



## City Council Staff Report

**From: City Manager**  
**Report Type: ACTION ITEMS**  
**Lead Department: Utilities**

**Meeting Date: June 17, 2024**  
Staff Report: 2405-2996

### TITLE

Approve Retention of the Current Western Area Power Administration (WAPA) Hydroelectricity Base Resource Contract Allocation From 2025-2030; CEQA Status: Not a Project.

### RECOMMENDATION

The Utilities Advisory Commission and staff recommend that the City Council keep the City of Palo Alto's full share of its allocated hydroelectric resource under the current hydroelectricity supply contract, the 2025 Base Resource Contract from Sierra Nevada Region of the Western Area Power Administration (2025 WAPA Contract), as approved by Council in February of 2021 ([Staff Report #11679](#)<sup>1</sup>).

Note: No action from City Council is required to remain in the contract at the current resource allocation percentage (12.06299%). Staff will revisit project financial impact in 2029 and make a recommendation for the period of 2030 through 2034. The decision to reduce the contract allocation or terminate the contract will be revisited every five years until the last termination opportunity in 2049.

### EXECUTIVE SUMMARY

In 2021 the City Council approved the 2025 WAPA Contract, which allocates to the City a 12.06299% share of the WAPA contract's base resource generation from 2025-2055. As negotiated, the City has the option to reduce its allocation or terminate the 2025 WAPA Contract until June 30, 2025. The current decision is whether to maintain, decrease, or exit our hydroelectricity supply contract with WAPA for the years 2025 – 2030. If the City chooses to keep this contract in the electricity supply portfolio at the current allocation percentage, there will be an opportunity to reduce or eliminate the City's resource allocation share again in 2029, and every five years until the contract terminates in 2054. Exiting the contract or reducing the

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<sup>1</sup> Staff Report 11679 <https://www.cityofpaloalto.org/files/assets/public/v/1/agendas-minutes-reports/reports/city-manager-reports-cmrs/year-archive/2021/02-01-21-id-11679.pdf>

contract allocation share is a permanent decision through the remaining duration of the contract (2054).

Extensive analysis was completed to support this recommendation to extend the full share of contract, which will continue to provide approximately 40% of the City's current electricity supply. The recommendation to keep the hydroelectric contract is driven by high market electricity prices, improved project cost control, and greatly improved operational flexibility of the project. City of Palo Alto Utilities (CPAU) is working alongside WAPA to increase flexibility of the hydroelectric resource, to mitigate risks to the project, and to improve value in the rapidly changing electricity markets of the Western U.S.

Staff would like to highlight exceptional efforts over the last eight years by federal staff at both WAPA and U.S. Bureau of Reclamation (USBR) who have worked with power customers to increase project flexibility while lowering costs. This continued partnership with power customers helps to mitigate the risks and uncertainties inherent in the contract.

## **BACKGROUND**

CPAU has been a power customer of the USBR and WAPA since 1960. The City signed the current contract in 2000 (CMR 378:00, [Resolution 8007](#)<sup>2</sup>) which began delivering hydroelectric power to the City in 2005 and would terminate if not extended by December 31, 2024. The City Council approved the 2025 WAPA Contract extension in 2021 after nearly seven years of negotiation ([Staff Report #11679](#)<sup>3</sup>). This 2025 WAPA Contract extension runs from 2025-2054 unless the City decides to reduce its resource allocation percentage or exit the contract. The City can choose to reduce its resource allocation or exit the contract before June 30, 2024, and then may reconsider every five years thereafter for duration of the 30-year extension, assuming the City remains in the contract through the full extension term. Therefore, while this is potentially a 30-year extension, any decision to remain at the City's current resource allocation percentage is only binding for the next five years from January 1, 2025 to December 31, 2029. Most renewable and hydroelectricity contracts require a ten to twenty-year commitment, so the opportunity to reduce or end the contract every five years is a somewhat rare flexibility. A decision to reduce the City's allocation percentage or terminate the agreement will be permanent for the remainder of the 30-year extension period.

In 2020 WAPA completed a cost-of-service study which found that power customers such as the City had overpaid over the lifetime of the project since 1930. WAPA has been returning overpaid funds to the City and other power customers since 2021 and that will continue through 2030,<sup>4</sup> and if the City exits the contract in 2025 then overpaid funds will not be reimbursed to the City.

