



CITY COUNCIL STAFF REPORT

From: City Manager

Report Type: Action

Lead Department: Utilities

Meeting Date: April 17, 2023

Staff Report: 2301-0706

TITLE

Finance Committee and the Utilities Advisory Commission Recommend the City Council Approve and Authorize the City Manager or Their Designee to Execute a Third Phase Agreement With Northern California Power Agency for the Purchase of up to 87,600 Megawatt Hours per Year of Geothermal Energy From Calpine Corporation's Geysers Power Company, LLC Over a Term of up to 12 Years for a Total not to Exceed Amount of \$76.2 Million; CEQA status: not a project under CEQA Guidelines sections 15378(a) and (b)

RECOMMENDATION

The Finance Committee, the Utilities Advisory Commission (UAC), and Staff recommend the City Council:

1. Authorize the City Manager, or their designee, to execute a Third Phase Agreement¹ with the Northern California Power Agency (NCPA) to purchase up to 87,600 MWh of renewable energy/year from a portfolio of geothermal projects owned by Calpine Corporation's Geysers Power Company, LLC, over a period of 12 years, at a total cost not to exceed \$76.2 million;
2. Authorize the City Manager, or their designee, to execute on behalf of the City all related documents or agreements necessary to administer the Third Phase Agreement that are consistent with the Palo Alto Municipal Code and City Council approved policies, including, but not limited to, collateral assignment agreements; and take any and all actions as are necessary or advisable to implement and administer the Third Phase Agreement;
3. Authorize the City Manager, or their designee, to approve and execute amendments to the Third Phase Agreement¹, as may be required from time to time, so long as the contract price and length of the agreement remain unchanged; and
4. Waive the application of the anti-speculation requirement of Section D.1 of the City's Energy Risk Management Policy as it may apply to surplus electricity purchases resulting

¹ Third Phase Agreement: <https://www.cityofpaloalto.org/files/assets/public/agendas-minutes-reports/reports/city-manager-reports-cmrs/attachments/03-07-2023-id-15051-ncpa-agreement.pdf>

from the City's participation in the Calpine contract, due to the variability of the City's hydroelectric resources and uncertainty around the City's long-term load forecast.

EXECUTIVE SUMMARY

Through a Request for Proposals (RFP) recently conducted by NCPA, the City has the opportunity to enter into a 12-year agreement to purchase renewable power from a geothermal resource owned by Calpine. NCPA has executed a power purchase agreement (PPA) with Calpine to purchase the project output (which includes renewable energy and local resource adequacy capacity), and the City and other NCPA members who have elected to participate would receive shares of the output via Third Phase Agreements with NCPA. Palo Alto's share of the 100 MW project capacity would be 5 MW for the first two years of the agreement, and 10 MW for the remaining ten years—the output of which would be equivalent to 10.6% of Palo Alto's 2021 retail energy sales.

The primary benefits of the Calpine project are: (1) the units are fully constructed and are already in operation—hence there is no project development risk; (2) geothermal resources are baseload generators, meaning they produce a nearly uniform level of energy on a 24-hour basis, which is a good match for the City's load; and (3) the units provide local resource adequacy (RA) capacity, of which the City has a significant shortage. In addition, staff has determined that the contract price and value are very competitive with other renewable energy offerings in the market, and that this contract would provide a net value to the City (i.e., its total value would exceed the cost of the contract) of at least \$13/MWh, which would be equivalent to over \$550k/year during the first two years of the contract, and over \$1.1 million/year during the remaining ten years.

BACKGROUND

SB 100 & Carbon Neutral Plan goals

As part of ongoing efforts to meet the City's Carbon Neutral Plan requirements, as well as to comply with the state Renewable Portfolio Standard (RPS) mandate of providing at least 60% of sales from qualifying renewable resources by 2030, staff pursued a PPA opportunity presented by Calpine to NCPA. Calpine is offering to sell power from a geothermal² power plant, which qualifies as an in-state "Bucket 1" renewable resource under the state's RPS requirements.

