

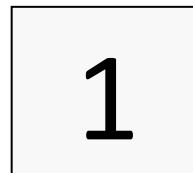
## MEMORANDUM

**TO: UTILITIES ADVISORY COMMISSION**

**FROM: UTILITIES DEPARTMENT**

**DATE: August 7, 2019**

**SUBJECT: Renewable Portfolio Standard Compliance Strategy Options for the City's Electric Supply Portfolio**



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### **REQUEST**

Staff is requesting that the UAC affirm that the following portfolio management strategies and actions are in line with UAC policy positions:

- (1) Sell renewable energy supplies that exceed the City's total load on an annual basis to reduce costs to consumers;
- (2) Pursue Council adoption of an amendment to the Carbon Neutral Plan to adopt an hourly carbon emissions accounting methodology, with average hourly grid emissions factors;
- (3) Do not consider a portfolio management strategy in which the City attempts to buy renewable energy to match its load in every hour of the year (the "Carbon Neutral every hour" approach); and
- (4) Do not consider an RPS compliance strategy that involves relying on the City's stock of "banked" RECs from previous years.

Staff intends to pursue item 1 under its existing Council authorities and is seeking confirmation that the UAC agrees. Staff will return to the UAC with a proposed amendment to the Carbon Neutral Plan at a subsequent meeting to implement item 2. Staff intends to cease consideration of the "Carbon Neutral every hour" approach and the use of banked RECs and is seeking confirmation that the UAC is comfortable with that.

Additionally, staff seeks additional UAC feedback on a staff proposal to pursue a portfolio management strategy of selling CPAU's California-based renewable energy (i.e., Bucket 1 RECs) which is not needed for RPS compliance, and purchasing lower-cost renewable energy generated outside of California (Bucket 3 RECs)<sup>1</sup>. Staff estimates that this policy could free up

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<sup>1</sup> State law has established three different categories or "buckets" of renewable energy products—and sets limits on the degree to which a utility can rely on the less preferred categories to fulfill their RPS requirements. The first category (Bucket 1), the most preferred one, encompasses all renewable energy that is delivered into the California grid as it is generated. The second type of renewable energy (Bucket 2) consists of renewable energy generated out-of-state that is used by the out-of-state grid as it is generated, and then later an equal amount of energy from a different resource is delivered into the California grid. This type of arrangement is referred to as "firming and shaping" the resource's output. The third category of renewable energy (Bucket 3) is the state's least preferred one, and also the least expensive to procure. Bucket 3 encompasses all sales of RECs without any associated energy. In these "unbundled REC" transactions, the energy is generated and consumed (usually out-of-

about \$3M per year for sustainability efforts that benefit electric ratepayers, without raising rates or increasing carbon emissions of the electric portfolio. Based on UAC feedback staff may continue analysis of this option and return to the UAC at a later date with a more formal proposal. Note that staff also considered the possibility of using this projected revenue for rate reduction, but heard feedback from the UAC at a previous meeting that reducing rates 1-2% in exchange for creating a portfolio that might be perceived as less green was not preferred.

Lastly, staff seeks UAC feedback on the possibility of reintroducing a “green rate” option for consumers.

### **EXECUTIVE SUMMARY**

This report is a follow-up to a [report](#) presented in June 2019 on the same topics—and that report was actually an extension of a similar [report](#) presented in May 2019. Together, these reports satisfy Initiatives #4 and #5 of the City’s 2018 [Electric Integrated Resource Plan \(EIRP\)](#)<sup>2</sup>, which Council approved in December 2018.

This report goes into some detail on the background behind the adoption of the City’s current policies related to carbon accounting and RPS procurement. It then describes several different procurement strategies that the City might pursue in order to comply with its state RPS requirements—though a narrower set of options than staff presented in the June 2019 report—along with the financial impact to the utility of changing from its current RPS compliance strategy. Also presented are the implications for the City’s carbon emissions associated with these RPS compliance strategy options. Staff sees one RPS compliance strategy, selling renewable energy that exceeds load (and which are not needed for maintaining carbon neutrality under an hourly accounting framework), as clearly worth pursuing. This strategy results in an average annual savings of \$1.2 million per year over the next twelve years (or about 0.13 cents/kWh, equivalent to a 0.7% rate change). A second strategy, selling renewable energy in excess of state RPS requirements, merits more discussion and analysis, but could free up an additional \$1.9 million per year to devote to carbon reduction programs that benefit electric ratepayers over the next twelve years without increasing portfolio carbon emissions.

Finally, staff seeks UAC validation of the four strategies and actions listed above that appeared to garner consensus at the May and June 2019 UAC meetings.

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state) but the RECs are sold separately to a California utility. Technically Bucket 3 RECs can be located in California, but virtually all Bucket 3 RECs are generated outside the state.

<sup>2</sup> Initiative #4 of the Work Plan called for staff to evaluate the carbon content of the electric supply portfolio using hourly grid emissions intensity data, to consider the merits of buying carbon offsets to ensure the carbon content of the cumulative hourly portfolio is zero on an annual basis, and to reevaluate the manner in which the City communicates with customers about the carbon content of the electric portfolio. Initiative #5 of the Work Plan called for staff to investigate the merits of monetizing the City’s excess renewable energy supplies in order to minimize the cost of maintaining an RPS compliant and carbon neutral electricity supply portfolio.

