plan by amending the water rights of both the CVP and SWP. It imposes Delta outflow objectives (minimum flows to repel saltwater intrusion), salinity standards at multiple Delta monitoring stations, X2 position requirements (the distance from the Golden Gate where salinity reaches 2 parts per thousand, which must be maintained at various locations depending on water year type), export-to-inflow ratio limits, and San Joaquin River flow requirements at Vernalis.

These requirements can force Reclamation to increase upstream reservoir releases or curtail Delta pumping, both of which affect how much water is available for generation and where it goes. In wet years, the X2 requirement at Port Chicago or Chipps Island can require massive Delta outflows (11,400–29,200 cfs), drawing heavily on CVP storage.

LAYER 5: U.S. ARMY CORPS OF ENGINEERS — Flood Control Space

The Corps of Engineers dictates flood reservation space (or "flood control space") at CVP reservoirs, particularly Shasta, Folsom, and New Melones. From roughly November through April, flood control is the top operational priority. The Corps requires reservoirs to be drawn down to specified levels by early winter to create capacity for potential storm events.

This has a direct and sometimes counterintuitive effect on BR. During the drawdown, water is released—and that generates power. But it also means the reservoir cannot be refilled as aggressively during the storage season, and in years when the Corps mandates aggressive flood releases that bypass the power plant (through spillway releases rather than turbine releases), potential generation is lost entirely. The Sacramento River Temperature Task Group's annual reports document how USACE flood space requirements interact with storage management and cold water pool objectives throughout the year.

LAYER 6: SHASTA COLD WATER POOL MANAGEMENT AND TEMPERATURE CONTROL

This is where operations get particularly nuanced for power generation. The Sacramento River below Shasta must maintain temperatures at or below 56°F during summer and fall to protect winter-run Chinook salmon egg incubation. This is mandated through a combination of the NMFS BiOp RPAs, SWRCB Water Rights Order 90-5, and the annual Sacramento River Temperature Management Plan (TMP).

The mechanism involves the Temperature Control Device (TCD)—a massive steel shutter structure on the upstream face of Shasta Dam that allows operators to draw water from different reservoir depths. When the cold water pool is limited, operators sometimes must *bypass the power plant entirely*, releasing cold water through low-level outlet works rather than through the penstocks to turbines. In 2021, Reclamation bypassed power generation at Shasta for over a month, preserving approximately 300,000 AF of cold water but costing roughly $5 million in lost power revenue. Additionally, peaking operations at the power plant (ramping generation up and down to follow electricity prices) can draw warmer surface water into the TCD, degrading temperature management. This means environmental constraints can directly conflict with economically optimizing power generation.

Multi-layer BR Constraint Framework:
Variability leads to the difficulty in forecasting Base Resource generation

LAYER 7: TRINITY RIVER RESTORATION PROGRAM

The Trinity River Division diverts water from the Trinity basin into the Sacramento system through a tunnel to Whiskeytown Reservoir and then Spring Creek Powerhouse into Keswick Reservoir. The 2000 Trinity River Record of Decision established a variable annual flow regime requiring significant releases to the Trinity River for fishery restoration—water that would otherwise be available for diversion to the Sacramento system for additional generation and CVP use. Trinity releases reduce the volume available for Sacramento-side generation and affect temperature management at Keswick Reservoir (since Spring Creek Powerhouse discharges affect water temperatures there). The Trinity River Division Act also established First Preference Customer rights for Trinity County, which are served before Base Resource.

LAYER 8: PROJECT USE LOADS — The Internal Consumption

Your Hydropower Estimating document makes clear that what reaches WAPA is gross generation *minus* project use loads. These include the Jones Pumping Plant (Tracy) and other major CVP pumping facilities, the Delta-Mendota Canal and associated smaller pump stations, and the San Luis Unit pumping (joint use with SWP). Pumping load is itself regulated—OMR flow restrictions under the BiOps directly constrain how much the CVP can pump, which paradoxically *reduces* project use load but also reduces the water available for south-of-Delta deliveries. The pumping schedule has its own regulatory environment and varies significantly by season and water year type.

LAYER 9: COORDINATED OPERATIONS AGREEMENT (COA) WITH SWP

The CVP and SWP share facilities in the Delta and at San Luis Reservoir. The Coordinated Operations Agreement (originally 1986, amended 2018) governs how the two projects share responsibility for meeting Delta standards and how surplus water and storage capacity are allocated between them. COA water-balance obligations can require one project to compensate the other—meaning the CVP may need to release additional water or accept reduced pumping to settle its account with the SWP, affecting net generation.

LAYER 10: CONTRACTUAL PRIORITY DEDUCTIONS

Before BR reaches end-use customers, the BRC itself (Section 5.3) specifies a deduction hierarchy: Project Use is served first, then First Preference Customers (Trinity, Calaveras, and Tuolumne counties under specific statutory authority), then adjustments for maintenance, reserves, system losses, and certain ancillary services. Only what remains constitutes Base Resource. Contingency reserves (spinning and non-spinning per Exhibit C) further reduce the available capacity.

Multi-layer BR Constraint Framework:
Variability leads to the difficulty in forecasting Base Resource generation

LAYER 11: MAINTENANCE, OUTAGES, AND PHYSICAL CONSTRAINTS

BRC Section 7.6 explicitly limits WAPA's obligation to "actual CVP generation available on a real-time basis" and lists scheduled maintenance, system emergencies, forced outages, and "other constraints" as reasons BR may be unavailable, with no obligation to replace. Aging infrastructure (some CVP facilities are 80+ years old), equipment failure, wildfire damage to transmission lines, and planned facility upgrades all reduce available generation.

LAYER 12: CLIMATE CHANGE AS A META-VARIABLE

While not a single regulatory input, climate change acts as a threat multiplier across nearly every layer above. It shifts precipitation from snow to rain (reducing the natural storage of snowpack and altering runoff timing), shrinks cold water pools in reservoirs more rapidly, increases water demand (both agricultural and urban), intensifies drought-flood cycles, and may require more aggressive environmental protections as species decline further.

Validity Check: Testing This Framework

To stress-test this BR constraint framework, four years were analyzed using the criteria [2015 (critical dry), 2017 (very wet), 2022 (critically dry) and 2024 (above normal)]. In dry years, virtually every one of these variables compounds against BR. Hydrology is terrible. BiOp requirements force temperature management trade-offs. The Corps requires flood space drawdowns in the preceding winter that decreases storage levels. Shasta's cold water pool depletes early, triggering power bypasses. CVPIA (b)(2) water is needed upstream. D-1641 Delta outflow requirements must be met despite low inflows. The result is dramatic reductions in both CVP generation and available Base Resource. Conversely, in wet years like 2017, high hydrology lifts all boats—but even then, X2 requirements and flood releases mean that not all that water passes through turbines at economically optimal times.

The system behaves like a complex adaptive system where no single variable can be analyzed in isolation. A change in a BiOp's OMR flow restriction affects pumping load, which affects net generation, which affects BR availability—but it also changes the volume of water that must be released from upstream reservoirs to meet Delta standards, which affects cold water pool management at Shasta, which affects whether power bypass is needed, which further reduces generation. **Base Resource is not a fixed product. It is the residual output of a multi-layered system of competing legal, environmental, hydrological, and operational demands, each of which may independently reduce the generation available to customers.**

ATTACHMENT 2

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Water Year 2022

Applying the Multi-Layer Constraint Framework to CVP Base Resource Availability

Prepared for the Power and Water Resources Pooling Authority
February 2026

WORKING DRAFT

Executive Summary

Water Year 2022 (October 2021 through September 2022) was classified as a Critically Dry year on the Sacramento Valley Water Year Index, marking the third consecutive year of severe drought (following Dry WY2020 and Critical WY2021). This three-year sequence is regarded as the worst on record. WY2022 represents a near-worst-case scenario for Base Resource availability and provides the essential drought-year counterpoint to the WY2024 analysis.

CVP powerplants generated approximately 2.0 billion kilowatt-hours during WY2022, less than 44 percent of the long-term average of approximately 4.5 billion kWh. Project use consumed approximately 20 percent of this reduced generation, leaving roughly 1.6 billion kWh available to WAPA public agency customers. This catastrophic reduction in output was driven by the simultaneous binding of nearly every constraint layer in the twelve-layer framework.

The defining features of WY2022 were:

- **Zero Agricultural Allocations:** Reclamation announced 0% allocations for both north-of-Delta and south-of-Delta agricultural contractors. This was the fourth time in a decade south-of-Delta allocations were zeroed. For the first time, Sacramento River Settlement Contractors were reduced to approximately 18% of historical use, with Reclamation explicitly prioritizing fish protection over senior water rights.
- **Record-Low Reservoir Storage:** The CVP began WY2022 with only 3.21 MAF in total storage across six major reservoirs, approximately 52% of the 15-year average. Shasta reached its second-lowest level on record by May 1, 2022, at approximately 1.82 MAF (40% capacity). The system ended WY2022 with 3.6 MAF, one of the lowest carryover totals in recent history.
- **Weather Whiplash:** October 2021 began with a record atmospheric river, and December 2021 storms produced over six feet of Sierra snow. Then the storm door slammed shut: January through March 2022 was the driest on record for Northern California, and snowpack was virtually non-existent by April 1.
- **Emergency Regulatory Waivers:** A Temporary Urgency Change Petition (TUCP) was approved April 4, 2022, allowing CVP and SWP to release less water into the Delta. The Emergency Drought Salinity Barrier was reinstalled on West False River. These extraordinary measures underscore how profoundly drought compressed the operational envelope.
- **Temperature Management Crisis:** Shasta's cold water pool was projected comparable to the catastrophic drought years 2014, 2015, and 2021. The court-ordered IOP established a six-agency Shasta Planning Group to manage the crisis in real time. Keswick releases were held to approximately 3,250 cfs, a fraction of normal, to preserve both storage and thermal capacity.

1. Hydrology Baseline: WY2022 Conditions

WY2022 entered in crisis. The CVP began the water year on October 1, 2021 with only 3.21 million acre-feet in total storage across its six major reservoirs, approximately 52% of the 15-year average and one of the lowest starting points in recent history. This deficit was the direct consequence of the Critically Dry WY2021 and Dry WY2020.

1.1 Precipitation and Snowpack

The WY2022 precipitation story is one of extreme volatility, a textbook illustration of climate whiplash:

- **October 2021:** An atmospheric river delivered record rainfall to Northern California, briefly raising hopes of drought relief.
- **December 2021:** A succession of winter storms deposited more than six feet of Sierra snow by month's end. The statewide snowpack briefly surged above average.
- **January–March 2022:** The driest January-through-March period on record for Northern California. The Northern Sierra Precipitation 8-Station Index showed conditions nearly 20 inches below average. The December snowpack evaporated under dry, warm conditions. By April 1, snowpack was virtually non-existent.

The Sacramento Valley Index classified WY2022 as Critically Dry. Regional precipitation ranged from 68% of average at Shasta's headwaters to 73% at the Stanislaus basin (New Melones). Southern Sierra cumulative precipitation was approximately 37% below normal. The only basin that approached normal precipitation was the American River (approximately 98% of average), which had important but limited implications for Folsom operations.