Existing RPS portfolio

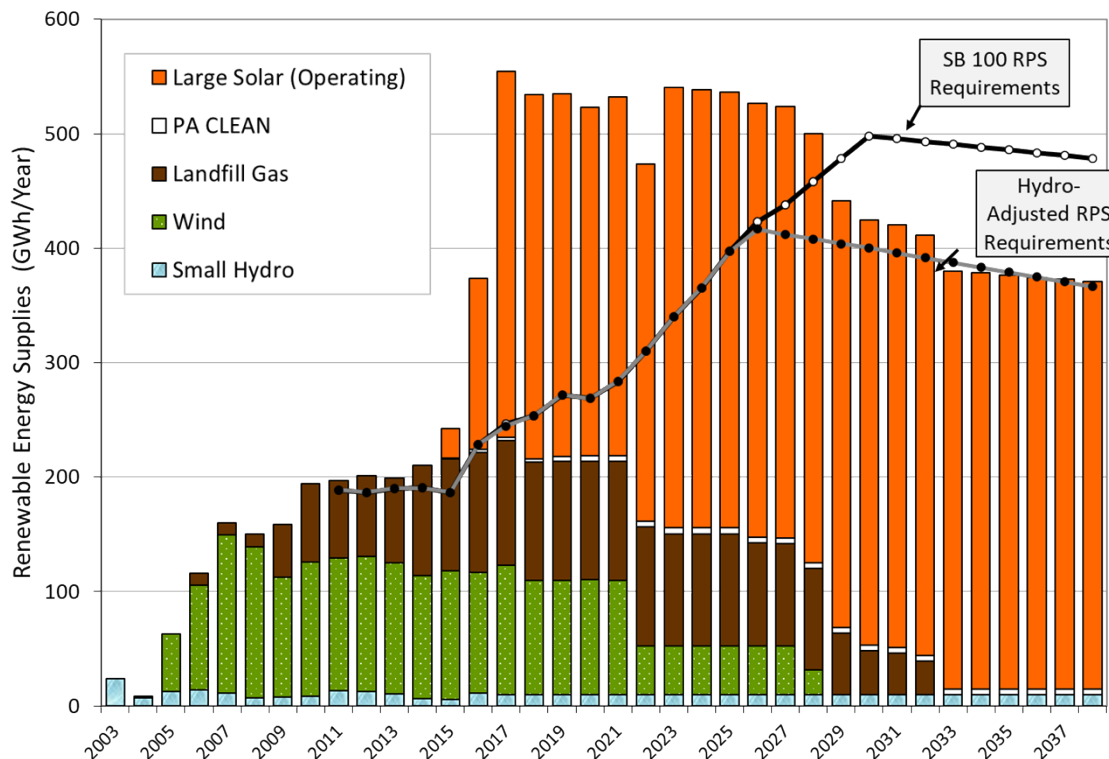
Over the past three years, the City has had an average RPS level of 63%³ and is projected to maintain a high percentage of its power from renewable resources well into the future. Figure 1 below shows Palo Alto's projected RPS requirements along with the City's existing supply

² Geothermal power plants have a small amount of carbon emissions associated with their operations from the natural release of greenhouse gases from the geysers.

³ This value refers to the total renewable energy content of the City's supply portfolio, including all of its in-state ("Bucket 1") renewable resources and its unbundled, out-of-state ("Bucket 3") renewable energy credits (RECs). For state RPS reporting purposes, the volume of Bucket 3 RECs that can be counted is limited; under this more restrictive framework the City's reported RPS level has averaged 31% over the last three years.

resources. Starting in 2029, the City is projected to have a deficit relative to its RPS requirement level (depending on the amount of large hydroelectric output the City receives⁴).

Figure 1: Palo Alto's Existing RPS Supplies and RPS Requirement Levels



ANALYSIS

The Market for Renewable Resources in California

The pricing and availability of renewable resources in California has evolved significantly over the past decade as state and federal policies have shifted the market landscape. While the trend over the last decade has been the declining cost of renewable PPAs, the last two years has seen increasing challenges to developing and building renewable projects resulting from material shortages, supply chain issues, inflation, labor shortages, and tariffs. Before 2020, the market would generally have been described as a buyer's market, however, in the last two and a half years, this characterization has shifted to a seller's market as there are more renewable buyers, increasing challenges to completing projects, and as a result PPA prices have risen from record lows.

⁴ Under the state's RPS law, utilities that receive significant amounts of generation from certain large hydroelectric facilities are able to satisfy their RPS requirements with a lower RPS level than is required of other utilities. Such utilities are only required to achieve an RPS level equal to the difference between their total retail sales volume and the amount of generation they receive from qualifying large hydro facilities.

While the downward trend in renewable energy pricing has reversed in the last couple of years, staff expects the generous subsidies included in the Inflation Reduction Act (IRA), which was signed into law August 16th, 2022, to eventually push renewable energy prices lower again. There are many details in the IRA that are being outlined by the Treasury Department, and the initial feedback from developers is that it is still too early to understand the net impact this law will have on Palo Alto's renewable resource options. Ultimately staff expects the IRA to reduce the cost of renewables. However, the consensus view in the California market is that it will likely be several years before these cost reductions materialize, given the extent of the current supply-demand imbalance and the various development challenges.

While the market prices for intermittent renewable resources such as solar and wind, and energy storage systems have fluctuated in recent years, the price for baseload firm renewable resources such as geothermal energy has remained relatively steady. The price for energy from geothermal resources is relatively high, reflecting its higher cost of development and its higher value to the electrical grid.

Results of Palo Alto's Renewable RFP (2022 RFP)

In May 2022, staff issued a Request for Proposals of new renewable and/or carbon-free generating resources and energy-storage resources. Staff's evaluation of the four conforming project proposals (all of which were for solar resources) indicated that their "green premiums" (i.e. their net cost to the City – their total value less their total cost) ranged from \$3/MWh to -\$18 /MWh. In comparison, the Calpine geothermal project's net cost is estimated at -\$3/MWh (see below for more detail on this analysis). But in the course of reviewing the four responsive proposals, staff (1) became aware of efforts at the federal level to pass significant new clean energy legislation (in what became the IRA), and (2) learned about the Calpine geothermal project proposal. As a result of these two events, staff decided to reject the four conforming proposals received through this RFP.

Calpine Geothermal Project Summary

In May 2020, Calpine submitted a proposal to NCPA's⁵ Renewables RFP for the sale of energy and associated attributes from Calpine's⁶ existing portfolio of geothermal projects located in The Geysers area of Northern California. At the time Calpine submitted its proposal, NCPA members were evaluating other lower-cost project proposals. But shortly thereafter, the price of renewable projects started to significantly increase, due to the confluence of factors noted above. So in September 2021, NCPA requested proposal updates from Calpine and the other RFP

⁵ NCPA is a not-for-profit Joint Powers Agency whose membership includes municipalities, a rural electric cooperative, and other publicly owned entities, including the City of Palo Alto. The mission of NCPA is to provide members cost effective wholesale power, energy-related services, and advocacy on behalf of public power consumers through joint action.