## **BACKGROUND**

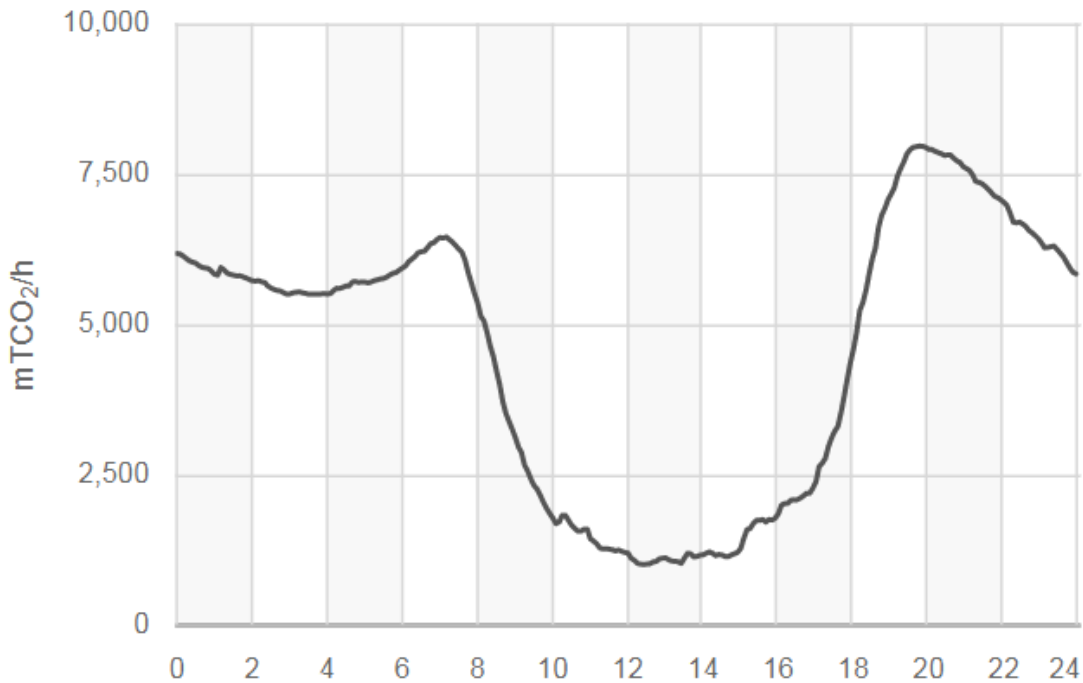
Over the past two years, staff has shared numerous presentations with the UAC related to the electric supply portfolio in the course of developing and implementing the 2018 [Electric Integrated Resource Plan \(EIRP\)](#). In the course of these discussions, UAC commissioners have clearly articulated two points. First, the UAC would like staff to pursue a supply portfolio that minimizes total cost to customers, while also minimizing carbon emissions. While in the past the City's goal was to increase the amount of renewable energy in its portfolio (its RPS level), the fact that City has reached carbon neutrality has led the UAC to recommend pursuing a policy of maintaining carbon neutrality going forward while calculating the portfolio's carbon impact based on hourly and seasonal grid emissions. This point was made most clearly in December 2017, when staff delivered a [report](#) to the UAC on potential changes the City could make to its strategy for complying with its Renewable Portfolio Standard (RPS) and Carbon Neutral Plan objectives.

And second, the UAC wants staff to communicate with the public about the supply portfolio in a manner that is both accurate and accessible. Initial discussion on this topic occurred in [June](#) and [September](#) 2018 during discussions of the EIRP. A more in-depth discussion of this topic also occurred in May 2019 during discussion of carbon accounting methodologies for the City's electric portfolio.

The May 2019 report also described a new accounting methodology being proposed by California Energy Commission (CEC) staff for quantifying emissions on Power Content Labels (PCLs) starting next year. Staff described the communications challenges that could result if the City adopts an accounting methodology that is at odds with the methodology used on the PCLs that are sent to customers every year. However, the UAC expressed a clear preference for employing an accounting methodology that most accurately represents the carbon emissions of the electric portfolio, even if it results in the reporting of two different portfolio emissions totals in some years.

When the [Carbon Neutral Plan](#) was approved by Council in March 2013, carbon neutrality was defined as a portfolio that “will demonstrate annual net zero greenhouse gas (GHG) emissions, measured at the Citygate, in accordance with The Climate Registry's Electric Power Sector protocol for GHG emissions measurement and reporting.” In effect, this means that the City's carbon neutral supplies (in megawatt-hours (MWh)) would be compared with the City's total load on an annual basis, and if they equal or exceed the load then the City's electric supply would be deemed to be carbon neutral. At the time, this accounting methodology was considered to be the most accurate accounting methodology that could be achieved—or needed. This was in part because in 2013 there was very little solar generation connected to the California Independent System Operator (CAISO) grid, and therefore the grid's average emissions factors did not vary in the extreme manner that they do today—for example, as in the emissions rate chart shown in Figure 1 below, for CAISO emissions on March 16, 2019. But, more practically, CAISO did not begin to publish grid emissions factor data with sub-annual granularity until 2018, and therefore a more granular accounting methodology was not feasible at that time.