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<sup>2</sup> Resolution 8007 <https://www.cityofpaloalto.org/files/assets/public/v/1/city-clerk/resolutions/reso8007.pdf>

<sup>3</sup> Staff Report 11679 <https://www.cityofpaloalto.org/files/assets/public/v/1/agendas-minutes-reports/reports/city-manager-reports-cmrs/year-archive/2021/id-11679.pdf>

<sup>4</sup> WAPA's financial limitations do not allow return of funds by 2025.

The contractual costs have been estimated by WAPA and USBR to be about \$9M in 2025 escalating to about \$11.5M in 2030. Contractual costs are not fixed, but WAPA and USBR aim for cost stability year to year.

The 2025 WAPA Contract governs a hydroelectricity resource which comes almost entirely from the Central Valley Project. The Central Valley Project is a federal water storage and conveyance project consisting of twenty reservoirs, ten generating power plants, three pump stations, and 643 miles of canals. The Central Valley Project can generate up to 2,000 MW and delivers about seven-million-acre feet of water 500 miles south each year. Most of the water delivered irrigates agriculture in the southern part of the California Central Valley. As a reference this is equivalent to moving water from Jamestown New York, on Lake Erie, to Spartanburg South Carolina. Figure 1 shows the entire project spanning much of California. Figure 2 shows a simplified diagram of the Central Valley Project focused on the reservoirs, power plants and pumping stations. CPAU currently purchases about 12% of the Base Resource hydroelectricity, which is the surplus electricity from the project and amounts to about 65% of the total generation of the Central Valley Project.

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Figure 1. USBR Map of Central Valley Project- By Shannon1 - Own work, CC BY-SA 4.0,  
<https://commons.wikimedia.org/w/index.php?curid=47015188>

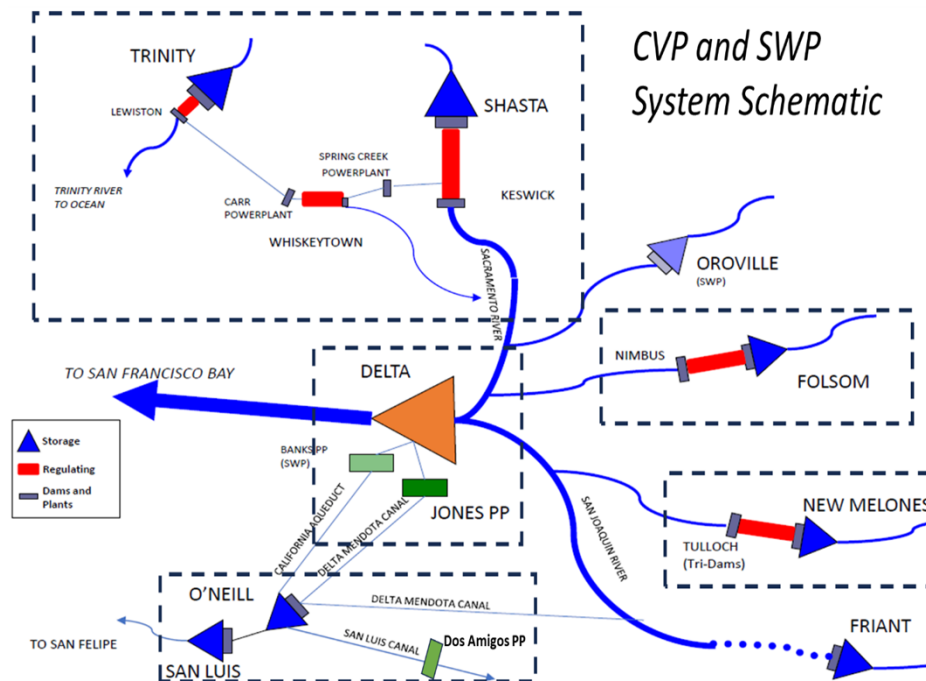


Figure 2. Simplified diagram of the Central Valley Project (CVP). A few State Water Project (SWP) units are shown when they are closely integrated or shared with the CVP. Credit: Cary Fox, USBR 2024

## ANALYSIS

To determine whether or not to recommend keeping the status quo under this contract extension, modeling with Ascend Analytics energy software as well as a broader uncertainty and sensitivity analyses was completed. Supplemental sensitivity and uncertainty analysis was performed to illustrate the magnitude of the uncertainties and to verify the Ascend model results with more conservative assumptions.

### Ascend Analytics Analysis

Staff and the Ascend Analytics team completed robust analysis of the energy value under the 2025 WAPA Contract, using hundreds of Monte Carlo simulations<sup>5</sup> comparing WAPA to other resources and variable forward-market prices. Several large community choice aggregators use Ascend Analytics tools for valuation of electricity supply contracts as it is considered one of the best-in-class tools currently available.