⁶ Calpine Corporation (Calpine) was founded in 1984 and, through its wholly-owned subsidiary GPC, is the largest owner of geothermal plants in The Geysers area in Northern California, with 725 MW of green energy capacity operating around the clock. The Geysers area is known as the world's largest geothermal field spanning an area of 30 square miles in Sonoma, Lake, Mendocino, Marin, and Napa counties.

respondents to see if their projects were still available and if there were any changes in price and/or terms initially offered. Section 2.30.340(d) of the City's Municipal Code permits the City to procure wholesale utility commodities and services through public agencies, including NCPA. After receiving the updated information, NCPA and member utility staff⁷ reviewed and analyzed the projects again and determined the geothermal output from Calpine would best diversify their renewable energy portfolios, aid them in achieving California RPS requirements, help meet their sustainability goals, and meet the needs of their expected load growth.

Over the course of 2022, NCPA staff led negotiation of a PPA with Calpine for renewable energy and RA from Calpine's Geysers geothermal facilities on behalf of the interested NCPA members. To enable NCPA to enter into the PPA with Calpine, participating NCPA members must execute a Third Phase Agreement with NCPA, which specifies the rights and obligations of NCPA and participating members regarding governance and administration of the PPA. The Third Phase Agreement also obligates the participating members to pay their assigned contract percentage share of all project costs (outlined in Exhibit A of the attached Third Phase Agreement), including but not limited to, administrative services costs, scheduling coordination costs, and all other costs related to the PPA.

Santa Clara, as the initial project participant, executed the Third Phase Agreement on December 23, 2022, which enabled NCPA to execute renewable energy and RA Agreements with Calpine for output from the Geysers geothermal facilities. As described in Exhibit A of the attached Third Phase Agreement, participating members become project participants by exercising their right to accept a transfer of a portion of the project participation percentage from Santa Clara by April 30, 2023.

In total, NCPA members have expressed interest in purchasing 100 MW of generating capacity from Calpine for a term of 12 years. Palo Alto requested up to 20 MW of this capacity, but given the demand from other NCPA members, has only been allocated 10 MW, with 5 MW starting in 2025, and 5 additional MW starting in 2027. This total geothermal capacity is expected to generate up to 876,000 MWh annually, of which Palo Alto would receive up to 87,600 MWh/year. This project will increase and further diversify Palo Alto's renewable energy portfolio in accordance with the City's adopted Integrated Resource Plan and RPS Procurement Plan. The proposed 10 MW share of the Calpine geothermal output is equivalent to 10.6% of Palo Alto's 2021 retail energy sales.

Due to increased demand for renewable energy generation resources, Calpine is limiting the amount of time it will reserve the quantity, price and terms of a PPA for prospective buyers. Therefore, staff recommends authorizing the City Manager to enter into the aforementioned Third Phase Agreement with NCPA. The benefits of the Calpine project are: (1) the units are fully constructed and are already in operation; (2) geothermal resources are baseload generators, meaning they produce a nearly uniform level of energy on a 24-hour basis; and (3) the units

⁷ The City of Alameda, City of Biggs, City of Gridley, City of Lodi, City of Lompoc, Port of Oakland, and City of Santa Clara are all expected to sign onto the Third Phase Agreement to receive output from this project.

provide local resource adequacy (RA) capacity, of which the City has a significant shortage. Unlike many other new renewable energy projects, this project doesn't carry any development risk.

Economic Assessment of Calpine Geo Contract

The Calpine Geothermal PPA is expected to provide good value to CPAU customers while also reducing the supply portfolio's seasonal energy and RA capacity deficits, thereby reducing budget uncertainty. The geothermal project provides three valuable products to the electric portfolio: energy, resource adequacy, and renewable energy credits (RECs). If the sum of these three values is greater than the cost of the power purchase agreement, then the City will see a net monetary benefit from this contract.

The primary value provided by this PPA is from the baseload energy output that the geothermal resource produces. Based on forward energy curves as of December 12, 2022, the average value of this energy is \$71.80/MWh between 2025 and 2030.⁸

In addition to the energy component, each MWh of geothermal generation qualifies as a "Bucket 1" renewable energy credit (REC), which historically has been valued between \$12-\$18/MWh. Recently, Palo Alto sold surplus Bucket 1 RECs for as much as \$25/MWh, and according to reports from independent brokers, the value of RECs has recently surged to over \$40/MWh.

Finally, the geothermal plant capacity qualifies as local RA, which the City can count towards its annual local and system RA requirements. RA is typically transacted and priced on a \$/kW-month basis and has ranged between \$6/kW-month to \$8/kW-month recently, which would translate to approximately \$8 to \$11/MWh for the geothermal project. Staff transacted for system RA at a price around \$15/MWh in October 2022, well above historical RA prices. The increase in RA prices is driven by increasing system RA requirements and reduced qualifying capacity of solar resources, leading to a market shortage of RA in high load summer months.

These benefits of the geothermal PPA in aggregate are estimated to range between \$92 to \$101/MWh against a PPA price of \$79/MWh.