**Figure 1: CAISO Average CO<sub>2</sub> Emissions Rates for March 16, 2019**



The City also has a state-mandated RPS procurement policy (from [Senate Bill 100](#)) separate from the Carbon Neutral Plan. The last time the Council formally considered a significant change to these policies was in [April 2012](#)—at a time when the City’s RPS level was approximately 20%, and it had no large-scale solar generation in its portfolio. The modification that Council made to the City’s RPS policy in April 2012 was to clarify that the City’s then RPS target of 33% was a floor, not a ceiling, and that staff should continue to pursue additional renewable energy supplies until it reached the 0.5 cent/kWh rate impact limit on such purchases. In pursuing this policy staff achieved the current RPS levels. Due to long-term permanent load reductions in recent years, RPS-eligible energy supplies (all supply sources other than hydro) are currently more than 60% of retail energy sales, and combined with the City’s hydroelectric generation, total renewable and carbon free energy is approximately 111% of load in an average hydro year.

When the UAC considered RPS procurement policies in [December 2011](#), some commissioners discussed alternative possibilities for the funds that would be required to make these purchases. One commissioner even brought up the idea of “bucket swapping” (i.e., selling the City’s Bucket 1 renewables and replacing them with less expensive Bucket 3 resources) and applying the resulting savings to other carbon mitigation measures, which is an idea that staff and the UAC have again considered recently. However, ultimately the UAC recommended pursuing additional renewable energy purchases as the most direct route to ensuring a reduction in the City’s electric supply-related carbon emissions. It should be noted, however, that this policy discussion did not consider the possibility of making renewable energy purchases in excess of the City’s load; Section B(1) of the City’s 2018 Energy Risk Management Policy prohibits buying energy not needed for meeting forecasted load. The current scenario,

where long-term permanent load reductions result in the City having regular supply surpluses, was not discussed.

## **DISCUSSION**

At the May and June 2019 UAC meetings, staff and the UAC discussed a wide range of potential changes to the City's carbon accounting methodology and renewable energy procurement strategy. At the May meeting, Commissioners expressed a strong desire to see estimates of the financial impact of any changes to the City's current approaches on these matters. The June report presented estimates of the financial effects of a broad range of potential changes to the City's carbon accounting and RPS procurement policies—as well as their impact on the City's RPS level and Power Content Label. The primary objective of this report is to enable a more thorough discussion of a narrower set of RPS compliance strategy options.

### ***Carbon Accounting Methodology Change***

In the May and June 2019 UAC reports on carbon accounting, staff presented six potential accounting methodologies:

- A. The City's Current Method (Method A) – Procure carbon neutral resources equal to total load on an annual basis. In addition, unbundled RECs can be purchased in order to make generic market energy purchases effectively carbon neutral.
- B. The Proposed Power Content Label (PCL) Method (Method B) – The CEC has proposed an accounting methodology, in order to implement Assembly Bill (AB) 1110,<sup>3</sup> that is similar to the City's current method (annual summation of resource supplies and load), except unbundled REC purchases would not be allowed to neutralize the carbon content of generic market energy purchases.
- C. Hourly Accounting Method #1 (Method C) –An hourly comparison of the City's supplies and load, with each hourly net energy value assigned the average hourly carbon emissions intensity of the CAISO grid to convert it to an hourly emissions total. These hourly emissions totals would then be summed across the hours in a year. In addition, unbundled REC purchases *would* be allowed to neutralize the carbon content of generic market energy purchases.
- D. Hourly Accounting Method #2 (Method D) – This approach is the same as Hourly Accounting Method #1, except that unbundled REC purchases would not be allowed to neutralize the carbon content of generic market energy purchases.
- E. Hourly Accounting Method #1a (Method E) – Identical to Method C, except that it uses the grid's marginal hourly emissions factors, instead of average.
- F. Hourly Accounting Method #2a (Method F) – Identical to Method D, except that it uses the grid's marginal hourly emissions factors, instead of average.