1.2 Reservoir Storage

Key CVP reservoir positions at the start of WY2022 and at critical junctures:

Constraint	WY2022 Status	Impact on Base Resource
Shasta	~2.1 MAF Oct 2021; ~1.82 MAF May 1, 2022 (40% capacity, 2nd lowest on record)	Devastating: minimal cold water pool, minimal generation head
Trinity	~0.8 MAF Oct 2021; ~0.54 MAF end of WY2022	Severely depleted; Critical Year flow regime, minimal trans-basin diversions
Folsom	Near average start; depleted to 0.35 MAF by EOY	Drawn down heavily to provide Delta inflow; generation reduced
New Melones	~0.59 MAF EOY; below 51% of 15-year average	Limited Stanislaus operations
San Luis (CVP share)	Minimal south-of-Delta supply	Near-zero south-of-Delta deliveries; pumping minimal

The reservoir picture was catastrophic for generation. Shasta's depleted storage meant drastically reduced hydraulic head, lower turbine efficiency, and the need to restrict releases to preserve what remained of the cold water pool. Trinity was similarly depleted, crippling the entire trans-basin diversion pathway through Carr and Spring Creek powerplants.

1.3 Implications for Generation

Reclamation reported that CVP powerplants generated approximately 2.0 billion kWh during WY2022, compared to a long-term average of approximately 4.5 billion kWh. This 56% reduction in generation was not merely a proportional scaling with reduced water supply; it reflected the compounding effects of low reservoir head, restricted release rates, temperature management constraints, and operational decisions to conserve storage rather than generate

power. The generation shortfall was the worst since at least WY2015 and possibly among the worst in CVP history.

2. Constraint Layer: ESA Biological Opinions and Interim Operations Plan

WY2022 was the second year under the court-ordered Interim Operations Plan (WY2021–2024). The IOP was ordered by the U.S. District Court on March 14, 2022, establishing specific priorities and planning frameworks for Shasta cold water pool management. In parallel, the CVP continued operating under the 2019 BiOps (2020 ROD), which were themselves the subject of ongoing litigation and the Biden Administration's reinitiation of ESA consultation (announced September 30, 2021).

2.1 The Six-Agency Shasta Planning Group

The IOP's most consequential structural innovation for WY2022 was the establishment of the six-agency Shasta Planning Group (SPG), which worked iteratively with the Sacramento River Temperature Task Group (SRTTG) and the Upper Sacramento Scheduling Team (USST) to provide real-time operational guidance. This multi-agency coordination body governed the most critical operational decisions affecting both water deliveries and hydropower generation from Shasta, making it the de facto decision-making authority for the CVP's largest powerplant complex.

2.2 ESA Constraints on Shasta Releases

The ESA imperative in WY2022 was existential for Sacramento River winter-run Chinook salmon. The 2021 disaster, in which approximately 80% of winter-run eggs were killed by lethal water temperatures, forced a fundamental reordering of priorities. For the first time in CVP history, Reclamation explicitly prioritized protection of endangered fish over irrigation deliveries to senior Sacramento River Settlement Contractors. Keswick Dam releases were held to approximately 3,250 cfs, a dramatic reduction from normal irrigation-season flows that would typically range from 6,000 to 10,000 cfs.

This priority shift had direct generation consequences. Lower Keswick releases meant less water flowing through the Shasta and Keswick powerplant complex. The constrained releases were further restricted to drawing from the coldest available layers of the reservoir (via middle TCD gates), limiting the volume that could pass through the penstocks at any given time.

2.3 Reinitiation of Consultation

On September 30, 2021, Reclamation and DWR requested reinitiation of ESA consultation on the Long-Term Operation of the CVP and SWP, citing anticipated modifications to the proposed action. A Notice of Intent to prepare a new Environmental Impact Statement was published in the Federal Register on February 28, 2022. This reinitiation meant WY2022 operated under a regulatory framework that was acknowledged by all parties to be transitional, yet it would take until December 2024 for new BiOps and a ROD to be finalized. The uncertainty itself constrained planning and forward operations.

3. Constraint Layer: CVPIA Section 3406(b)(2) Water

WY2022's Critically Dry classification affected CVPIA environmental water obligations in complex ways. The 800,000 AF annual environmental yield dedication is subject to adjustment in critical years, but the practical effect in WY2022 was paradoxical: because reservoir storage was so depleted and water deliveries so reduced, the incremental volume attributable to (b)(2) was difficult to distinguish from water that would have remained in storage regardless.

Several (b)(2) obligations nonetheless shaped operations:

- Instream flow requirements on the Sacramento, American, and Stanislaus rivers remained active, though at reduced Critical Year levels. These minimum flows constrained Reclamation's ability to further reduce releases even when every drop was needed for storage conservation.
- Delta outflow contributions, though reduced under the TUCP, still required some portion of CVP releases to maintain minimum Delta water quality.
- Accounting complexity was acute: with the TUCP relaxing some D-1641 standards, the question of what constituted (b)(2) water versus water that would have been released regardless became nearly unanswerable. This ambiguity has implications for future years' accounting of the 800,000 AF dedication.

From a generation perspective, even the reduced (b)(2) flows represented water released on schedules dictated by fish needs and Delta water quality rather than power market optimization, further constraining the ability to generate during high-value hours.

4. Constraint Layer: State Water Board D-1641, TUCP, and Bay-Delta Standards

WY2022 triggered the most relaxed tier of D-1641 requirements (Critical Year standards), but even these minimums were unsustainable given reservoir conditions. The State Water Board approved a Temporary Urgency Change Order on April 4, 2022, authorizing CVP and SWP to operate under modified water quality and flow requirements.

4.1 Temporary Urgency Change Petition

The TUCP allowed the projects to release less water into the Delta from April through at least June 2022, conserving limited storage in Shasta, Oroville, and Folsom reservoirs. This was the second consecutive year of TUCP operations, establishing what critics called a pattern of waiving minimum protections during drought. Key TUCP provisions included:

- Reduced Delta outflow requirements below D-1641 minimums, allowing reservoirs to retain water that would otherwise have been released for salinity control.
- Modified Cross-Channel Gate operations to help manage Delta salinity under extremely low flow conditions.
- Flexibility in export-to-inflow ratios, though this was largely academic given that exports were already minimal.

4.2 Emergency Drought Salinity Barrier

DWR reinstalled the Emergency Drought Salinity Barrier on West False River, a physical rock barrier designed to reduce saltwater intrusion into the Delta. The barrier was refilled in April (a notch had been cut in January for fish passage) and was expected to remain through November 30, 2022. This infrastructure measure reduced the volume of freshwater releases needed for Delta salinity control, providing indirect storage conservation benefits. However, its construction and maintenance represented a cost, and its presence altered Delta hydraulics in ways that complicated fish agency determinations about pumping operations.

4.3 Generation Implications of TUCP

The TUCP's storage conservation mandate directly suppressed generation. By authorizing reduced releases, the TUCP preserved water in reservoirs for health and safety, temperature management, and carryover storage. While this conserved water for future use, it meant fewer acre-feet passed through turbines during WY2022 than even the depleted hydrology might have otherwise produced. The TUCP transformed the D-1641 constraint from its usual role as a demand on upstream releases into something closer to a release floor that was itself waived, with the generation consequences flowing directly from the storage conservation imperative.

5. Constraint Layer: USACE Flood Control

Flood control requirements were effectively moot in WY2022. With reservoir storage far below flood reservation levels at all CVP facilities, the Army Corps of Engineers' flood control rules imposed no binding constraint on operations. There was no risk of uncontrolled spill, no required drawdown to flood pool limits, and no tension between flood control storage space and conservation storage.

The absence of flood control as a binding constraint is itself significant: it confirms that in a Critically Dry year, the constraint stack simplifies but does not disappear. The constraints that remain—ESA, temperature management, minimum health and safety deliveries, and Delta water quality—are sufficient to suppress generation well below what even the depleted hydrology would permit if the sole objective were power production.

6. Constraint Layer: Shasta Cold Water Pool and Temperature Management

Temperature management was the single most consequential constraint on Shasta operations in WY2022. The cold water pool crisis of WY2021, which killed approximately 80% of winter-run Chinook eggs, loomed over every operational decision. The 2022 Temperature Management Plan, coordinated through the court-ordered IOP framework, represented an unprecedented level of multi-agency intervention in CVP power operations.

6.1 Cold Water Pool Conditions

In mid-March 2022, Shasta Reservoir's cold water pool volume was projected to be comparable to other drought years: 2014, 2015, and 2021. Each of those years experienced significant or catastrophic winter-run salmon mortality from elevated water temperatures. With Shasta at approximately 1.82 MAF by May 1, 2022, the volume of water below 52°F was severely limited,

and the stratified layers of progressively colder water that the TCD depends on were compressed into a thin band at the bottom of the reservoir.

6.2 Operational Response

The 2022 TMP imposed severe restrictions on Shasta releases:

- Keswick Dam releases were held to approximately 3,250 cfs during April, using middle TCD gates to access the coldest available water. This maintained release temperatures of 52–53°F but at dramatically reduced flow volumes.
- Trinity River imports through Carr Powerplant were minimized. Because Trinity water entering Keswick via Spring Creek was warmer than Shasta's deep cold water pool, imports required additional cold water pool expenditure to maintain blended temperatures. Reclamation reduced trans-basin diversions to preserve both Trinity storage and Shasta's thermal capacity.
- Peaking operations were severely curtailed. The Shasta powerplant's five penstocks draw from the TCD at varying depths; peaking generation pulls warmer water from higher in the column. With the cold water pool volume so marginal, any departure from minimum-flow, maximum-cold operations risked catastrophic temperature exceedances downstream.
- System-wide drought actions reduced demands on Shasta. Reclamation redirected supply responsibilities to other CVP and SWP reservoirs and non-project sources where possible, including drawing Folsom Reservoir down heavily for Delta inflow to reduce the burden on Shasta.

6.3 Power Bypass Considerations

WY2021 had seen Shasta power bypass experiments and implementation (bypassing the powerhouse to release cold water from lower outlets). In WY2022, the strategy shifted to extreme release reduction rather than power bypass. The rationale was that with storage so depleted, the priority was to keep water in the reservoir entirely rather than releasing it in any configuration. Where water was released, it was routed through the TCD and penstocks to capture whatever generation was possible. The WY2021 power bypass experience—which resulted in approximately $5 million in lost power revenue with questionable cold water pool savings—informed the WY2022 decision to minimize total releases instead.

The generation consequence was severe regardless: with releases constrained to approximately 3,250 cfs (roughly half of a normal year's minimum flow), Shasta powerplant output was commensurately reduced. At 710 MW installed capacity, the system was operating at a fraction of its potential.

7. Constraint Layer: Trinity River Restoration

WY2022 was classified as a Critical year for the Trinity basin under the 2000 Record of Decision. The Critical Year flow regime prescribes the lowest environmental releases from Lewiston Dam, reflecting the basin's depleted condition. Trinity Lake storage fell to approximately 0.54 MAF by end of WY2022, leaving the reservoir severely depleted.

7.1 Trans-Basin Diversions

Diversions through Carr Powerplant to Whiskeytown and onward through Spring Creek Powerplant to Keswick were significantly reduced in WY2022. The TMP explicitly noted that Trinity diversions were adjusted to balance flow and water temperature goals. Because Trinity water entering Keswick via Spring Creek was warmer than Shasta's cold water pool releases, even modest imports required additional expenditure of Shasta's precious cold water to maintain downstream temperature targets.

This created a double constraint on generation: Trinity Division powerplants (Carr and Spring Creek) produced less because diversions were reduced, while Shasta's generation was also constrained by the need to maintain temperatures in the blended Keswick outflow. The system's two principal generation pathways from the north—Sacramento-side and Trinity-side—were both suppressed simultaneously.

7.2 Trinity River Fishery Impacts

Even the reduced Critical Year environmental flows from Lewiston Dam represented water that could not be diverted for Sacramento-side power generation. Additionally, low flows in the Trinity River itself were contributing to disease outbreaks and die-offs of salmon in the lower Klamath-Trinity system, creating pressure from fishery agencies to maintain or increase Trinity River releases rather than divert additional water to the Sacramento system. This tension between competing fishery needs (Trinity salmon versus Sacramento winter-run) further constrained the operational flexibility that might have supported generation.