With each of these revenue streams, there is a large degree of uncertainty around what will happen to future prices from changes to macro-economic conditions, regulations, interdependent regional power markets, and overall market uncertainty. That said, forward pricing curves project off-peak power prices to become more valuable than on-peak prices within the next few years, and proposed changes to the RA market rules would reward generators that produce in times of the grid's greatest need. Furthermore, under the state's RPS legislation, all load serving entities are required to increase their share of renewable energy in their portfolios (to 60% by 2030), so there is increasing demand for RECs. All of these trends support the expected long-term value of the geothermal project, given its ability to generate renewable energy around

⁸ Note that all energy prices in California have increased sharply over the past two years, not just those of renewable energy projects: Two years ago, forward energy curves pegged the value of this product at \$33/MWh, and even three months ago its value was projected to be just \$54/MWh.

the clock. The geothermal project's inability to reduce output during the sunshine hours will expose it to some lower prices, but these downsides are expected to be offset by the other trends mentioned. Staff conservatively estimates the geothermal project will provide a net benefit of at least \$3/MWh⁹, with the potential for significant upside if market prices stay high and there are further challenges to bringing new resources onto the grid in the coming 5-10 years.

Risk Management Assessment

Given this project is an existing power plant, there is no development risk, and instead only operational risk. There are some unique operational risks to running a geothermal power plant, but NCPA, which owns and manages an existing geothermal plant nearby, has confidence in Calpine's history of managing their steam fields and the plant's ability to reliably produce power over the term of the agreement.

In general, businesses in the renewable industry lack extensive financial and operational track records, and because of the capital-intensive nature of these projects, they tend to be highly leveraged as well. In contrast to most of the City's renewable energy suppliers, Geysers Power Company, LLC (the wholly-owned subsidiary of Calpine that controls its geothermal assets) is an investment-grade company (BBB/stable credit rating), as determined by Kroll Bond Rating Agency, a nationally recognized statistical rating organization, approved by the Securities and Exchange Commission. While Calpine has a higher projected default rate than the City's other (non-renewable) electric and gas suppliers, Calpine does have an excellent track record of operating a large portfolio of geothermal projects in the Geysers area over many years. And the output for this project will come from a collection of Calpine's resources in this area, so even if there are problems with one or two resources there is very little risk that the City will not receive the contracted volumes of output. To further mitigate this risk, in the event of a credit downgrade event, Calpine will provide collateral (in the form of cash or a letter of credit), in the amount of \$2.5 million for the first two years of the contract and \$5.0 million for the remainder of the contract, which would protect the City and the other PPA offtakers in a scenario where the facilities are unable to produce the contracted output and the market price of the replacement renewable power is higher than the price of the Calpine PPA. And perhaps most importantly, under the terms of the proposed PPA the City is not at risk for paying for output that is not delivered. As with all of the City's PPAs, the City will make no payments under the PPA until energy from the project is delivered.

Palo Alto's Energy Portfolio with Calpine Geo

Under the City's Energy Risk Management Procedures, staff regularly develops procurement plans for the prompt 36-month period to mitigate the City's market price exposure. Given the supply portfolio's heavy concentration of hydroelectric and solar resources, these procurement plans typically result in staff buying market energy in the fall/winter months and selling surplus

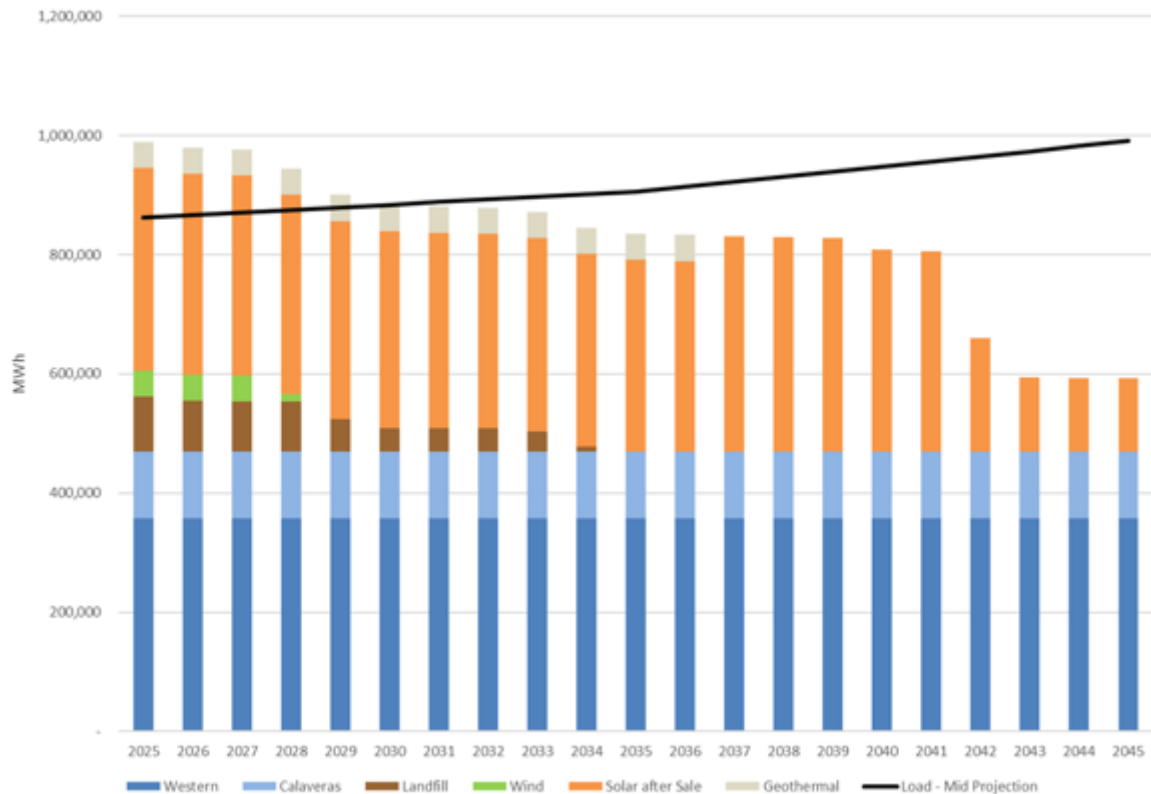
⁹ The conservative net value estimate of \$3/MWh is based on the lower-end estimates of the value of the project's RPS and RA products (\$12/MWh and \$8/MWh, respectively) and an energy value of \$62/MWh instead of \$71.80/MWh. The lower energy value estimate is equivalent to the energy value estimate of a few months ago, before the recent run-up in power and gas market prices.