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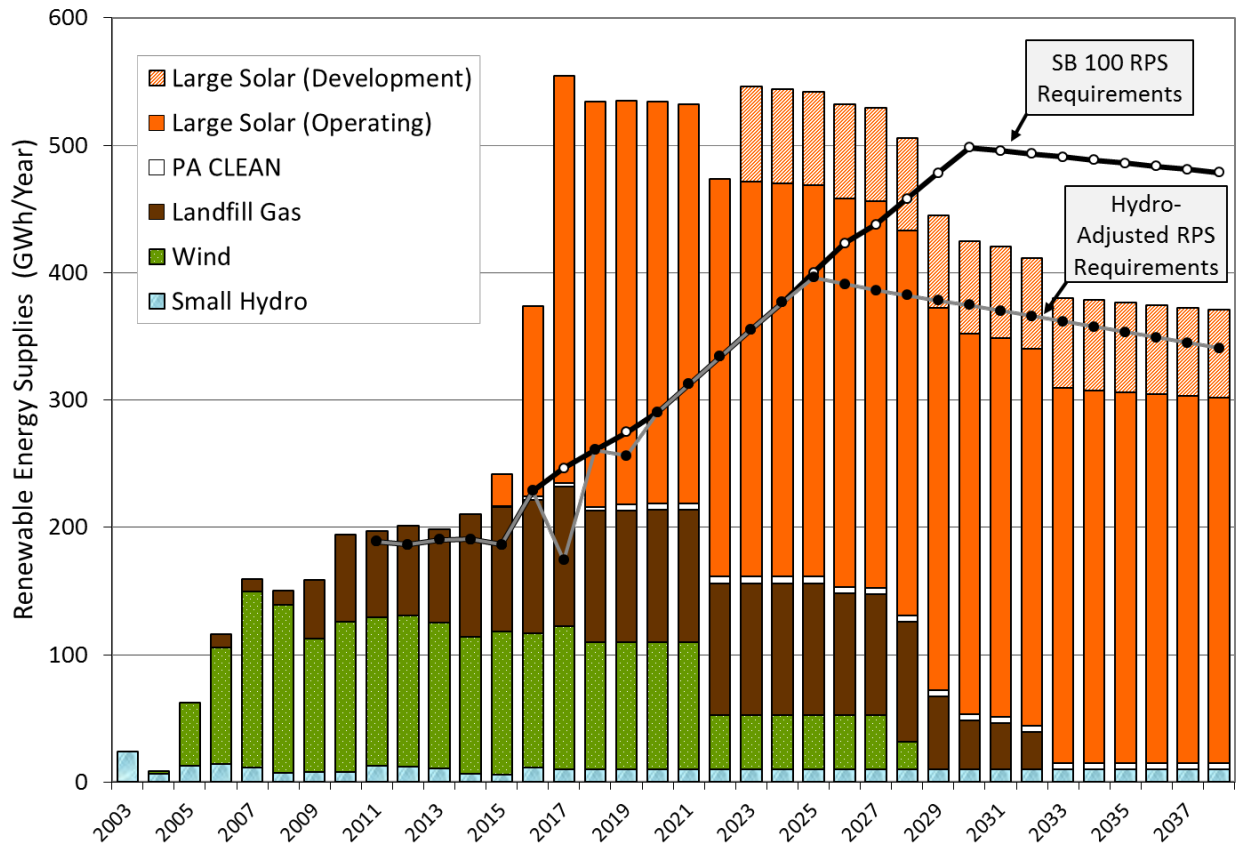
<sup>3</sup> AB 1110 (2016) requires that every load-serving entity (LSE) include an annual average carbon emissions intensity factor associated with its electricity supplies on its Power Content Label, starting with the 2019 PCL (which will be published in 2020). For details on the CEC's proposed accounting methodology, see the latest draft regulations and rulemaking documents here: [https://www.energy.ca.gov/power\\_source\\_disclosure/16-OIR-05/](https://www.energy.ca.gov/power_source_disclosure/16-OIR-05/).

After much discussion at the May and June UAC meetings, it appeared that there was consensus among commissioners that the most accurate accounting method—the gold standard for measuring the environmental impact of our electric supply portfolio—was Method C, the hourly accounting methodology using average emissions intensity values, and that this is the approach the City should use going forward. And while this methodology would hold the City’s supply portfolio up to the strictest standard of emissions reporting, assuming that the City continues to use unbundled RECs to mitigate any residual emissions that are calculated using this approach, the cost impact would be relatively small. Based on previous UAC feedback, staff intends bring an amendment to the Carbon Neutral Plan to the UAC at a subsequent meeting for recommendation to Council for adoption.

### ***RPS Compliance Strategy Options***

Since the adoption of its first RPS target in 2002, the City has consistently maintained an RPS procurement goal that exceeds the statewide RPS mandate level, all while remaining under the City’s 0.5 cent/kWh rate impact limit for renewables purchases. Figure 2 illustrates the growth in the City’s RPS supplies over the past 15 years and how these supplies compare to the statewide RPS requirements. Note that the state’s RPS procurement legislation, [Senate Bill 100](#), includes a provision that exempts municipal utilities from meeting the RPS requirement level in years when the utility has received greater than 40% of its retail sales from large hydro generation contracts that were effective as of January 1, 2018. Thus Figure 2 includes a “hydro-adjusted RPS requirement” line, showing the volume of renewable supplies that the City would need to comply with SB 100 if it retains its existing hydro supplies, including renewing the Western contract in 2025.

**Figure 2: Palo Alto's RPS Supplies and Procurement Requirements**



For calendar year (CY) 2018, as Table 1 shows, the City’s actual RPS level was 63.9%—more than twice the state’s RPS requirement for that year of 29%.