8. Constraint Layer: Project Use Loads

Reclamation reported that project use consumed approximately 20% of WY2022's 2.0 billion kWh of generation, or roughly 400 million kWh. This percentage is notably higher than in average years, reflecting the operational dynamics of drought:

- **Reduced Generation Denominator:** With total generation at 44% of average, even modest pumping loads consumed a larger share of the reduced output.
- **Pumping for Delta Salinity Control:** Although south-of-Delta exports were near zero (consistent with 0% agricultural allocations), some pumping at Jones and Banks continued for Delta salinity management, particularly in coordination with the Emergency Drought Salinity Barrier operations.
- **Other Project Use:** CVP facility electrical loads for dam operations, fish facilities, communication systems, and other infrastructure continued regardless of generation levels, representing a fixed component of project use that becomes proportionally larger when generation shrinks.

The net Base Resource available to WAPA customers was approximately 1.6 billion kWh (80% of 2.0 billion kWh), compared to a typical year's Base Resource of roughly 3.6 billion kWh (80% of 4.5 billion kWh average). This represents a reduction of approximately 55% from normal, though the actual contracted BR formula involves additional deductions for First Preference customers and system losses.

9. Constraint Layer: Coordinated Operations Agreement

The Coordinated Operations Agreement governing CVP/SWP joint operations was under extraordinary stress in WY2022. Both projects were in crisis simultaneously, and the TUCP fundamentally altered the Delta standards that COA coordinates around.

9.1 Shared Drought Burden

Under COA, the CVP and SWP share responsibility for meeting Delta water quality standards. In WY2022, with both systems depleted, the question became not how to share surplus but how to share scarcity. Reclamation drew heavily on Folsom Reservoir (which had benefited from above-average American River precipitation) for Delta inflow, depleting Folsom from above-average to well-below-average levels. This was effectively a within-CVP transfer that reduced Folsom's generation contribution while partially offsetting Shasta's storage conservation.

9.2 SWP Parallel Crisis

The SWP allocated only 5% of requested supplies in WY2022. Lake Oroville, the SWP's principal reservoir, had reached its lowest storage level on record in WY2021 and began WY2022 still severely depleted. DWR's parallel crisis meant neither project could lean on the other for Delta standard compliance. The mutual depletion amplified the constraints on both systems' operations and generation.

10. Constraint Layer: Contractual Priority Deductions

Under the BRC Section 5.3 deduction hierarchy, WY2022's Base Resource was calculated from a drastically reduced gross generation. The standard deductions applied:

- **Project Use:** Approximately 400 million kWh (20% of 2.0 billion kWh total generation).
- **First Preference Customers:** Trinity, Calaveras, and Tuolumne county loads were served at full priority. In a drought year, these fixed loads consumed a proportionally larger share of the diminished generation pool.
- **Reserves and Losses:** Spinning and non-spinning reserves per Exhibit C and transmission/transformation losses on the 230-kV CVP system. These are partly percentage-based, so they scaled down with generation, but minimum requirements still applied.

WY2022 fell within the pre-2025 contract period under the 2004 Power Marketing Plan. The existing long-term contracts governed allocations through December 31, 2024. WAPA's five-year BR forecasts under BRC Section 6.1 would have used WY2022 conditions as one data point for the "low" hydrological scenario. However, WY2022 demonstrated that even the low scenario may underestimate actual generation shortfalls when multiple constraint layers bind simultaneously.

11. Constraint Layer: Maintenance, Outages, and Infrastructure

In WY2022, infrastructure constraints compounded the drought's impacts in several ways:

- **Low Reservoir Head:** As Shasta Lake dropped to 40% capacity, the reduced water surface elevation decreased hydraulic head at the powerplant. Lower head means less pressure driving water through turbines, reducing both the volume that can pass through the turbines and the efficiency of energy conversion. This effect is non-linear: generation capacity drops faster than reservoir levels.
- **TCD Operational Limitations:** With reservoir levels approaching the lower operational limits of the Temperature Control Device, operators had fewer options for selecting intake depths. The TCD's design assumes a certain minimum reservoir elevation for effective temperature control; at extreme low levels, the device cannot access the coldest bottom waters as efficiently.
- **Tracy Fish Collection Facility:** Although exports were minimal, the facility's operational status remained essential for any pumping that occurred. The facility's screening and salvage capacity acts as a hard constraint on pumping regardless of water availability.

No major forced outages at CVP powerplants were publicly reported in WY2022. However, the reduced water throughput likely reduced wear on turbines and generators, potentially providing a modest benefit for future maintenance scheduling.

12. Constraint Layer: Climate Change as a Meta-Variable

WY2022 is arguably the single most illustrative year for the climate change–Base Resource nexus. Multiple climate-amplified dynamics converged:

12.1 Precipitation Volatility

The whiplash between October's atmospheric river, December's heavy snowfall, and the record-dry January–March is consistent with climate projections of more intense precipitation events separated by longer dry intervals. The CVP was designed for a Mediterranean climate with relatively predictable winter rainy seasons; WY2022's pattern defeated the system's ability to translate early-season precipitation into reliable water supply.

12.2 Snow-to-Rain Transition

December's six feet of Sierra snow was largely negated by the warm, dry conditions that followed. Reclamation noted that WY2021's inflow shortfall was partly explained by warm conditions and dry soils absorbing snowmelt before it could reach reservoirs. The same dynamic likely operated in WY2022: even where snow fell, its conversion to reservoir inflow was impaired by elevated temperatures and dry antecedent soil conditions.

12.3 Three-Year Drought Compounding

Climate projections suggest increased frequency of multi-year drought sequences. WY2022's severity was not simply a function of WY2022's precipitation; it was the compound effect of three consecutive below-average years. Each dry year depleted storage and cold water pools, leaving the system progressively less resilient. By WY2022, there was essentially no margin for error—every constraint that could bind did bind, and the system operated at or near its physical limits across every dimension simultaneously.

Regional Director Ernest Conant's characterization of the 2020–2022 drought as the worst three-year drought on record underscores the severity. For Base Resource planning, this

demonstrates that single-year hydrological scenarios are insufficient: the system's state at the start of a water year (carryover storage) is as important as that year's precipitation.

13. Synthesis: WY2022 Constraint Interaction Map

The following table summarizes how each constraint layer manifested in WY2022 and its directional impact on Base Resource availability:

Constraint	WY2022 Status	Impact on Base Resource
1. Hydrology	Critically Dry; 3rd consecutive drought year; worst 3-year drought on record	Severely Negative: generation at 44% of average
2. ESA/BiOps/IOP	Court-ordered IOP Year 2; six-agency SPG; fish prioritized over settlement contractors	Severely Negative: Keswick releases held to ~3,250 cfs; peaking eliminated
3. CVPIA (b)(2)	Critical year provisions; reduced but still binding minimum flows	Negative: environmental flows consumed scarce releases
4. D-1641 / TUCP	D-1641 standards waived via TUCP; salinity barrier installed	Complex: TUCP conserved storage but suppressed releases/generation
5. Flood Control	Non-binding; reservoirs far below flood pool	Neutral: no constraint in critically dry conditions
6. Temperature Mgmt	Cold water pool comparable to 2014, 2015, 2021 crises; extreme release restrictions	Severely Negative: dominated Shasta operations, suppressed generation
7. Trinity Restoration	Critical Year flows; minimal trans-basin diversions	Severely Negative: crippled Carr/Spring Creek generation pathway
8. Project Use	20% of reduced generation; higher proportional share	Negative: fixed loads consumed larger share of diminished output
9. COA	Both CVP and SWP in crisis; Folsom drawn down for Delta duty	Negative: mutual depletion amplified constraints
10. Contractual	Pre-2025 contracts; standard deduction hierarchy	Negative: fixed deductions consumed larger share of smaller pool
11. Maintenance	Low reservoir head reduced turbine efficiency; TCD at operational limits	Negative: infrastructure design limits exacerbated drought impacts
12. Climate	Weather whiplash; snow-to-rain transition; 3-year compound drought	Severely Negative: climate amplified every other constraint

13.1 The Drought-Year Cascading Failure

Where WY2024 illustrated the "good-year paradox" (favorable hydrology suppressed by non-hydrological constraints), WY2022 illustrates the opposite phenomenon: the drought-year cascading failure. In WY2022, hydrological scarcity triggered or amplified every other constraint simultaneously:

- Low reservoir storage reduced hydraulic head, directly reducing generation capacity per unit of water released.
- Depleted cold water pools made temperature management the binding constraint on Shasta releases, suppressing flows to levels far below what even the reduced water supply might have supported.
- ESA protections could not be relaxed because the species (winter-run Chinook) were already at existential risk from WY2021's catastrophic mortality, requiring the unprecedented priority shift over settlement contractors.
- The TUCP, while relaxing D-1641 standards, did so in service of storage conservation rather than generation—the water saved was kept in storage, not released through turbines.
- Trinity's depletion eliminated the trans-basin diversion pathway, removing one of the CVP's two principal generation sources.
- Project use's proportional share grew because fixed facility loads do not decrease with generation, consuming 20% versus a more typical 15–18%.

13.2 Comparison to WY2024

The contrast between WY2022 and WY2024 is instructive for Base Resource planning:

Constraint	Metric Status	Impact on Base Resource
Water Year Type	Critically Dry (WY2022)	Above Normal (WY2024)
CVP Total Generation	~2.0 billion kWh (44% of avg)	Near or above 4.5 billion kWh average
S-of-D Ag Allocation	0%	50%
Settlement Contractors	~18% (unprecedented reduction)	100%
Shasta May 1 Storage	~1.82 MAF (40% capacity)	~4.0 MAF (88% capacity)
Temperature Bypass	No (extreme release reduction instead)	No (adequate cold water pool)
TUCP Required	Yes (April–June+ 2022)	No
Primary BR Constraint	Hydrology + temperature cascading failure	Regulatory constraints despite favorable hydrology

This comparison demonstrates the asymmetric nature of Base Resource volatility. In WY2024, generation was suppressed by perhaps 10–20% from its hydrological potential by regulatory constraints. In WY2022, generation was suppressed by more than 55% from the long-term average by the compound effect of hydrological and non-hydrological constraints mutually reinforcing each other. The downside risk dwarfs the upside constraint.

14. Implications for PWRPA

14.1 Base Resource Forecasting

WY2022 demonstrates that the "low" scenario in WAPA's BRC Section 6.1 five-year forecasts must account for cascading constraint failure, not merely low precipitation. A hydrology-only low scenario might project generation at 60–70% of average in a Critically Dry year; WY2022's actual result of 44% reflects the compounding effects of temperature management, ESA restrictions, depleted trans-basin pathways, and reduced hydraulic head. PWRPA's resource planning must model these compounding effects explicitly, or it will systematically underestimate drought-year shortfalls.

Moreover, WY2022 was the third year of drought. The system's state entering WY2022 (carryover storage at 52% of average) was as important as WY2022's own precipitation. A planning methodology that treats each water year independently cannot capture this serial correlation in drought impacts. A rolling multi-year framework is essential.