Ascend uses current market prices along with planned transmission projects and generation projects to create a custom market price forecast for the California ISO area. These price forecasts by region within the California ISO are then used to generate project-specific price forecasts at

<sup>5</sup> Monte Carlo simulations are used to model the probability of different outcomes when a number of the inputs in models have large uncertainties associated. It is a technique used to understand the impact of risk and uncertainty.



each ISO node. This nodal price granularity provides improved accuracy for project revenue projections.

The model dispatched the hydropower from the 2025 WAPA Contract realistically, respecting hourly maximum and minimum constraints (which change daily but, were modeled by a representative day per month) and then shaping the output around the highest priced hours. The modeling implemented monthly and annual total energy constraints which were tied to the precipitation of that year. Modeling also swept a broad modeling space with large variations in precipitation each year and a large range of forward-market electricity prices to reflect the current unpredictable conditions to assist in studying the range of possibilities.

### **Supplemental Sensitivity and Uncertainty Analysis**

The primary purposes of the supplemental analyses were to explore a broader set of uncertainties, and more conservative scenarios than were considered with Ascend. The supplemental analyses performed by staff included:

- Input lower energy prices since forward-market prices have come down since last year when the IRP modeling was completed, and explore sensitivity of results to a broader range of prices
- Quantify the impact of highly variable precipitation as an explicit cost adder of the project as the variable generation (steady costs are an intrinsic cost of the current 2025 WAPA Contract)
- Quantify the cost to the City's electricity portfolio of the seasonal mismatch of generation from WAPA, which generates in the spring and summer, versus the City's electric portfolio needs, which are mostly in the fall and winter
- Quantify the cost adder due to the inaccurate month-ahead forecast from WAPA
- Map the magnitude of uncertainties that should be planned for via hydroelectricity reserves if City keeps its status quo allocation under the 2025 WAPA contract
- Map the sensitivity to each of the additional costs and potential regulatory risks.

### **Supplemental Costs Included in Analysis**

Actual costs of the 2025 WAPA contract in the City's electric utility resource portfolio are greater than the contractual costs, due to: the hydrologic variability which we self-insure against and partially pass through to customers (via the large hydro adder), the high cost of supplemental energy in dry years, and the cost monthly forecasting errors. These and other costs are described in more detail below and are included as intrinsic costs to the project.

#### **Cost of precipitation variability:**

- The structure of the 2025 WAPA Contract is that CPAU must pay fully for the contracted allocation amount, no matter how much energy is generated. This means CPAU pays an extremely volatile price per unit of electricity from year to year given the extreme swings from wet to dry years in California. For example:
  - o In 2022 CPAU received about 20% of long-term average generation expected

- In 2021 CPAU received about 50% of long-term average generation expected
- Back-to-back dry years and extreme multi-year droughts are becoming more common in California, which effectively increases the reserve funds CPAU needs to self-insure against precipitation variability through the Hydroelectric Stabilization Reserve. CPAU limits the self-insurance costs by accepting some level of volatility in electricity rates, as CPAU passes through to customers some costs in Hydro Rate Adjustment surcharge.

Cost of seasonal mismatch with CPAU electric portfolio:

- WAPA delivers electricity mostly in the Spring and Summer, when CPAU's electric portfolio already has a surplus, requiring CPAU to sell power from other projects during low price seasons, and purchase market power during higher priced Fall and Winter to comply with risk management guidelines. The seasonal mismatch to CPAU's electric portfolio is quantified and included additional cost to capture the full cost of keeping the 2025 WAPA Contract.

Cost of month-ahead forecast errors:

- Poor forecasts add cost and exposure to the day-ahead market if the energy is not delivered as expected for the current month. The month-ahead forecasts from WAPA have been shown to have persistent inaccuracies due to the operational complexity of the project and the reservoir, streamflow, temperature, dissolved oxygen, and pumping requirements. This cost is quantified and included in staff's analysis.