**Table 1: 2018 RPS Procurement and RPS Level**

<b>Retail Sales</b>	<b>888,033</b>
Small Hydro	13,266
Landfill Gas	110,139
Wind	101,801
Solar	342,650
<b>Renewables Total</b>	<b>567,856</b>
<b>RPS Level</b>	<b>63.9%</b>

In addition to exceeding statewide RPS procurement requirements, the City’s renewable supply portfolio is also composed entirely of higher-value in-state resources—where the environmental attribute (a Renewable Energy Certificate or “REC”) is “bundled” with the energy produced by the resource. In contrast, the state’s RPS regulations allow utilities to satisfy a portion of their procurement requirement (up to 10% of it) with lower value out-of-state resources.

The June 2019 UAC report presented a fairly broad range of potential RPS strategies that the City could pursue—some of which would significantly increase the City’s electric supply costs,

and others that would significantly decrease it. After a thorough discussion of these options at the June UAC meeting, the four RPS procurement strategies that staff believes deserve further consideration are:

- a) *Status Quo*: Maintain the current set of resources in the City’s portfolio, and continue to have a net surplus of resources on an annual basis (assuming average hydro conditions) until some of the existing contracts expire or the City’s load increases.
- b) *Sell Supplies Exceeding Load*: This approach is similar to the Status Quo approach, except staff would sell off the renewable resources that exceed the City’s annual load—provided that those resources would not be needed to maintain a carbon neutral supply portfolio as determined using an hourly accounting methodology.<sup>4</sup> Staff considers this a low-risk approach that will generate cost savings while maintaining carbon neutrality (based on hourly carbon accounting), and it intends to pursue this option under its existing authorities, unless the UAC and Council express a preference for the status quo approach of having renewable and carbon-free energy in excess of load.
- c) *Sell Supplies Exceeding RPS Requirement*: Under this approach, the City would sell off all of its currently contracted renewable resources that exceed the state’s RPS requirement level (not just those that exceed its load).<sup>5</sup> The City would also “bucket swap,” essentially trading its California-based renewable energy (associated with Bucket 1 RECs) for out of state renewable energy (associated with Bucket 3 RECs), to the extent allowable under the state’s RPS regulations. This approach is similar to the “Minimally Compliant” approach discussed at the June UAC meeting, except the City would not apply its stock of excess RPS supplies that it has built up since 2010<sup>6</sup> toward its RPS requirements in future years.
- d) *Premium Rate Option*: This approach would involve allowing customers a choice of which rate they would like to be on—with a slight price discount for those customers choosing the “Sell Supplies Exceeding RPS Requirement” option. There are also other premium rate options that the City could consider offering customers, in addition to or instead of the two listed above. For example, customers could be given a rate option where they would be assured that their electricity supply is carbon neutral every hour of the year.

At the June UAC meeting, staff also discussed a “Carbon Neutral Every Hour” approach, which would entail the most dramatic changes to the portfolio and be the most expensive to pursue. This approach would require the City to sell large volumes of its solar and wind resources, replacing them with baseload renewables, and also alter the scheduling of its hydroelectric

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<sup>4</sup> Staff’s carbon accounting analysis of calendar year 2018 indicates that the City will likely need to maintain an overall surplus of about 40,000 Bucket 1 RECs (4.5% of the City’s total load) in order to maintain a Carbon Neutral portfolio under an hourly carbon accounting approach, without resorting to purchasing additional Bucket 3 RECs.

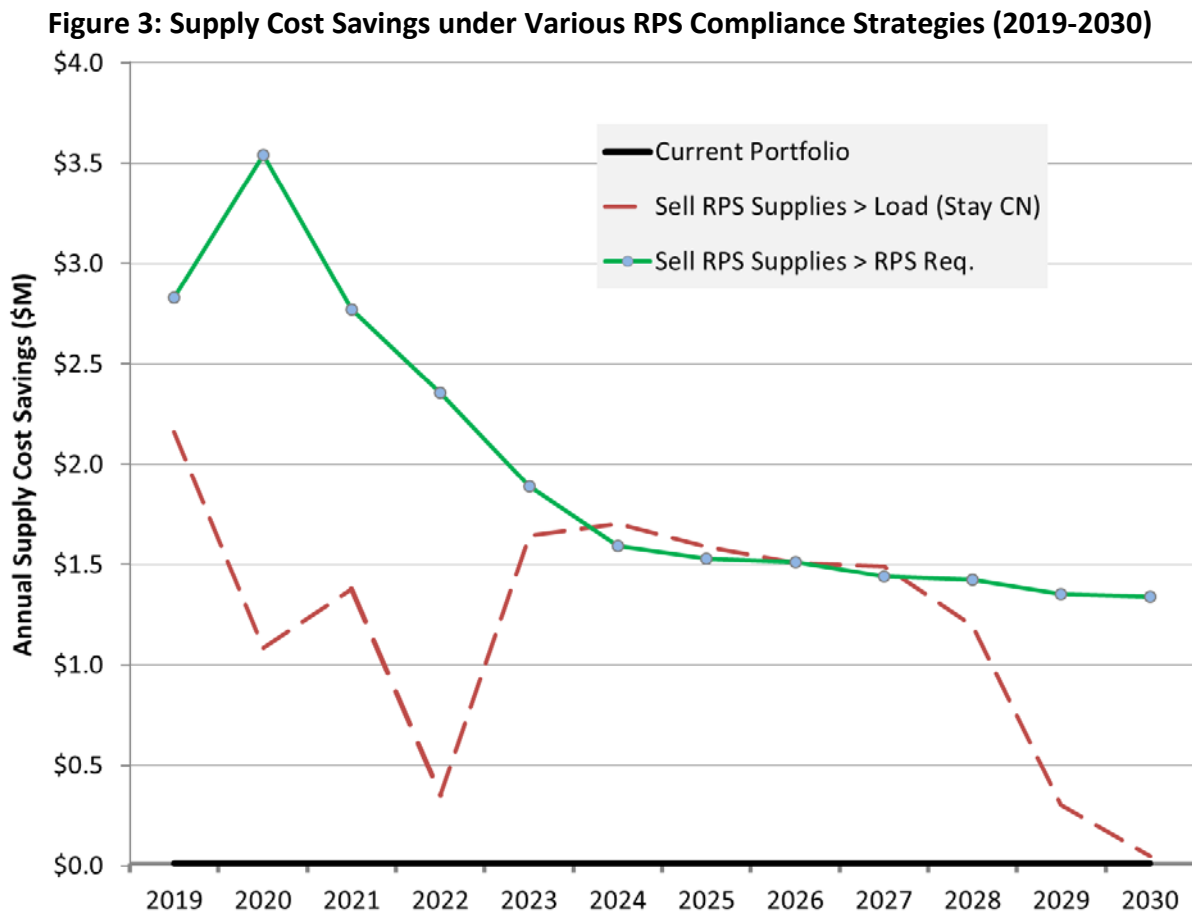
<sup>5</sup> The City would not, however, be purchasing any additional in-state renewable resources with the intent to sell them in exchange for out-of-state renewable resources. In addition to likely being a money-losing strategy, this approach would also violate the City’s anti-speculation policy.