14.2 CARB Allowance Allocation

WY2022 provides the strongest possible evidence for the hydro-dependent EDU volatility adjustment proposed in PWRPA's comments on the proposed amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms. Consider:

- If CARB anchored PWRPA's allowance allocation to a WY2022 baseline, the allocation would reflect a year where CVP generation was barely 44% of average, projecting an artificially low emissions profile and correspondingly low allowances.
- If CARB instead anchored to a WY2023 (Wet) or WY2024 (Above Normal) baseline, the allocation would reflect near-average or above-average generation, projecting an emissions profile that would be catastrophically insufficient in a subsequent drought.
- Neither single-year anchor captures PWRPA's actual compliance burden, which oscillates wildly between years based on factors entirely outside PWRPA's control.

The proposed ten-year average methodology addresses this directly. Over a ten-year period including both WY2022 and WY2023–2024, the average would capture the full range of hydrological and constraint variability, producing an allocation that approximates PWRPA's actual average compliance burden.

14.3 Financial Exposure

The financial implications of WY2022 for PWRPA are severe:

- **Replacement Power Costs:** With Base Resource at roughly 44% of average, PWRPA member agencies needed to procure approximately 2.0–2.5 billion kWh of replacement power from the CAISO market or bilateral contracts. In a drought year with reduced hydropower statewide, market prices typically elevate, compounding the cost.
- **CAISO Transmission Charges:** Replacement power procured through CAISO incurs HV and LV transmission charges that CVP power delivered via WAPA's 230-kV system does not. The marginal cost of drought-year replacement power is therefore higher per MWh than the average market price.
- **Cap-and-Trade Exposure:** To the extent replacement power is sourced from emitting resources, PWRPA incurs additional compliance costs for associated GHG emissions. A

drought year simultaneously reduces the zero-emission hydro supply and increases reliance on emitting replacements, creating a double hit to cap-and-trade compliance.

14.4 Forward-Looking Risk Assessment

WY2022, read alongside WY2024, frames the risk landscape for PWRPA's Base Resource:

- **Drought Frequency:** Climate projections suggest increased frequency of Critically Dry years and multi-year drought sequences. If the probability distribution of water year types shifts toward drier outcomes, WY2022-like events become more common.
- **Constraint Asymmetry:** In wet years, non-hydrological constraints cap the upside (WY2024: 50% allocation despite above-average supply). In dry years, all constraints compound the downside (WY2022: 0% allocation, 44% generation). The distribution of BR outcomes is not symmetric around the mean; the left tail is fatter and more damaging.
- **Carryover Storage Dependence:** WY2022's severity was largely a product of depleted carryover from WY2020–2021. Any planning framework that fails to account for multi-year serial correlation in drought will underestimate the probability and severity of WY2022-like outcomes.
- **Regulatory Floor:** Even in WY2022's extreme conditions, ESA protections and temperature management requirements remained binding. The regulatory floor does not retreat in proportion to drought severity; in some respects (the priority shift over settlement contractors), it actually tightened. PWRPA cannot assume that drought produces proportional regulatory relief.

End of Analysis

ATTACHMENT 3

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Water Year 2024

Applying the Multi-Layer Constraint Framework to CVP Base Resource Availability

Prepared for the Power and Water Resources Pooling Authority
February 2026

WORKING DRAFT

Executive Summary

Water Year 2024 (October 2023 through September 2024) was classified as an Above Normal year on the Sacramento Valley Water Year Index, following the exceptionally Wet year of 2023. Despite broadly favorable hydrology, the year demonstrated with unusual clarity that non-hydrological constraints independently suppress Base Resource availability even when water supply conditions are good.

This analysis applies the twelve-layer constraint framework previously developed to the specific facts of WY2024. The central finding is this: although WY2024 enjoyed above-average reservoir storage carried over from 2023, near-normal snowpack, and reservoirs that nearly filled by spring, south-of-Delta CVP agricultural allocations peaked at only 50% of contract totals. That disconnect between hydrologic conditions and delivered water supply directly illustrates the dominance of non-hydrological constraints in determining CVP operations and, consequently, Base Resource availability to WAPA preference customers such as PWRPA.

The primary constraint drivers in WY2024 were:

- **Court-Ordered Interim Operations Plan (IOP):** WY2024 was the final year under the IOP, which modified the 2019 BiOps and imposed additional operational restrictions beyond the underlying ESA requirements.
- **Spring Delta Pumping Restrictions:** Steelhead and winter-run salvage events in March 2024 triggered a 5-day pumping curtailment at Jones and Banks, reducing CVP Delta exports by approximately 10 TAF. Extended spring OMR restrictions further limited pumping capacity during peak export windows.
- **Shasta Temperature Management:** Shasta started July at approximately 4.0 MAF and maintained 50–52°F temperatures below Keswick throughout summer. While no power bypass was required, the successful temperature management required constraining Shasta peaking operations and carefully managing Trinity Division imports through Spring Creek.
- **Regulatory Uncertainty:** WY2024 was a pivotal transition year. The draft EIS for new Long-Term Operations was released July 26, 2024; USFWS issued its new BiOp November 8, 2024; NMFS issued its BiOp December 6, 2024; and Reclamation signed the 2024 ROD December 19, 2024. This regulatory environment created cautious operations throughout the year.
- **Contract Transition:** All WAPA Sierra Nevada Region long-term power sales contracts expired December 31, 2024, adding contractual uncertainty on top of operational uncertainty.

1. Hydrology Baseline: WY2024 Conditions

WY2024 entered with a significant advantage: the exceptionally Wet WY2023 had filled most CVP reservoirs well above average. Shasta Reservoir, the system's anchor at 4.55 MAF capacity, began WY2024 at approximately 115% of average for the date. Trinity Lake was similarly well-positioned. This carryover storage was the single most favorable hydrologic factor in WY2024.

1.1 Precipitation and Snowpack

WY2024 precipitation was notably uneven. October through January was drier than average. California's statewide snowpack measured only 25% of average at the first snow survey in early January 2024, rising to 36% of average by mid-January after additional storms. Late February and March storms improved conditions significantly, bringing the Northern Sierra to near-normal levels. By the critical April 1 measurement, snowpack had recovered to approximately normal.

The Sacramento Valley Index classified WY2024 as Above Normal, reflecting both current-year runoff and the favorable carryover from WY2023's high index. The San Joaquin Valley also classified as Above Normal. Critically, the year was determined to be non-critical under CVP settlement contract definitions, enabling 100% deliveries to settlement contractors.

1.2 Reservoir Storage

Key CVP reservoir positions entering WY2024 and at seasonal peaks:

Constraint	WY2024 Status	Impact on Base Resource
Shasta	69% capacity (115% avg) Jan 2024; ~4.0 MAF by July 1	Provided strong cold water pool and generation head
Trinity	~2.0 MAF by July 1 (out of 2.5 MAF capacity)	Sufficient for both river restoration and Sacramento exports
Folsom	Above average entering WY2024	Supported American River deliveries at 100%
New Melones	Above 80% capacity	Supported Stanislaus operations
San Luis (CVP share)	~80% of CVP capacity entering year	Supported south-of-Delta deliveries; 83 TAF reserved for drought pool

The reservoir picture was fundamentally supportive of generation. Shasta's high storage meant elevated hydraulic head at the powerplant, improving turbine efficiency. Trinity's strong position supported both in-basin restoration flows and trans-basin diversions through Carr Powerplant to Whiskeytown and onward through Spring Creek Powerplant.

1.3 Implications for Generation

In a system unconstrained by non-hydrological factors, WY2024's hydrology would have supported generation well above the CVP's long-term average of approximately 4.6 million MWh. Reservoirs were high, snowmelt runoff was near-normal, and carryover storage provided buffer. The actual generation outcome was determined not by how much water was available, but by when, where, and how fast that water could be released through turbines given the regulatory constraints described in the following sections.

2. Constraint Layer: ESA Biological Opinions and Interim Operations Plan

WY2024 was the fourth and final full water year under the court-ordered Interim Operations Plan that had governed CVP/SWP operations since WY2021. The IOP layered additional protections on top of the 2019 BiOps (which themselves remained in effect but under litigation). The 2024

IOP incorporated several elements from the California Department of Water Resources' Incidental Take Permit, including modified Delta smelt and winter-run protections.

2.1 Spring Pumping Curtailments

The most direct impact on CVP operations in WY2024 occurred during the critical spring export window. In March 2024, elevated salvage of steelhead and winter-run Chinook at both Jones and Banks Pumping Plants triggered regulatory action. Federal and state fisheries agencies required a coordinated 5-day pumping curtailment beginning approximately March 12, 2024, accompanied by scientific monitoring for adaptive management.

Westlands Water District reported the reduced pumping was expected to decrease WY2024 CVP water supply by approximately 10 TAF. While seemingly modest in volume, this curtailment occurred during a peak export window when San Luis Reservoir was approaching capacity, meaning the lost pumping opportunity could not be easily recaptured later.

Beyond this specific event, OMR flow restrictions were binding throughout much of the winter and spring. Under the IOP and state ITP, OMR flows in the south Delta were generally limited to no more negative than -5,000 cfs during sensitive fish migration periods. DWR Director Karla Nemeth noted that WY2024 saw both record-low pumping for a wet-type year and high fish salvage at the pumps, highlighting the operational tension between water supply and species protection.

2.2 Shasta Operations Under the IOP

The IOP established a multi-agency Shasta Planning Group and iterative engagement with the Sacramento River Temperature Task Group. For WY2024, these bodies guided Shasta operations under a tiered temperature management framework. Because Shasta storage exceeded 2.8 MAF at the start of May and conditions supported meeting 53.5°F at Clear Creek, WY2024 qualified for the most favorable tier, but operators still had to manage releases conservatively to preserve the cold water pool through October.

2.3 New BiOps and ROD (Late 2024)

The regulatory landscape shifted fundamentally in the final quarter of WY2024 (calendar year 2024):

- July 26, 2024: Reclamation released the draft EIS for Long-Term Operations with four action alternatives plus a no-action alternative.
- November 8, 2024: USFWS issued its final Biological Opinion on Delta smelt and associated species, finding no jeopardy/no adverse modification under the proposed Alternative 2.
- December 6, 2024: NMFS issued its final Biological Opinion on salmonids and green sturgeon, also finding no jeopardy under Alternative 2.
- December 19, 2024: Reclamation signed the 2024 LTO Record of Decision, selecting Alternative 2 (Multi-Agency Consensus Proposal). This ROD included a new Shasta operational framework, reconciled CVP/SWP Delta operations, and proposed an adaptive management program.

The 2024 BiOps and ROD replaced the IOP framework but were themselves superseded within weeks. On January 24, 2025, the Trump Administration issued Executive Order 14181, and in December 2025, Reclamation issued a new ROD implementing "Action 5," which modified the

2024 Alternative 2 to increase water deliveries. This ongoing regulatory instability is itself a form of constraint on BR forecasting: PWRPA cannot predict which operational rules will govern any future water year.

3. Constraint Layer: CVPIA Section 3406(b)(2) Water

WY2024's non-critical classification triggered full CVPIA obligations. The 800,000 acre-feet of dedicated environmental yield was in full effect. In an Above Normal year, CVPIA (b)(2) water was used for:

- Instream flows supporting anadromous fish spawning and migration on the Sacramento, American, and Stanislaus rivers.
- Delta outflow augmentation beyond D-1641 minimums during spring fish migration windows.
- Pumping curtailment credits, though the ongoing accounting controversy means some portion of the 800,000 AF may have overlapped with independently required IOP/BiOp restrictions.

From a generation perspective, CVPIA water dedicated to environmental flows is water that either passes through turbines at times dictated by fish needs (not market optimization) or bypasses turbines entirely. In WY2024, the spring pulse flow actions on Clear Creek and the Sacramento River, while beneficial for juvenile salmon outmigration survival, required specific release volumes and timing that constrained Reclamation's ability to optimize generation scheduling.