energy during the spring/summer months. Furthermore, within any given day, the supply portfolio is routinely short during off-peak (nighttime) and long during on-peak (daytime) periods. This PPA would reduce the need for market purchases and increase the opportunity for market sales in the spring and summer months, depending on the level of output from the City's hydroelectric resources.

The existing supply portfolio¹⁰ is projected to have an overall surplus position from 2025 through 2028 even without entering an agreement for the geothermal project, as shown in Figure 2 below. The load forecast shown in Figure 2 is based on the mid-range scenario presented at the December 2022 UAC meeting, which includes modest load growth from data centers, electric vehicles, and building electrification. The hydro generation estimates are based on long term historical averages, which have been significantly higher than actual generation in the last few years during the drought. However, as noted in the December UAC meeting discussion, there is significant uncertainty around both the load and hydro generation projections shown here. Staff recently learned about commercial development plans that could result in significantly greater data center load within the next few years; meanwhile, the impacts of climate change are likely to significantly reduce the long-term level of hydro generation. Combined, these two factors could flip the portfolio's overall surplus positions of the next few years to deficit positions.—In light of this uncertainty, staff recommends waiving the anti-speculation requirement of the City's Energy Risk Management Policy for this agreement.

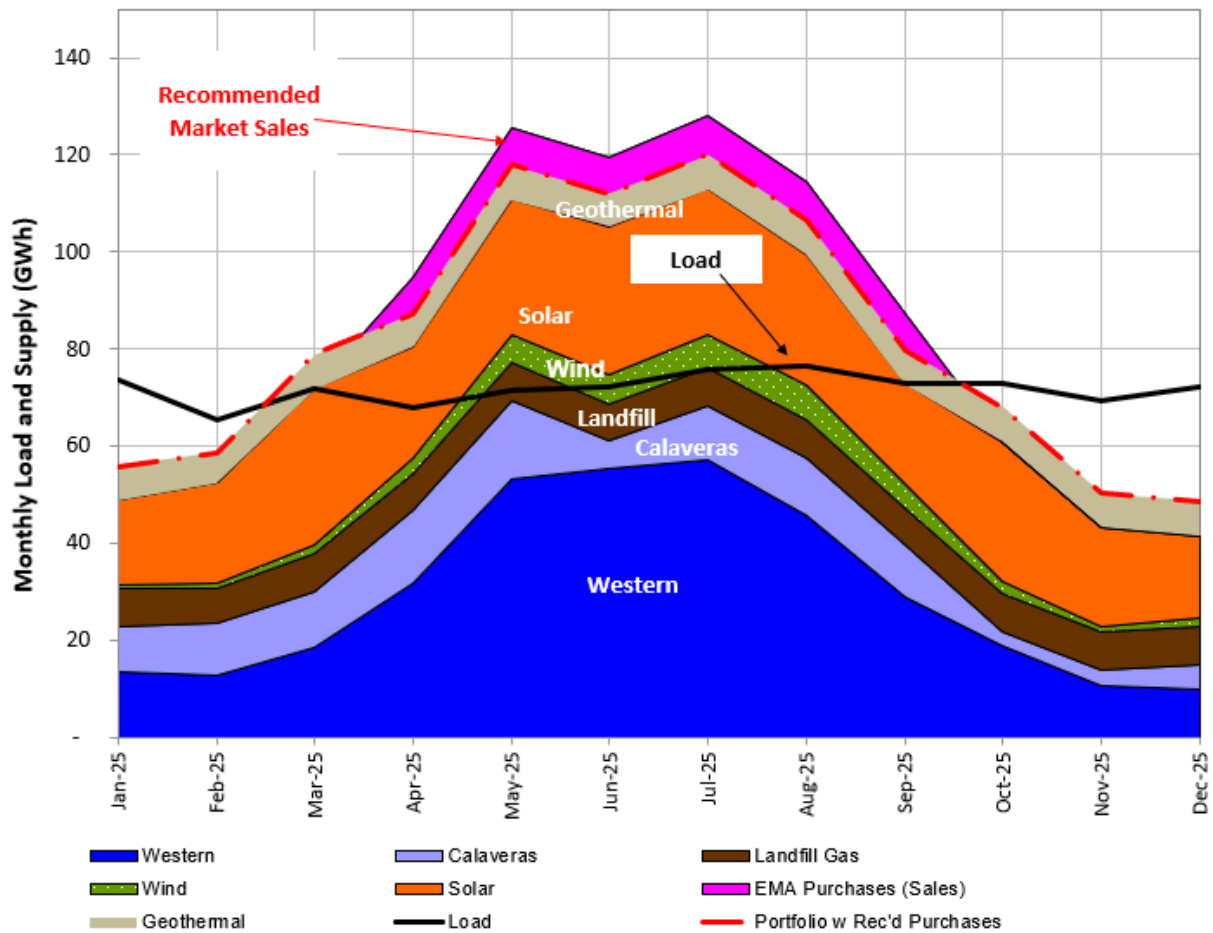
¹⁰ All six of the City's solar PPA extend to 2040 or later, while the landfill gas PPAs expire between 2026 and 2034. The City has one remaining wind PPA which expires in June 2028. Furthermore, the City can renew the Western Base Resource contract for a new 30-year term that would start in 2025, and for planning purposes it is currently included in the supply portfolio baseline assumptions. Lastly, the City owns its share of the Calaveras project and it is therefore expected to remain in the portfolio indefinitely.