<sup>6</sup> This refers to the “Excess Procurement” and “Historic Carryover” provisions of the City’s Renewable Portfolio Standard Procurement Plan, which was last updated and approved by Council in December 2018 as part of the EIRP approval process: <https://www.cityofpaloalto.org/civicax/filebank/documents/67789>.



resources. However, staff did not recommend pursuing this approach, and there did not appear to be any support among the commissioners for continuing to discuss it. Therefore, staff seeks confirmation from the UAC that this approach can be dropped from consideration. Similarly, staff feels that the “Minimally Compliant” strategy—which would see the City rely on its large cache of banked RECs over the next 10 years—should no longer be considered. This approach would result in the City’s annual RPS level dropping significantly below the state’s RPS requirement level over the next 10 years. RPS compliance would instead be achieved by applying all of the City’s banked RECs toward RPS compliance, rather than reserving these as a form of compliance insurance. This practice, using “excess procurement” and “historic carryover” RECs, is permitted by state RPS regulations and the City’s RPS Procurement Plan, but its use in this manner could create public perception issues.

Figure 3 below displays the annual supply cost savings (through 2030) of the “Sell Supplies Exceeding Load” and “Sell Supplies Exceeding RPS Requirement” procurement strategies. Note that the “Sell Supplies Exceeding RPS Requirement” procurement strategy line in this graph only represents the *incremental* supply cost savings associated with this approach, after the City has already sold the RPS supplies that exceed its load. Attachment A shows these cost projections (and staff’s estimates of REC costs) in more detail.



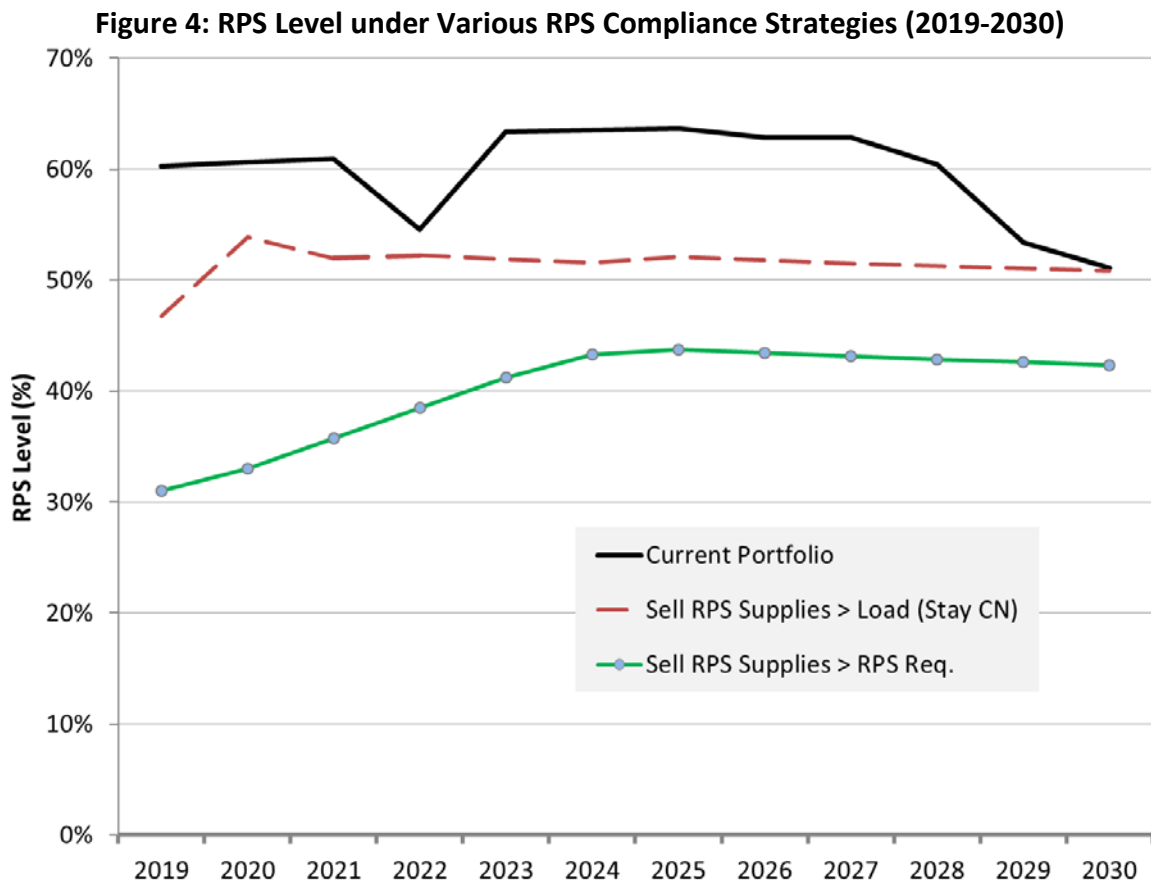
Note that the downward trend in supply cost savings over time, as well as the dip in supply cost savings for 2022, is due to the timing of existing wind and landfill gas contracts expiring during