4. Constraint Layer: State Water Board D-1641 and Bay-Delta Standards

As an Above Normal water year, WY2024 triggered moderately stringent Delta requirements under D-1641:

- **Delta Outflow:** Above Normal year outflow requirements mandated significant flows to maintain the X2 salinity position. In wetter months, X2 was required at or near Chipps Island, demanding approximately 11,400 cfs or more of net Delta outflow.
- **Export-to-Inflow Ratios:** D-1641 limits on the ratio of Delta exports to inflow constrained CVP pumping at Jones even when fish protections might have otherwise allowed higher rates.
- **San Joaquin River at Vernalis:** Flow requirements at Vernalis for the San Joaquin system affected New Melones releases and Stanislaus River operations.
- **Salinity Standards:** Multiple Delta monitoring stations required compliance with conductivity limits, which in practice required CVP upstream releases to maintain freshwater flow patterns.

The critical insight for WY2024 is that D-1641 requirements were binding independently of ESA protections. Even if BiOp restrictions were relaxed, the State Water Board's water quality standards would have continued to constrain Delta operations, upstream releases, and consequently generation scheduling. The December 2025 draft revised Bay-Delta Plan signals that these requirements may become more stringent in future years.

5. Constraint Layer: USACE Flood Control

WY2024's early-season hydrology was moderate, reducing flood control pressure compared to WY2023. However, the standard November-through-April flood reservation requirements remained in effect at Shasta, Folsom, and New Melones. The Corps required these reservoirs to maintain flood reservation space through the wet season.

The flood control interaction with generation in WY2024 was primarily felt through the refill constraint. Because WY2023 was exceptionally wet, reservoirs entered WY2024 relatively full. Corps rules required drawdown to flood reservation levels by early winter, meaning some releases occurred for flood control purposes rather than for optimized power generation. Where these releases passed through turbines, they generated power; but the timing was dictated by Corps rule curves rather than market prices.

Conversely, the moderate precipitation in early WY2024 meant fewer emergency flood releases and less risk of uncontrolled spill that bypasses powerplants entirely. This was a modest positive for generation efficiency.

6. Constraint Layer: Shasta Cold Water Pool and Temperature Management

WY2024 was a relative success for Shasta temperature management, in stark contrast to the catastrophic failures of WY2014-2015 and WY2021. Shasta Lake started July at approximately 4.0 MAF (out of 4.55 MAF capacity), providing a robust cold water pool. The 2024 Temperature Management Plan targeted 53.5°F at the Sacramento River above Clear Creek (CCR), and operators maintained 50–52°F at Keswick Dam throughout the summer.

6.1 No Power Bypass Required

Critically, WY2024 did not require a Shasta power bypass. In WY2021, operators bypassed the powerplant for over a month to preserve the cold water pool, losing approximately $5 million in power revenue. In WY2024, the combination of adequate storage, near-normal meteorology, and the Temperature Control Device allowed operators to route water through the penstocks and turbines while maintaining temperature compliance.

6.2 Constraints on Peaking Operations

However, the absence of a power bypass does not mean temperature management imposed no generation costs. The TCD draws water from different depths in Shasta Lake, and peaking operations (ramping generation up during high-price afternoon hours) pull warmer water from higher in the reservoir column. To maintain downstream temperature targets, operators had to limit peaking flexibility, particularly during the June-September temperature-critical period. This constrained WAPA's ability to optimize the economic value of generation even though the physical volume of water through the turbines was not reduced.

6.3 Trinity Interaction with Temperature

Trinity Division water imported through Spring Creek Powerplant enters Keswick Reservoir at warmer temperatures than the Shasta cold water pool discharge. WOMT notes from WY2024 show Trinity River releases at Lewiston at 300 cfs during the low-flow winter period, with diversions through Carr Powerplant to Whiskeytown of approximately 100 TAF per month during

May-July. The warmer Trinity imports required additional cold water pool expenditure from Shasta to maintain the blended temperature target at CCR, creating a direct tradeoff between Sacramento-side generation and Trinity fishery objectives.

7. Constraint Layer: Trinity River Restoration

WY2024's Above Normal classification for the Trinity basin determined the environmental flow schedule under the 2000 Record of Decision. The variable flow regime required substantial releases from Lewiston Dam for fishery restoration purposes. WOMT records confirm Trinity River releases at Lewiston of 300 cfs during winter base flows, with scheduled increases beginning in mid-April for spring peak flows.

The 50/50 split (averaged over multiple years) between water released to the Trinity River and water diverted to the Sacramento system through Carr Powerplant means that in an Above Normal year, a significant portion of Trinity inflow was retained in-basin for environmental purposes. This water would otherwise have been available for trans-basin diversion and generation through Spring Creek Powerplant.

From a Base Resource perspective, Trinity Division operations affect both the volume and timing of generation. Carr Powerplant and Spring Creek Powerplant together represent meaningful CVP capacity, and their output is governed primarily by Trinity fishery requirements and Shasta temperature management needs rather than power market conditions.

8. Constraint Layer: Project Use Loads

CVP project use loads in WY2024 reflected the complex interaction between water deliveries and pumping requirements. Jones Pumping Plant, the primary CVP Delta export facility, operates six pumps with a total capacity of approximately 4,600 cfs, each powered by 22,500-horsepower electric motors drawing power from CVP generation.

In WY2024, Jones Pumping Plant operations were constrained by the same OMR flow restrictions and fish salvage triggers that limited water exports. This created a paradoxical dynamic:

- When pumping was curtailed for fish protection, project use loads decreased (positive for net generation to WAPA).
- But the reduced pumping also meant less water moved south of Delta, reducing Reclamation's ability to fulfill delivery contracts and generating political/legal pressure to increase releases elsewhere.
- Pumping that did occur was concentrated in permitted windows, potentially creating lumpy project use loads rather than steady-state consumption.

The net effect on Base Resource depends on the relative magnitude of generation reductions versus pumping load reductions. In WY2024, with south-of-Delta allocations reaching only 50%, project use was below what a full-delivery year would require, likely providing a modest net positive to BR compared to a hypothetical year with identical hydrology but no export restrictions.

9. Constraint Layer: Coordinated Operations Agreement

The CVP and SWP continued to operate under the 2018 amended Coordinated Operations Agreement in WY2024. COA governs shared responsibility for meeting Delta standards and allocates surplus water and storage capacity between the two projects.

In WY2024, COA dynamics affected Base Resource through two channels. First, the shared obligation for Delta outflow meant CVP sometimes released additional water to compensate for SWP operational decisions, or vice versa. Second, San Luis Reservoir operations (a joint facility) required coordination: Reclamation reserved 83,000 AF of CVP San Luis storage as a drought reserve pool, and an additional 185,000 AF of rescheduled WY2023 water was stored but excluded from WY2024 allocations. These operational decisions reduced the volume of water actively being moved through the system, with downstream effects on pumping and generation.

DWR reported that WY2024 was characterized by both record-low pumping for a wet-type year and high fish salvage, suggesting the COA coordination mechanisms were under stress from the divergence between available water and permitted export rates.

10. Constraint Layer: Contractual Priority Deductions

Under BRC Section 5.3, Base Resource is what remains after deducting project use, First Preference customer loads (Trinity, Calaveras, and Tuolumne counties), reserves, and system losses. In WY2024:

- First Preference loads were served at full priority as required by the Trinity River Division Act and New Melones provisions.
- Contingency reserves (spinning and non-spinning per Exhibit C) were deducted from available capacity.
- System losses (transformation and transmission losses on the 230-kV CVP system) reduced delivered energy.

WY2024 was also the final year of the existing WAPA long-term power sales contracts, which all expired December 31, 2024. The 2025 Power Marketing Plan had been published in August 2017, establishing that starting January 1, 2025, WAPA would provide 98% of available CVP power to existing customers. The contract transition created additional administrative complexity but did not change the fundamental physics of how much generation reached WAPA after deductions.

11. Constraint Layer: Maintenance, Outages, and Infrastructure

BRC Section 7.6 limits WAPA's obligation to actual CVP generation available on a real-time basis, with no replacement obligation for generation unavailable due to scheduled maintenance, forced outages, system emergencies, or other constraints.

In WY2024, notable infrastructure factors included the completion of the Jones Pumping Plant motor rewind project, which restored full pumping capability. The Tracy Fish Collection Facility, which operates in conjunction with Jones, remained essential to CVP export operations: if the fish facility cannot salvage fish, pumping ceases entirely. Aging infrastructure across the CVP

system (some facilities over 80 years old) continued to require scheduled maintenance windows, particularly during lower-demand fall and winter months.

No major forced outage events were identified for WY2024 from available records, though detailed facility-level outage data is not publicly reported.

12. Constraint Layer: Climate Change as a Meta-Variable

WY2024 illustrated several climate-change dynamics. The early-season precipitation deficit followed by late-season recovery is consistent with projections of more volatile precipitation timing. The shift from snow to rain was evident: snowpack was well below average in early January but reservoir levels remained above average due to rain-driven inflows and WY2023 carryover. This pattern stresses the CVP's design assumption of gradual spring snowmelt providing steady water supply and generation.

The Sacramento River Temperature Task Group's 2025 Plan noted that WY2024 conditions were comparable to other above-average years like 2016 and 2018, but explicitly referenced the improved cold water pool management as a product of active coordination that began in February. This real-time management intensity reflects the narrowing margin for error as warming temperatures degrade cold water pools more rapidly.

Climate projections from DWR modeling suggest higher frequency of critical and below-normal years and lower frequency of wet and above-normal years, meaning WY2024's Above Normal classification may become less common in coming decades. For Base Resource planning, this means the favorable tail of the hydrologic distribution shrinks while the unfavorable tail thickens.

13. Synthesis: WY2024 Constraint Interaction Map

The following table summarizes how each constraint layer manifested in WY2024 and its directional impact on Base Resource availability:

Constraint	WY2024 Status	Impact on Base Resource
1. Hydrology	Above Normal; reservoirs high from WY2023 carryover	Positive: supported above-average generation potential
2. ESA/BiOps/IOP	Court-ordered IOP final year; spring pumping curtailments; salvage triggers	Negative: suppressed Delta exports and spring generation optimization
3. CVPIA (b)(2)	Full 800 TAF obligation in non-critical year	Negative: environmental flows reduced or retimed generation
4. D-1641 / Bay-Delta	Above Normal year triggers; X2 requirements active	Negative: Delta outflow obligations constrained upstream storage
5. Flood Control	Moderate; less pressure than WY2023	Neutral: required drawdown but limited spill
6. Temperature Mgmt	Successful; no power bypass needed	Mildly Negative: constrained peaking flexibility
7. Trinity Restoration	Above Normal flow regime; significant in-basin retention	Negative: reduced trans-basin generation

Constraint	WY2024 Status	Impact on Base Resource
8. Project Use	Below full-delivery levels due to export restrictions	Mildly Positive: lower pumping loads
9. COA	Coordination strained by export limits; drought reserve held	Neutral to Mildly Negative
10. Contractual	Contract expiration year; full deduction hierarchy	Neutral: standard deductions applied
11. Maintenance	Jones motor rewind completed; no major outages	Neutral to Mildly Positive
12. Climate	Volatile early-season precipitation; warming trends	Mildly Negative: increasing management intensity

13.1 The Paradox of WY2024

WY2024 presents what might be called the “good-year paradox” for Base Resource planning. Hydrology was favorable. Reservoirs were high. No power bypass was needed. And yet:

- South-of-Delta agricultural allocations reached only 50% despite above-average reservoir storage and near-normal snowpack.
- Spring Delta pumping experienced both record lows for a wet-type year and high fish salvage.
- Reclamation explicitly cited “anticipated regulatory constraints throughout the spring” as limiting south-of-Delta allocations even in March, when Northern Sierra conditions had improved to near-normal.
- The regulatory framework governing operations changed three times in four months (IOP through September 30, 2024 ROD December 19, EO 14181 January 24, 2025).