**Supplemental Uncertainties Included in Analysis**

- Exploring a broader range of low power prices similar to 2019 power price levels as an additional conservative sensitivity analysis
- Additional environmental costs which could be added to the contract cost analysis in the future under some interpretations of the Central Valley Improvement Act
- Lower generation from the project from both climate change and additional environmental constraints which would lower absolute generation which could be implemented as part of federal and state proceedings
- Lower value generation from more generation being shifted into spring months with lower value from both reduced snowpack and additional environmental constraints being considered at the state and federal level

**RESULTS**

Overall, the 2025 WAPA Contract competed favorably under the large majority of scenarios explored, due to the dispatchable nature of the hydroelectricity. The improved dispatchability allows the project to generate in the late evening hours of the summer and even to some extent year-round as the overbuild of solar generation causes shortfalls of dispatchable power in the evening hours. The new flexibility of the project benefits from the increasing seasonal and hourly volatility from surplus solar in California. USBR operators are currently cycling pumped storage within the day to capture additional power revenues, backing down generation and spilling water

over dams to capture negative prices, and pumping during the middle of the day to capture negative prices. These operational improvements are new in the last few years and are saving millions of dollars per year to CPAU and other power customers.

### **Results of Analysis with Ascend Analytics**

The WAPA contract was chosen over competing resources in nearly every scenario of hundreds designed by staff and run by Ascend Analytics. The WAPA contract also had a positive net energy value in nearly every scenario. Some important caveats to these Ascend results are that the forward-market energy prices were very high last year, and that the supplemental cost of the inaccuracy of the month-ahead forecast were not explicitly added to the cost of the WAPA electric product.

### **Results of Supplemental Uncertainty and Sensitivity Analysis**

The results of the additional uncertainty and sensitivity analysis are shown in Figure 3. Key takeaways are that the uncertainties are large especially in the latter years, but overall, the 2025 WAPA Contract will likely have a positive net value to CPAU.

The largest drivers of the positive net value are high market electricity prices and the higher likelihood of better than average generation in 2025 and 2026. The probability of relatively high hydroelectricity generation in 2025 and 2026 is due to the very high precipitation in 2023 and the average precipitation 2024.

The primary drivers of the decreasing value over time are the increasing chance of dry years over the next five years, increasing costs, and decreasing power market prices. Current market price forecasts expect prices to decline from today through 2030, and each forecast for several months has slightly accelerated this projected decline.

The largest drivers of uncertainty are the variability of power prices, variability of precipitation, and regulatory risks to the amount and timing of generation.

The magnitude of uncertainty one year out into the future is approximately \$7-\$15M. With climate change increasing the likelihood of multiyear droughts in the future, CPAU may need to consider increasing the hydro reserve fund to ensure rate stability.

### **Alternatives Analyzed**

The modeling using Ascend Analytics energy software compared WAPA to several alternatives. This modeling showed that overall WAPA outperformed other available carbon-free electricity resources in the Western US. Internal additional analysis confirmed that WAPA is most likely less expensive and more resilient to emerging risks (increasing volatility, lower average prices) than all other carbon-free electricity sources currently available. These advantages were maintained even accounting for climate change uncertainties with large hydroelectric. If CPAU electricity load grows, we may consider local round-the-clock resources for additional diversity as our current portfolio is heavy in remote hydroelectric and solar resources. Staff have



assessed that the marginal diversity benefit of decreasing our exposure to hydroelectricity by decreasing the WAPA contract is far outweighed by the flexibility and cost of the WAPA resource.