that period (combined with a new solar contract coming online in 2023), along with the increases in the state’s RPS requirement (which ultimately reaches 60% in 2030). As these existing contracts expire over time and the RPS requirement rises, the City would have fewer excess renewable supplies to sell.

This analysis indicates that simply selling the City’s RPS supplies that exceed its annual load (while maintaining carbon neutrality under an hourly accounting standard) would reduce supply costs by an average of \$1.2 million per year, while utilizing the “Sell Supplies Exceeding RPS Requirement” approach would reduce supply costs by an additional \$1.9 million per year (on average) over this 12-year period.

As noted in the June UAC report, the City also currently has about 1.2 million banked RECs from previous years, which it is able to carry over for RPS compliance in any future period. If the City were to utilize these banked RECs for compliance over the next 12 years (and therefore sell even more of its current portfolio of resources), it would result in approximately \$2 million per year in additional cost savings. However, when this option was discussed at the June UAC meeting there did not appear to be any interest among commissioners in pursuing it, largely because it would result in the City having a real-time RPS level significantly below the state’s required level during this period. Staff seeks UAC validation that this option should no longer be considered.

Figure 4 below depicts the trajectory that the City’s annual RPS level is expected to take between now and 2030 under the first three different RPS compliance strategies listed above.



### ***Emissions Implications & Bucket 3 RECs***

The City's current portfolio, because of its significant surplus of carbon neutral resources relative to load, is expected to be responsible for *net negative* carbon emissions over the next 12 years (under average hydro conditions), under either the annual carbon accounting or an hourly carbon accounting methodology.<sup>7</sup> However, if the City sells most of its RPS supplies that exceed its load (retaining an overall surplus of supplies in order to ensure the portfolio remains carbon neutral under an hourly carbon accounting standard), the portfolio would be considered to be responsible for negative emissions under an annual accounting framework (-43 lb CO<sub>2</sub>/MWh on average over the 2019-2030 period), or exactly zero emissions under an hourly carbon accounting methodology. Similarly, if the City sold all of its RPS supplies that exceed the RPS requirement level, its portfolio would be considered to have an emissions intensity of 97 lb CO<sub>2</sub>/MWh on average over the 2019-2030 period under an annual accounting framework, or 137 lb CO<sub>2</sub>/MWh on average over the 2019-2030 period under an hourly carbon accounting methodology. Abating these emissions would require the purchase of about 129,000 RECs<sup>8</sup> at a cost of about \$193,000.

Although the state's Power Content Label regulations related to emissions reporting are not expected to recognize any emissions value associated with the purchase of out-of-state (Bucket 3) RECs, staff feels Bucket 3 RECs have significant environmental value and merit when used as a carbon mitigation tool in the City's Carbon Neutral Plan. This is based in part on the fact that, aside from the state's PCL regulations, all other industry accounting protocols recognize unbundled RECs as embodying the emissions profile of the underlying renewable generator. It is also based on a review of a large amount of academic research into the value of unbundled RECs—which indicates that trading RECs across state lines can reduce overall electricity costs without having a negative impact on overall carbon emissions in the region. Attachment B has much more detail on the relative environmental value of out-of-state and in-state RECs.