The unmistakable conclusion: hydrology set an upper bound on generation potential, but non-hydrological constraints determined where within that bound actual operations fell. In WY2024, those constraints were binding enough to suppress water deliveries to half of contracted levels for the CVP’s largest customer class, despite fundamentally supportive water supply conditions.

14. Implications for PWRPA

14.1 Base Resource Forecasting

WY2024 reinforces that Base Resource cannot be forecast from hydrology alone. WAPA’s BRC Section 6.1 requires five-year forecasts based on high, average, and low hydrological conditions, but the WY2024 experience demonstrates that even the “high” hydrological scenario may produce only moderate Base Resource if non-hydrological constraints are simultaneously binding. PWRPA’s resource planning must account for the full constraint stack, not merely a range of precipitation outcomes.

14.2 CARB Allowance Allocation

WY2024 provides a concrete case study supporting the argument developed in PWRPA's comments on the proposed amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms. If CARB were to anchor PWRPA's post-2030 allowance allocation to a single year like WY2024, the result would capture a year where:

- Favorable hydrology produced above-average generation potential;
- But non-hydrological constraints suppressed actual delivered energy below that potential;
- And the regulatory framework itself was in flux, with the governing rules changing multiple times.

A Path 1 methodology anchored to such a year would systematically misrepresent PWRPA's compliance burden in subsequent years when either hydrology deteriorates or constraints tighten further (or both). The multi-year average approach proposed for PWRPA as a hydro-dependent EDU is validated by the WY2024 experience.

14.3 The 2025 Contract Transition

WY2024 ended with the expiration of all existing WAPA SNR contracts on December 31, 2024. The new BRC 21-SNR-02613 and its amendments now govern PWRPA's access to Base Resource under the 2025 Power Marketing Plan. While the fundamental BR formula (gross generation minus project use minus First Preference equals BR) remains unchanged, the contract transition occurred simultaneously with the 2024 ROD, and within weeks, the supersession by the 2025 Action 5 ROD. PWRPA is entering the new contract period with the underlying operational rules themselves in active dispute between federal administrations, courts, and the State of California.

14.4 Forward-Looking Risk Assessment

The WY2024 constraint analysis suggests three scenarios for future BR volatility:

- **Regulatory Tightening:** If courts invalidate Action 5 and restore the 2024 ROD or impose additional protections (e.g., updated Bay-Delta Plan), constraints tighten and BR decreases relative to WY2024 levels, particularly in dry years.
- **Regulatory Loosening:** If Action 5 survives legal challenge and EO 14181 is fully implemented, maximum pumping at Jones may be pursued, potentially increasing project use loads while also increasing water through the system. Net effect on BR depends on the balance.
- **Regulatory Whiplash:** Continued oscillation between administrations produces the most damaging scenario for planning: operators default to conservative assumptions, courts impose conflicting requirements, and actual operations satisfy neither supply nor environmental objectives efficiently. WY2024's experience of four governing frameworks in four months is a preview of this risk.

End of Analysis

ATTACHMENT 4

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

California statute (PWRPA 7-year average retail sales)

Cal. Pub. Util. Code § 399.30(i)

Notwithstanding subdivision (a), for a local publicly owned electric utility that is a joint powers authority of districts established pursuant to state law on or before January 1, 2005, that furnishes electric services other than to residential customers, and is formed pursuant to the Irrigation District Law (Division 11 (commencing with Section 20500) of the Water Code), the percentage of total kilowatthours sold to the district's retail end-use customers, upon which the renewables portfolio standard procurement requirements in subdivision (b) are calculated, shall be based on the authority's average retail sales over the previous seven years.

California Code of Regulations (CEC POU RPS procurement targets)

20 CCR § 3204(b)(1)

For a POU that is a joint powers authority of districts established pursuant to state law on or before January 1, 2005, that furnishes electric services other than to residential customers, and is formed pursuant to the Irrigation District Law (Division 11 [commencing with section 20500] of the Water Code), the percentage of retail sales, upon which the RPS procurement targets in section 3204(a)(1)-(7) are calculated, shall be based on that POU's average annual retail sales over the seven years preceding the end of each year within that compliance period.

ATTACHMENT 5

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

YEAR	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2030	
Energy to Serve Load (raw) (MWh)	543,756	493,645	359,909	338,790	310,202	438,034	512,869	497,104	299,091	302,067	The representative emissions used to calculate the post-2030 allocation is the average annual emissions for the 10-year period 2015-2024 using a 55% RPS factor in all years.	Value from Board-approved Power Source Disclosure form filed with CEC in the respective year
Retail Sales (MWh)	519,422	437,919	298,379	324,751	278,472	419,743	490,504	474,779	290,313	291,714		Value from Board-approved Power Source Disclosure form filed with CEC in the respective year
Energy to Serve Load (final) (MWh)	543,756	493,645	359,909	338,790	310,202	438,034	512,869	497,104	299,091	302,067		Energy to Serve Load (raw), except if lesser than Retail Sales in any year, then is Retail Sales plus 7%
Coal (MWh)	-	-	-	-	-	-	-	-	-	-		No coal reported in S-2
Nuclear (MWh)	-	-	-	-	-	-	-	-	-	-		No nuclear reported in S-2
Large Hydro (MWh)	125,235	161,954	282,114	165,615	215,614	196,122	125,877	56,380	156,986	203,309		Value from Board-approved Power Source Disclosure form filed with CEC in the respective year
RPS Factor Applied to Sales	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%		Renewable Portfolio Standard 2030 target of 60%, minus 5% to represent other electricity used to "firm and shape" zero-emissions electricity.
RPS Power (MWh)	285,682	240,855	164,108	178,613	153,160	230,859	269,777	261,128	159,672	160,443		Retail Sales times RPS Factor Applied to Sales
Natural Gas (MWh)	132,839	90,836	17,995	16,940	15,510	21,902	117,215	179,596	14,955	15,103		Energy not provided by other sources, except not less than 5% of Energy to Serve Load (final)
EDU-Specific Emissions ($MTCO_2e$)	57,838	39,550	7,835	7,375	6,753	9,536	51,035	78,196	6,511	6,576		Calculated emissions from coal and natural gas: Coal (MWh) times IPP Coal Emission Factor plus Natural Gas (MWh) times Natural Gas Emission Factor
			-	Baseline Industrial Covered Entity Purchased Electricity (MWh):			-	Baseline Industrial Covered Entity Purchased Electricity (MWh):				For each year 2022 through 2024, summed the actual electricity purchased by industrial covered entities served by the EDU, as reported in MRR. Took the average of those three values. Represents electricity for which industrial covered entities would receive allocations
EDU-Specific Emission Factor ($MTCO_2e$/MWh)	0.106	0.080	0.022	0.022	0.022	0.022	0.100	0.157	0.022	0.022		EDU-Specific Emissions divided by Energy to Serve Load (final)
Industrial Covered Entity Emissions ($MTCO_2e$)	-	-	-	-	-	-	-	-	-	-		Baseline Industrial Covered Entity Purchased Electricity times EDU-Specific Emissions Factor
Annual Allocation (allowances)	57,838	39,550	7,835	7,375	6,753	9,536	51,035	78,196	6,511	6,576	**27,121**	EDU-Specific Emissions less Industrial Covered Entity Emissions

ATTACHMENT 6

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION: Power Source Disclosure
June 2016
for the year ending December 31, 2015
SCHEDULE 2: ANNUAL POWER CONTENT LABEL CALCULATION
Applicable to: Power & Water Resources Pooling Authority

INSTRUCTIONS: Total specific purchases (by fuel type) and enter these numbers in the first column. Null power purchases should be included with Unspecified Power. REC only purchases should be included as part of the fuel type they represent. The remainder of this schedule will be automatically populated with net generic purchase and total retail sales information from Schedule 1. Any difference between total net purchases and total retail sales will be applied pro-rata to each non-renewable fuel type. The pro-rata calculations will then be divided by total retail sales to calculate fuel mix percentages.

	Net Purchases (kWh)	Percent of Total Retail Sales (kWh)
Specific Purchases		
Renewable	41,912,518	8%
Biomass & Biowaste	29,143,600	6%
Geothermal	-	0%
Eligible hydroelectric	12,768,918	2%
Solar	-	0%
Wind		0%
Coal	-	0%
Large hydroelectric	125,235,000	23%
Natural Gas	63,028,693	12%
Nuclear	-	0%
Other	-	0%
Total Specific Purchases	**230,176,211**	**43%**
Unspecified Power (kWh)	**313,579,304**	**57%**
Total	**543,755,515**	**100%**
Total Retail Sales (kWh)	**519,421,784**	

COMMENTS:
Unspecified Power = Net of Power Purchases and Power sold to CAISO
Total Retail Sales = Non-DLF Metered Load

0

ATTACHMENT 7

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
For the Year Ending December 31, 2016
SCHEDULE 2: ANNUAL POWER CONTENT LABEL CALCULATION
Applicable to: PWRPA Standard Portfolio

INSTRUCTIONS: Total specific purchases (by fuel type) and enter these numbers in the first column. Null power purchases should be included with Unspecified Power. REC only purchases should be included as part of the fuel type they represent. The remainder of this schedule will be automatically populated with net generic purchase and total retail sales information from Schedule 1. Any difference between total net purchases and total retail sales will be applied pro-rata to each non-renewable fuel type. The pro-rata calculations will then be divided by total retail sales to calculate fuel mix percentages.

	Net Purchases (MWh)	Percent of Total Retail Sales (MWh)
Specific Purchases		
Renewable	74,060	19%
Biomass & Biowaste	17,809	5%
Geothermal		0%
Eligible hydroelectric	15,695	4%
Solar	6,006	2%
Wind	34,550	9%
Coal		0%
Large hydroelectric	120,632	27%
Natural Gas	56,319	13%
Nuclear		0%
Other		0%
Total Specific Purchases	**251,011**	**59%**
Unspecified Power (MWh)	**186,211**	**41%**
Total	**437,222**	**100%**
Total Retail Sales (MWh)	**382,852**	

COMMENTS: Standard portfolio.

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
For the Year Ending December 31, 2016
SCHEDULE 2: ANNUAL POWER CONTENT LABEL CALCULATION
Applicable to: PWRPA Low CO2 Portfolio

INSTRUCTIONS: Total specific purchases (by fuel type) and enter these numbers in the first column. Null power purchases should be included with Unspecified Power. REC only purchases should be included as part of the fuel type they represent. The remainder of this schedule will be automatically populated with net generic purchase and total retail sales information from Schedule 1. Any difference between total net purchases and total retail sales will be applied pro-rata to each non-renewable fuel type. The pro-rata calculations will then be divided by total retail sales to calculate fuel mix percentages.

	Net Purchases (MWh)	Percent of Total Retail Sales (MWh)
Specific Purchases		
Renewable	15,101	27%
Biomass & Biowaste	2,974	5%
Geothermal		0%
Eligible hydroelectric	10,493	19%
Solar	1,184	2%
Wind	450	1%
Coal		0%
Large hydroelectric	41,322	73%
Natural Gas		0%
Nuclear		0%
Other		0%
Total Specific Purchases	**56,423**	**100%**
Unspecified Power (MWh)		**0%**
Total	**56,423**	**100%**
Total Retail Sales (MWh)	**55,067**	

COMMENTS: PWRPA Low CO2e Portfolio..