Figure 2: Projected Annual Load-Resource Balance, 2025-2045



While the supply portfolio, on average, has an overall surplus position in any given year, the portfolio is short during the 1st and 4th quarters of the calendar year given the seasonal generation from hydro and solar. Additionally, the portfolio is generally short during the non-solar (off-peak) hours. Monthly and daily load resource balance charts are shown in Attachments B and C. The geothermal project is a baseload power plant that produces electricity evenly across the day and year. Given the portfolio is currently projected to have surplus positions during the first few years of the geothermal PPA as shown above, staff is currently monitoring the City's actual load levels closely and will evaluate whether to sell solar energy during the 2nd and 3rd quarters (an amount equal to the total purchase amount from the Calpine project) to hedge being overly long on energy, while also improving the daily load-resource balance. Figure 3 below shows a monthly load-resource balance for the City's portfolio with both the Calpine purchase and solar energy sales included. This would balance the portfolio supply and demand more evenly across the seasons within any given year. While the City's risk management policies don't prescribe a specific load-resource balance level, staff tries to minimize the portfolio's overall exposure to the market in either direction to mitigate large supply cost fluctuations from market pricing volatility.

Figure 3: Monthly Load-Resource Balance with Geothermal Energy Purchase and Q2/Q3 Solar Energy Sale Included



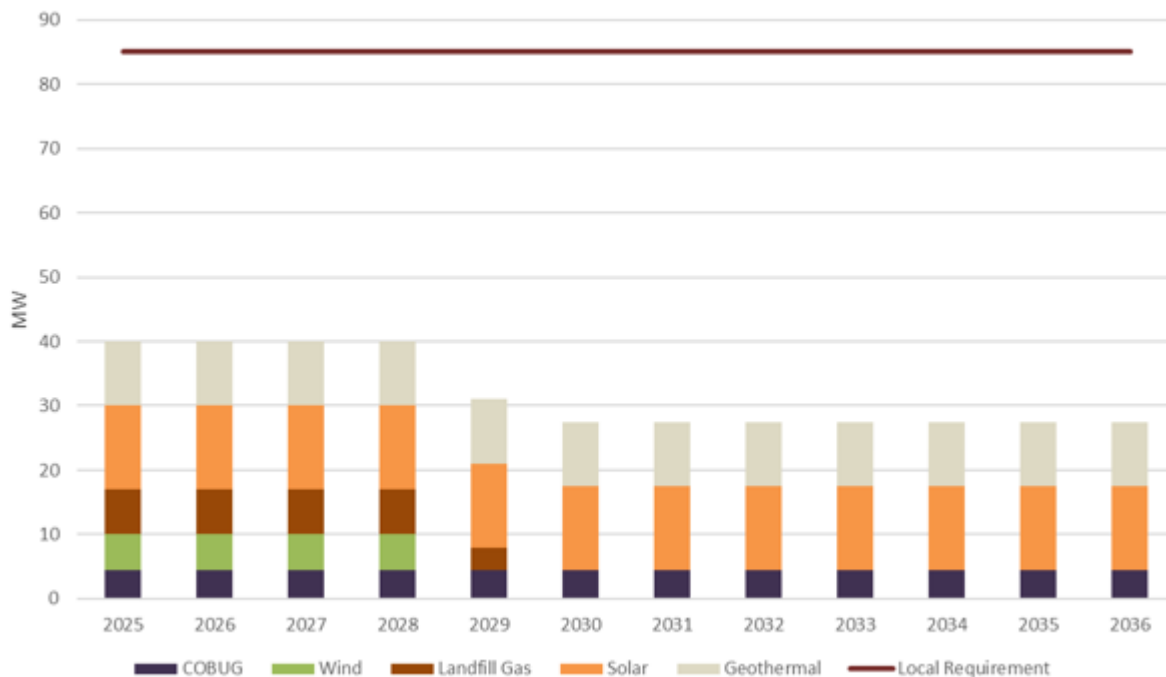
Palo Alto's Resource Adequacy Portfolio with Calpine Geo

Resource adequacy (RA) is another market that the City is required to participate in as a load serving entity in the California Independent System Operator (CAISO) balancing authority. The CAISO RA requirements dictate required levels of generating capacity the City must own or procure to meet local, system, and flexible resource requirements on an annual and monthly basis. Currently, staff manages the City's RA requirements by utilizing its own resources, participating in NCPA's Capacity Pool Program, and through bilateral transactions with other market participants.