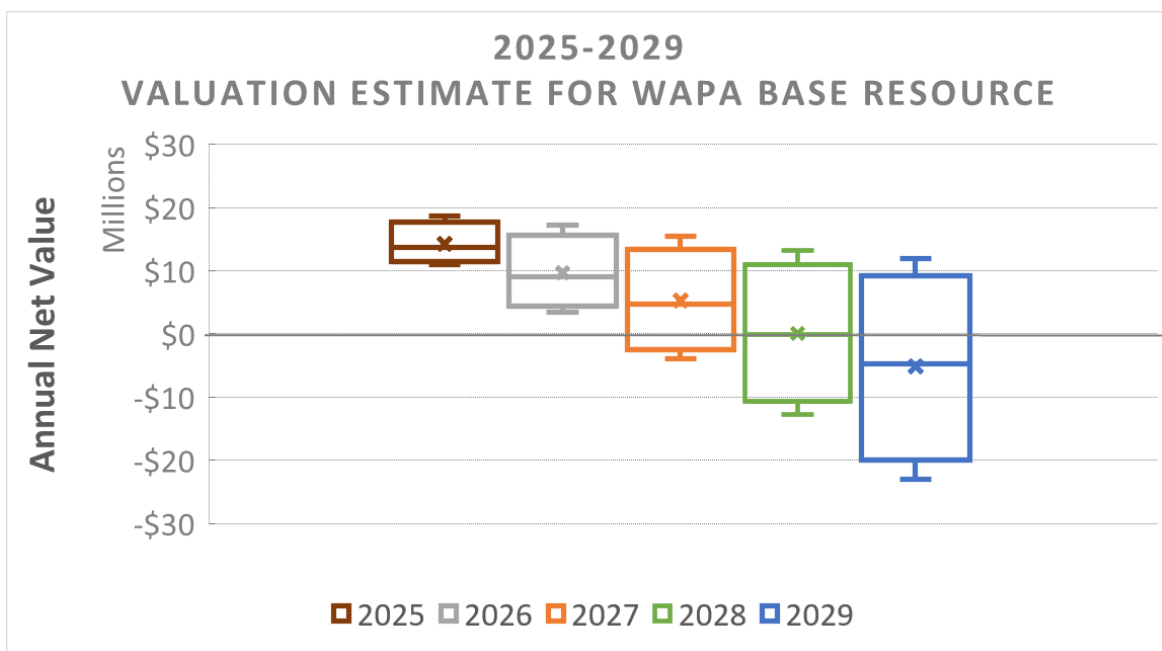


Figure 3. Results of the supplemental uncertainty and sensitivity analysis for years 2025-2029.

### FISCAL/RESOURCE IMPACT

Although there is a great deal of uncertainty due to regulatory risks and precipitation uncertainty, CPAU is expected to save money in aggregate over the next five years by retaining the resource. The annual costs are estimated to be \$9M in 2025 and escalate to approximately \$11.5M in 2029. Alternatives to continuing with the 2025 WAPA Contract are likely substantially more expensive in the next two to three years. There are larger risks and uncertainties associated with the project in the latter two to three years of the period analyzed (2027-2029). Staff is engaged with federal staff partners to mitigate those risks as much as possible by operational improvements and facility upgrades.

### POLICY IMPLICATIONS

Keeping the current resource allocation under the 2025 WAPA Contract is consistent with the 2023 Electric Utilities Integrated Resource Plan, the Utilities Strategic Plan, the Sustainability Implementation Plans, and the City's Sustainability and Climate Action Plan (S/CAP).

## STAKEHOLDER ENGAGEMENT

Staff presented the recommendation to extend the maximum available share of the WAPA Base Resource to the UAC May 1, 2024<sup>6</sup>. UAC members asked for clarification about:

1. Why the value of the project is going down over time?
  - a. Energy prices are currently projected to go down over the 2025-2029 timeframe, meaning the revenue from this generation would also go down.
2. If it were possible to sign up for only the years where the project was projected to be profitable, such as 2025-2027?
  - a. Our current WAPA contract is a 20-year contract, and that technically this contract extension is a 30-year contract, with the option to decrease our share or terminate every five years. That flexibility to decrease or exit every five years was the result of contract negotiations.
3. What the WAPA bar chart of costs the really meant in the presentation<sup>7</sup>?
  - a. Costs in 2024 were lower than in any year since 2010. This is largely because staff had worked closely with Western to get more value from WAPA transmission charging more to their transmission customers and generating more revenue from the project by operating it more flexibly and also participating in the Energy Imbalance Market.
4. How could costs of WAPA be going down if our rates were going up?
  - a. City rates are not only driven by the profitability of our electricity supply, but also by transmission costs and reliability products such as resource adequacy, the cost of both of which is going up.

The recommendation was approved with all six UAC Commissioners in attendance.

## ENVIRONMENTAL REVIEW

The City Council's approval regarding remaining in this contract extension does not require California Environmental Quality Act review, because it does not meet the definition of a project under Public Resources Code Section 21065 and CEQA Guidelines Section 15378(b)(5), as an administrative governmental activity which will not cause a direct or indirect physical change in the environment. WAPA's 2025 Power Marketing Plan authorizing the contract has a Categorical Exclusion from National Environmental Policy Act (NEPA) review since WAPA is reallocating its existing resources and is not planning to increase its generation or transmission.

## APPROVED BY:

Dean Batchelor, Director of Utilities      Staff: Lena Perkins, PhD, Senior Resource Planner

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<sup>6</sup> <https://www.cityofpaloalto.org/files/assets/public/v/1/agendas-minutes-reports/agendas-minutes/utilities-advisory-commission/archived-agenda-and-minutes/agendas-and-minutes-2024/05-may-2024/05-01-2024-packet-v2.pdf> Beginning page 14 of the pdf

<sup>7</sup> UAC Presentation <https://portal.laserfiche.com/Portal/DocView.aspx?id=72135&repo=r-704298fc&searchid=892593e2-02da-4c35-a291-f873f79be6f4>