ATTACHMENT 8

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Version: May 2018

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
Schedule 1 and 2, applicable to: Load Serving Entities
For the Year Ending December 31, 2017

Load serving entities are required to use the posted template and are not allowed to make edits to this format. Please fill out the company name and contact information.

GENERAL INSTRUCTIONS

COMPANY NAME
Power & Water Resources Pooling Authority

PRODUCT NAME (If Multiple Products Offered)
Standard Product

CONTACT INFORMATION	
Name	Bruce McLaughlin
Title	General Counsel
Mailing Address	3514 W. Lehman Road
City, State, Zip	Tracy, CA 95304
Phone	(209) 835-4670
E-mail	bcm@veraxlaw.com
Website for PCL Posting	www.pwrpa.org

Please fill out the schedules that apply to your company's filing requirements. Provide the annual report and attestation together in PDF format and the annual report in an excel file by email to PSDprogram@energy.ca.gov. Remember to fill in the company name above, submit separate reports and attestations for each additional product if multiple electric service products are offered. Report procurements in MWh (not kWh).

NOTE: Information submitted in this report is not automatically held confidential. If your company wishes the information submitted to be considered confidential an authorized representative must submit an application for confidential designation (CEC-13), which can be found on the California Energy Commissions's website at http://www.energy.ca.gov/commission/chief_counsel/documents/CEC13.pdf

If you have questions, contact PSD staff at PSDprogram@energy.ca.gov or (916) 653-6222.

Version: May 2018

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION: Power Source Disclosure Program

For the Year Ending December 31, 2017
SCHEDULE 1: POWER PROCUREMENTS AND RETAIL SALES
Applicable to: Load Serving Entities

INSTRUCTIONS: Enter information about power procurements supporting all electricity products for which your company is filing the Annual Report. If you need additional rows, add them from the INSERT menu. Please list all purchases (Specified and Unspecified purchases) as line items under the Facility Name heading. If a procurement was for unbundled RECs include the term "REC Only" in parentheses after the facility name in the Facility Name column, and categorize the power as the fuel type of the generating facility from which the unbundled REC was derived. If procured power was from a transaction that expressly transferred energy only and not the RECs associated with that energy, identify the power as "Unspecified Power" in the Fuel Type column.

ALL PROCUREMENTS (Specified and Unspecified)

Facility Name	Unit No.	Fuel Type	Location (State or Province)	RPS ID	WREGIS GU ID	EIA ID	FERC QF ID	Gross MWh Procured	MWh Resold or Self-Consumed	Net MWh Procured
Warm Springs Dam (SCWA)		small hydro PCC1	CA	62385A	W675			13	0	13
Central Valley Project (Bureau of Reclamation / WAPA)		large hydro	CA					233947	0	233947
CVP Base Resource (WAPA) Nimbus		small hydro PCC0	CA	61045A	W1161			5832	0	5832
CVP Base Resource (WAPA) Stampede		small hydro PCC0	CA	61046A	W1177			631	0	631
CVP Base Resource (WAPA) Lewiston		small hydro PCC0	CA	61044A	W1108			312	0	312
Astoria Solar (Recurrent)		solar PCC1	CA	62284C				28184	0	28184
Whitney Point Solar (NextEra)		solar PCC1	CA	61186A				8441	0	8441
Lodi Energy Center (NCPA)		natural gas	CA			57978		19383	0	19383
Unspecified power purchases			CA					38871	38871	0
										0
										0

Total Net Purchases	296,743
Total Retail Sales	235,569

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
For the Year Ending December 31, 2017
SCHEDULE 2: ANNUAL POWER CONTENT LABEL CALCULATION
Applicable to: Load Serving Entities

INSTRUCTIONS: Total specific purchases (by fuel type) and enter these numbers in the first column. Null power purchases should be included with Unspecified Power. REC only purchases should be included as part of the fuel type they represent. Total retail sales information from Schedule 1 will autopopulate on this schedule. Any difference between total net purchases and total retail sales will be applied pro-rata to each non-renewable fuel type. Each fuel type total will them be devided by retail sales to calculate fuel mix percentages.

	Net Purchases (MWh)	Percent of Total Retail Sales (MWh)
Specific Purchases		
Renewable	43,413	18%
Biomass & Biowaste		0%
Geothermal		0%
Eligible hydroelectric	6,788	3%
Solar	36,625	16%
Wind		0%
Coal		0%
Large Hydroelectric	233,947	75%
Natural Gas	19,383	6%
Nuclear		0%
Other		0%
Total Specific Purchases	**296,743**	**100%**
Unspecified Power (MWh)	**-**	**0%**
Total	**296,743**	**100%**
Total Retail Sales (MWh)	**235,569**	

COMMENTS:

Version: May 2018

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
Schedule 1 and 2, applicable to: Load Serving Entities
For the Year Ending December 31, 2017

Load serving entities are required to use the posted template and are not allowed to make edits to this format. Please fill out the company name and contact information.

GENERAL INSTRUCTIONS

COMPANY NAME
Power & Water Resources Pooling Authority

PRODUCT NAME (If Multiple Products Offered)
Zero Carbon Product

CONTACT INFORMATION	
Name	Bruce McLaughlin
Title	General Counsel
Mailing Address	3514 W. Lehman Road
City, State, Zip	Tracy, CA 95304
Phone	(209) 835-4670
E-mail	bcm@veraxlaw.com
Website for PCL Posting	www.pwrpa.org

Please fill out the schedules that apply to your company's filing requirements. Provide the annual report and attestation together in PDF format and the annual report in an excel file by email to PSDprogram@energy.ca.gov. Remember to fill in the company name above, submit separate reports and attestations for each additional product if multiple electric service products are offered. Report procurements in MWh (not kWh).

NOTE: Information submitted in this report is not automatically held confidential. If your company wishes the information submitted to be considered confidential an authorized representative must submit an application for confidential designation (CEC-13), which can be found on the California Energy Commissions's website at http://www.energy.ca.gov/commission/chief_counsel/documents/CEC13.pdf

If you have questions, contact PSD staff at PSDprogram@energy.ca.gov or (916) 653-6222.

Version: May 2018

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION: Power Source Disclosure Program

For the Year Ending December 31, 2017
SCHEDULE 1: POWER PROCUREMENTS AND RETAIL SALES
Applicable to: Load Serving Entities

INSTRUCTIONS: Enter information about power procurements supporting all electricity products for which your company is filing the Annual Report. If you need additional rows, add them from the INSERT menu. Please list all purchases (Specified and Unspecified purchases) as line items under the Facility Name heading. If a procurement was for unbundled RECs include the term "REC Only" in parentheses after the facility name in the Facility Name column, and categorize the power as the fuel type of the generating facility from which the unbundled REC was derived. If procured power was from a transaction that expressly transferred energy only and not the RECs associated with that energy, identify the power as "Unspecified Power" in the Fuel Type column.

ALL PROCUREMENTS (Specified and Unspecified)

Facility Name	Unit No.	Fuel Type	Location (State or Province)	RPS ID	WREGIS GU ID	EIA ID	FERC QF ID	Gross MWh Procured	MWh Resold or Self-Consumed	Net MWh Procured
Warm Springs Dam (SCWA)		small hydro PCC1	CA	62385A	W675			3342	0	3342
Central Valley Project (Bureau of Reclamation / WAPA)		large hydro	CA					48167	0	48167
Pentitencia Solar (Greenlight)		solar PCC1	CA	63288A				239	0	239
Santa Teresa Solar (Greenlight)		solar PCC1	CA	63289A				309	0	309
Whitney Point Solar (NextEra)		solar PCC1	CA	61186A				11109	0	11109
Zone 7 Water Agency DeValle WTP (REC Only)		solar PCC3	CA	63652A				641	641	0
										0

Total Net Purchases	63,166
Total Retail Sales	62,810

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
For the Year Ending December 31, 2017
SCHEDULE 2: ANNUAL POWER CONTENT LABEL CALCULATION
Applicable to: Load Serving Entities

INSTRUCTIONS: Total specific purchases (by fuel type) and enter these numbers in the first column. Null power purchases should be included with Unspecified Power. REC only purchases should be included as part of the fuel type they represent. Total retail sales information from Schedule 1 will autopopulate on this schedule. Any difference between total net purchases and total retail sales will be applied pro-rata to each non-renewable fuel type. Each fuel type total will them be devided by retail sales to calculate fuel mix percentages.

	Net Purchases (MWh)	Percent of Total Retail Sales (MWh)
Specific Purchases		
Renewable	14,999	24%
Biomass & Biowaste		0%
Geothermal		0%
Eligible hydroelectric	3,342	5%
Solar	11,657	19%
Wind		0%
Coal		0%
Large Hydroelectric	48,167	76%
Natural Gas		0%
Nuclear		0%
Other		0%
Total Specific Purchases	**63,166**	**100%**
Unspecified Power (MWh)	**-**	**0%**
Total	**63,166**	**100%**
Total Retail Sales (MWh)	**62,810**	

COMMENTS:

ATTACHMENT 9

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Version: April 2019

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
Schedule 1 and 2, applicable to: Retail Suppliers
For the Year Ending December 31, 2018

Retail suppliers are required to use the posted template and are not allowed to make edits to this format. Please complete all requested information.

GENERAL INSTRUCTIONS

RETAIL SUPPLIER NAME
Power & Water Resources Pooling Authority

ELECTRIC SERVICE PRODUCT NAME
Standard Electricity Product

CONTACT INFORMATION	
Name	Bruce McLaughlin
Title	General Manager
Mailing Address	3514 W. Lehman Road
City, State, Zip	Tracy, CA 95304
Phone	(916) 531-5566
E-mail	bcm@cameron-daniel.com
Website URL for PCL Posting	www.pwrpa.org

This Annual Report Template includes Schedules 1 and 2, applicable to retail suppliers. Power pools are required to report using Schedules 3 and 4 provided in a separate reporting template. Submit the Annual Report and Attestation in PDF format with an Excel version of the Annual Report to PSDprogram@energy.ca.gov. Remember to fill in the Retail Supplier Name and Product Name above, and submit separate reports and attestations for each additional product if multiple electric service products were offered in the previous year.

NOTE: Information submitted in this report is not automatically held confidential. If your company wishes the information submitted to be considered confidential an authorized representative must submit an application for confidential designation (CEC-13), which can be found on the California Energy Commissions's website at http://www.energy.ca.gov/commission/chief_counsel/documents/CEC13.pdf.

If you have questions, contact PSD staff at PSDprogram@energy.ca.gov or (916) 653-0237.

Version: April 2019

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION: Power Source Disclosure Program

For the Year Ending December 31, 2018
SCHEDULE 1: POWER PROCUREMENTS AND RETAIL SALES
Applicable to: Retail Suppliers

INSTRUCTIONS: Submit a separate annual report for each electric service product offered in 2018. List all purchases (Specific and Unspecified) made ONLY in the 2018 calendar year. Add additional rows if needed. If a purchase was for unbundled RECs include the term "REC Only" in parentheses after the facility name in the Facility Name column, and categorize the power as the fuel type of the generating facility from which the unbundled REC was derived. If power was purchased through a transaction that expressly transferred energy only and not the RECs associated with that energy, identify the power as "Unspecified Power" in the Fuel Type column. If purchased power was from a renewable electrical generation facility that is not certified for participation in California's RPS Program, identify the Fuel Type as "Other".