The geothermal plant would qualify as local RA for the City, and it would also count towards the City's system RA requirements. As Figures 4 and 5 below indicate, the City has local RA deficits of approximately 50-80 MW per month, but surpluses of system RA that average approximately 80

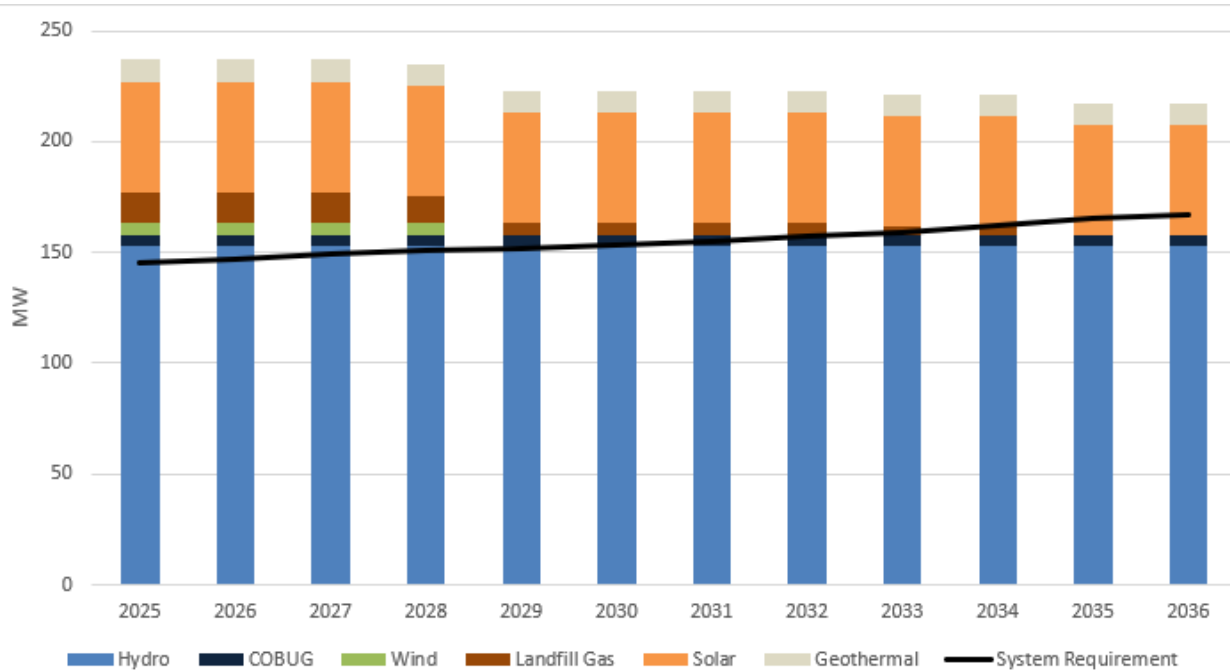
MW. This PPA would reduce the city's Local RA deficit by 10 MW and would increase the System RA surplus by an equivalent amount.¹¹

Figure 4: Annual Average Local RA Balance Forecast, 2025-2036



¹¹ While the City would retain the geothermal capacity in its own portfolio to help satisfy its local RA requirements, the addition of this contract would free up capacity from other resources (which do not qualify as local RA) that the City could sell to generate additional revenue and reduce its system RA surplus positions.

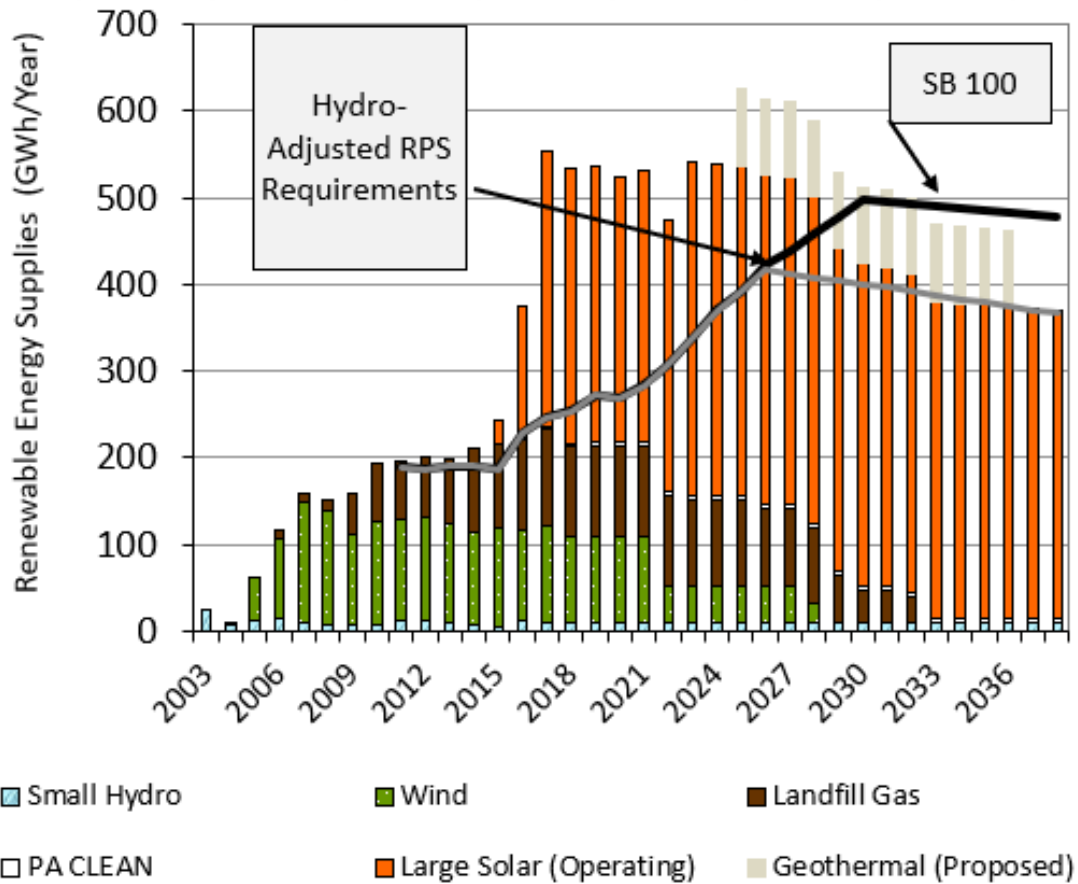
Figure 5: Annual Average System RA Balance Forecast, 2025-2036