ALL PROCUREMENTS (Specific and Unspecified)

Facility Name	Unit No.	Fuel Type	Location (State or Province)	RPS ID	WREGIS GU ID	EIA ID	FERC QF ID	Gross MWh Procured	MWh Resold or Self-Consumed	Net MWh Procured
Warm Springs Dam (SCWA)		small hydro PCC1	CA	62385A	W675	21944		3162		3162
Central Valley Project (Bureau of Reclamation / WAPA)		large hydro	CA		W1156, W115	2518		165615		165615
Central Valley Project (Bureau of Reclamation / WAPA)		large hydro	CA		W1168, W116	2518				
Central Valley Project (Bureau of Reclamation / WAPA)		large hydro	CA		W1288, W116	3255				
CVP Base Resource (WAPA) Nimbus		small hydro PCC0	CA	61045A	W1161	2518		4801		4801
CVP Base Resource (WAPA) Stampede		small hydro PCC0	CA	61046A	W1177	2518		434		434
CVP Base Resource (WAPA) Lewiston		small hydro PCC0	CA	61044A	W1108	2518		135		135
Astoria 2 Solar (Recurrent)		solar PCC1	CA	62691A	W4931	59728		30572		30572
Whitney Point Solar (NextEra)		solar PCC1	CA	61186A	W5441	60619		29177		29177
Penitencia Solar (Greenlight)		solar PCC1	CA	63288A	W5026			281		281
Santa Teresa Solar (Greenlight)		solar PCC1	CA	63289A	W5443			319		319
Lodi Energy Center (NCPA)		natural gas	CA			57978		39255		39255
Unspecified power purchases		Unspecified Power	CA					64307		64307
RD 108 Sycamore Slough Solar		solar PCC3	CA	63533A	W1574			162		162
Zone 7 Water Agency DeValle WTP (REC Only)		solar PCC3	CA	63652A	W5345			570		570
										0

Retail Supplier Name:	Power & Water Resources Pooling Authority	**Total Net Purchases**	338,790
Electric Service Product Name:	Standard Product	**Total Retail Sales**	324,751

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION:
Power Source Disclosure Program
For the Year Ending December 31, 2018
SCHEDULE 2: ANNUAL POWER CONTENT LABEL CALCULATION
Applicable to: Retail Suppliers

INSTRUCTIONS: Total specific purchases by fuel type and enter these values in the first column. If purchased power was from a transaction that expressly transferred energy only and not the RECs associated with that energy, identify the power as "Unspecified Power". Total Retail Sales will autopopulate from Schedule 1. Any difference between total net purchases and total retail sales will be applied pro-rata to each non-renewable fuel type. Each fuel type total will then be divided automatically by retail sales to calculate fuel mix percentages.

	Net Purchases (MWh)	Percent of Total Retail Sales (MWh)
Specific Purchases		
Renewable	69,613	21%
Biomass & Biowaste	-	0%
Geothermal	-	0%
Eligible Hydroelectric	8,532	3%
Solar	61,081	19%
Wind	-	0%
Coal	-	0%
Large Hydroelectric	165,615	48%
Natural Gas	39,255	11%
Nuclear	-	0%
Other	-	0%
Total Specific Purchases	**274,483**	**81%**
Unspecified Power (MWh)	**64,307**	**19%**
Total	**338,790**	**100%**
Total Retail Sales (MWh)	**324,751**	

Comments: Revision 2 with DG PCC3 solar included.

Version: July 2019

2018 POWER CONTENT LABEL

Power & Water Resources Pooling Authority

http://www.pwrpa.org/pwrpa%5Forg/index.cfm?q_webaction=DOCLIST&catid=33&rownumd=0&rownum=0&action=add

ENERGY RESOURCES	Power Mix	2018 CA Power Mix**
Eligible Renewable	**22%**	**31%**
Biomass & Biowaste	0%	2%
Geothermal	0%	5%
Eligible Hydroelectric	3%	2%
Solar	19%	11%
Wind	0%	11%
Coal	**0%**	**3%**
Large Hydroelectric	**48%**	**11%**
Natural Gas	**11%**	**35%**
Nuclear	**0%**	**9%**
Other	**0%**	**<1%**
Unspecified sources of power*	**19%**	**11%**
TOTAL	**100%**	**100%**

* "Unspecified sources of power" means electricity from transactions that are not traceable to specific generation sources.

** Percentages are estimated annually by the California Energy Commission based on the electricity generated in California and net imports as reported to the Quarterly Fuel and Energy Report database and the Power Source Disclosure program.

For specific information about this electricity product, contact:	**Power & Water Resources Pooling Authority** **(916) 629-0399**
For general information about the Power Content Label, please visit:	http://www.energy.ca.gov/pcl/
For additional questions, please contact the California Energy Commission at:	Toll-free in California: 844-454-2906 Outside California: 916-653-0237

ATTACHMENT 10

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Version: May 8, 2020

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION: Power Source Disclosure
SCHEDULE 3: ANNUAL POWER CONTENT LABEL DATA
for the year ending December 31, 2019
POWER & WATER RESOURCES POOLING AUTHORITY
ZERO CARBON - MUNICIPAL WATER PSD

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	14,570	25.7%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	767	1.4%
Solar	13,803	24.4%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	42,073	74.3%
Natural gas	-	0.0%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**56,643**	**100.0%**

Total Retail Sales (MWh)	**56,643**

Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.0%**

ANNUAL REPORT TO THE CALIFORNIA ENERGY COMMISSION: Power Source Disclosure
SCHEDULE 3: ANNUAL POWER CONTENT LABEL DATA
for the year ending December 31, 2019
POWER & WATER RESOURCES POOLING AUTHORITY
AGRICULTURAL WATER PSD

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	47,708	21.6%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	3,878	1.8%
Solar	43,830	19.8%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	173,541	78.4%
Natural gas	-	0.0%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**221,249**	**100.0%**

Total Retail Sales (MWh)	**221,249**

Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.0%**

ATTACHMENT 11

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

2020 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2020
Power & Water Resources Pooling Authority
Zero Carbon Water Portfolio

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	14,493	22.8%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	325	0.5%
Solar	14,168	22.3%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	49,063	77.2%
Natural gas	-	0.0%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**63,556**	**100.0%**

Total Retail Sales (MWh)	**63,556**
GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**-**
Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.0%**

2020 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2020
Power & Water Resources Pooling Authority
Standard Water Portfolio

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	114,079	32.0%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	4,651	1.3%
Solar	109,428	30.7%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	147,059	41.3%
Natural gas	18,004	5.1%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	77,045	21.6%
Total	**356,187**	**100.0%**

Total Retail Sales (MWh)	**356,187**
GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**283**
Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.9%**

ATTACHMENT 12

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

Version: May 2022

2021 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2021
POWER & WATER RESOURCES POOLING AUTHORITY
ZERO CARBON WATER PORTFOLIO

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	15,281	26.8%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	112	0.2%
Solar	15,169	26.6%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	41,731	73.2%
Natural gas	-	0.0%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**57,012**	**100.0%**

Total Retail Sales (MWh)	**57,012**

GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**-**

Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.0%**

Version: May 2022

2021 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2021
POWER & WATER RESOURCES POOLING AUTHORITY
STANDARD WATER PORTFOLIO

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	48,997	11.3%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	2,334	0.5%
Solar	46,663	10.8%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	84,146	19.4%
Natural gas	46,031	10.6%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	254,318	58.7%
Total	**433,492**	**100.0%**

Total Retail Sales (MWh)	**433,492**

GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**646**

Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.5%**

ATTACHMENT 13

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

2022 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2022
POWER & WATER RESOURCES POOLING AUTHORITY
ZERO CARBON WATER PORTFOLIO

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	23,326	36.1%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	205	0.3%
Solar	23,121	35.8%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	41,302	63.9%
Natural gas	-	0.0%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**64,628**	**100.0%**

Total Retail Sales (MWh)	**64,628**
GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**-**
Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.0%**

2022 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2022
POWER & WATER RESOURCES POOLING AUTHORITY
STANDARD WATER PORTFOLIO

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	105,808	25.8%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	4,502	1.1%
Solar	101,306	24.7%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	15,078	3.7%
Natural gas	22,419	5.5%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	266,846	65.1%
Total	**410,151**	**100.0%**

Total Retail Sales (MWh)	**410,151**

GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**660**

Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.9%**

ATTACHMENT 14

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

ATTACHMENT A to RESOLUTION 24-06-06

Version: April 2024

2023 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2023
Power & Water Resources Pooling Authority
Zero Carbon Water Portfolio

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	21,469	35.6%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	283	0.5%
Solar	21,186	35.1%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	38,843	64.4%
Natural gas	-	0.0%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**60,312**	**100.0%**

Total Retail Sales (MWh)	**60,312**
GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**-**
Percentage of Retail Sales Covered by Retired Unbundled RECs	**0.0%**

ATTACHMENT B to RESOLUTION 24-06-06

Version: April 2024

2023 POWER SOURCE DISCLOSURE ANNUAL REPORT
SCHEDULE 3: POWER CONTENT LABEL DATA
For the Year Ending December 31, 2023
Power & Water Resources Pooling Authority
Standard Water Portfolio

Instructions: No data input is needed on this schedule. Retail suppliers should use these auto-populated calculations to fill out their Power Content Labels.

	Adjusted Net Procured (MWh)	Percent of Total Retail Sales
Renewable Procurements	99,934	43.4%
Biomass & Biowaste	-	0.0%
Geothermal	-	0.0%
Eligible Hydroelectric	6,230	2.7%
Solar	93,704	40.7%
Wind	-	0.0%
Coal	-	0.0%
Large Hydroelectric	118,143	51.4%
Natural gas	11,924	5.2%
Nuclear	-	0.0%
Other	-	0.0%
Unspecified Power	-	0.0%
Total	**230,001**	**100.0%**

Total Retail Sales (MWh)	**230,001**

GHG Emissions Intensity (converted to lbs CO_2e/MWh)	**45**

Percentage of Retail Sales Covered by Retired Unbundled RECs	**1.6%**

ATTACHMENT 15

COMMENTS OF THE POWER AND WATER RESOURCES POOLING AUTHORITY ON THE PROPOSED AMENDMENTS TO THE CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS

ATTACHMENT A to RESOLUTION 25-06-06

Zero Carbon Water Portfolio	Portfolio Totals	PCL Data
Retail Sales	51326	
Total Specified	51326	
Biomass & Biogas	0	0%
Geothermal	0	0%
Eligible Hydroelectric	0	0%
Solar	15270	30%
Wind	0	0%
Large Hydroelectric	36056	70%
Nuclear	0	0%
Emerging Technologies	0	0%
Other	0	0%
Natural Gas	0	0%
Coal & Petroleum	0	0%
Unspecified Power - ACS	0	
Unspecified Power - Spot Market	0	
Unspecified Power - Total	0	0%
Total PCL GHGs (MT CO_2e)	0.0	
Emissions intensity (MT CO_2e/MWh)	0.000	
PCL GHG Intensity (lbs CO_2e/MWh)		0
Unbundled REC %		0%

ATTACHMENT B to RESOLUTION 25-06-06

Standard Water Portfolio	Portfolio Totals	PCL Data
Retail Sales	240388	
Total Specified	240388	
Biomass & Biogas	0	0%
Geothermal	0	0%
Eligible Hydroelectric	4501	2%
Solar	47928	20%
Wind	0	0%
Large Hydroelectric	167253	70%
Nuclear	0	0%
Emerging Technologies	0	0%
Other	0	0%
Natural Gas	20706	9%
Coal & Petroleum	0	0%
Unspecified Power - ACS	0	
Unspecified Power - Spot Market	0	
Unspecified Power - Total	0	0%
Total PCL GHGs (MT CO_2e)	12256.0	
Emissions intensity (MT CO_2e/MWh)	0.051	
PCL GHG Intensity (lbs CO_2e/MWh)		112
Unbundled REC %		1%