Palo Alto's RPS Portfolio with Calpine Geo

The PPA will also increase the City's share of power being generated by renewable resources, as required by the state's RPS regulations. The City is already on track to meet state RPS targets without the geothermal PPA, so this is not a driving factor for this deal, but it would further increase the amount of Bucket 1 RECs the City is able to swap for lower-cost Bucket 3 RECs through its REC Exchange Program. (The profits earned through the REC Exchange Program are earmarked toward local decarbonization initiatives, so this contract would help the City's overall sustainability efforts.) In addition, increasing the City's RPS level provides further flexibility in the future if the City pursues a smaller share of the Western Base Resource contract.

Figure 6: Palo Alto's Existing RPS Supplies and RPS Requirement Levels, with the Calpine Project



NEXT STEPS

The NPCA Commission approved Purchase Agreements Between Geysers Power Company, LLC and Northern California Power Agency, and the Third Phase Agreement for Purchase Agreements with Geysers Power Company, LLC at its December 1, 2022 meeting. Since then, NPCA, with input from attorneys representing participating members, completed PPA negotiations with Calpine. Santa Clara has executed the Third Phase Agreement with NPCA, and as the initial project participant has been allocated the full PPA output. Once Palo Alto and other participating members obtain their governing board approvals and execute the Third Phase Agreement as well, Santa Clara will assign shares of the PPA's energy, RECs and RA capacity to participating members, adding those members to the Third Phase Agreement between NPCA and Santa Clara. Santa Clara has asked all participating members to execute the Third Phase Agreement by the end of April 2023.

FISCAL/RESOURCE IMPACT

If Council approves the execution of this Third Phase Agreement with NCPA, the City will purchase up to 87,600 MWh/year for a total not-to-exceed amount of \$6.93 million/year during the 12-year contract term (2025-2036), up to \$76.2 million. Funding for the purchase of the renewable energy will be included in the Electric Utility Fund budget beginning in FY 2025.

POLICY IMPACT

Approval of the proposed Third Phase Agreement is in conformance with the City's Sustainability and Climate Action Plan (S/CAP), Integrated Resource Plan, Carbon Neutral Plan, and RPS Procurement Plan, specifically the City's Renewable Portfolio Standard to meet at least 60% of the City's electric sales from renewable energy.

STAKEHOLDER ENGAGEMENT

The UAC reviewed staff's recommendation to recommend approval of the Third Phase Agreement with NCPA at its meeting on February 1, 2023¹². At that meeting, staff provided background on the Calpine geothermal project, the market for renewable energy in California, and the impact that the Calpine contract would have on the City's electric supply portfolio. The UAC expressed strong approval for the Calpine contract, voting 7-0 to support staff's recommendation. The UAC also encouraged staff to seek out additional opportunities to contract for new baseload renewable resources.

The Finance Committee reviewed the UAC's and staff's recommendation to approve the Third Phase Agreement with NCPA at its meeting on March 21, 2023. At that meeting the Committee asked several questions about the Calpine contract, the City's RA requirements, and staff's load projections. Ultimately the Committee enthusiastically agreed with the UAC's and staff's recommendation to support this contract and voted 3-0 to recommend that the City Council approve the Third Phase Agreement with NCPA.

ENVIRONMENTAL REVIEW

The Council's approval of the Third Phase Agreement to purchase power generated by existing geothermal generating facilities does not constitute a "project" within the meaning of the California Environmental Quality Act (CEQA) under CEQA Guidelines sections 15378(a) and (b), because there is no potential for approval of this agreement to result in a physical change in the environment, and because this is an administrative governmental activity that will not result in a physical change in the environment. These facilities already underwent CEQA review, and no subsequent or supplemental environmental review will be required as (1) there are no substantial changes to these facilities which will require major revisions of any applicable environmental impact report; (2) there are no substantial changes that will occur with respect to the circumstances under which the facilities are being undertaken which will require major revisions in any applicable environmental impact report; and (3) no new information, which was

¹² UAC Meeting Minutes, 2/1/2023: <https://www.cityofpaloalto.org/files/assets/public/agendas-minutes-reports/reports/city-manager-reports-cmrs/attachments/03-07-2023-id-15051-uac-excerpt.pdf>

not known and could not have been known at the time the applicable environmental impact reports were certified as complete, has become available with respect to these facilities.

APPROVED BY:

Dean Batchelor, Director Utilities

Staff: James Stack, PhD