Although staff is confident that the carbon emissions associated with the "Sell Supplies Exceeding RPS Requirement" approach should be considered zero (with the purchase of some Bucket 3 RECs), the state's Power Content Label regulations are expected to require the City to report emissions associated with that portfolio. Beginning in 2020, the City is required to report the emissions associated with its electric supply on a Power Content Label every year (per AB 1110). Figure 5 below depicts the average supply portfolio carbon emissions intensities that the City would be required to report on its annual PCL between now and 2030 under the three different RPS compliance strategies listed above (assuming the state's draft PCL regulations are adopted). Note that the carbon accounting methodology that is expected to be required for

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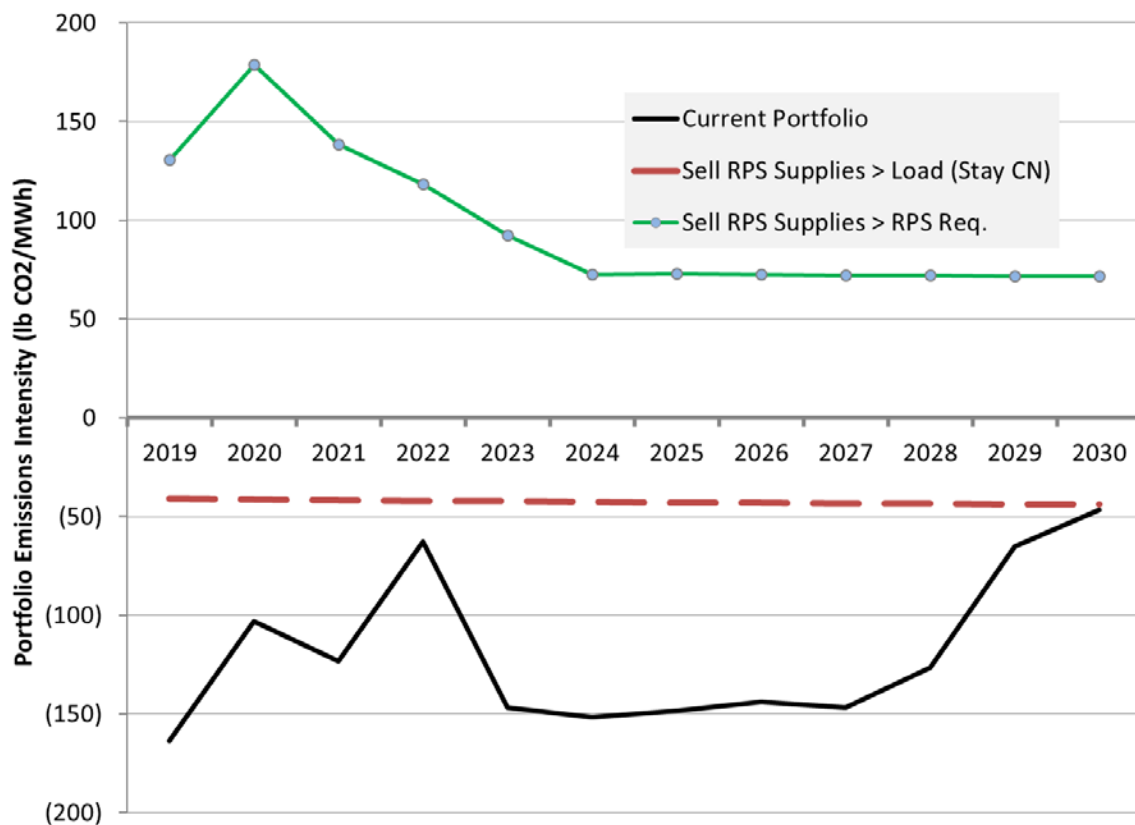
<sup>7</sup> Based on the analysis of the City's portfolio that staff presented in the May 2019 UAC report, a carbon accounting methodology using average hourly emissions factors yields an annual carbon emissions total about 16,100 mT CO<sub>2</sub> greater than an annual accounting approach—which is the approach the City currently uses and which the state is expected to require utilities to use on their PCLs.

<sup>8</sup> The exact number of RECs that would need to be purchased would depend on where the RECs were generated, as the emissions value of a REC is generally assigned the average emissions profile of the power mix in the region it is generated. Regional emissions profile data can be found in the U.S. EPA's eGRID database: [https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016\\_summarytables.pdf](https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016_summarytables.pdf).

calculating the City’s emissions intensity on its PCL is an annual accounting approach, similar to what the City currently uses.

Under the “Sell Supplies Exceeding RPS Requirement” approach the emissions intensity of the City’s electric portfolio as reported on the PCL would be between 70 and 180 lb CO<sub>2</sub>/MWh (with an average value of 97 lb CO<sub>2</sub>/MWh), far lower than the California-wide average emissions intensity of 528 lb CO<sub>2</sub>/MWh.<sup>9</sup> For context, however, some other energy providers, such as neighboring Community Choice Aggregators (CCAs) like Silicon Valley Clean Energy and publicly owned utilities (POUs) like Alameda Municipal Power will likely be reporting zero emissions intensity on their PCLs. If this option were pursued, staff would need a focused public relations and engagement effort to help the public and the City’s most active stakeholders understand the environmentally beneficial intent of the strategy and how CPAU’s portfolio remains carbon neutral.

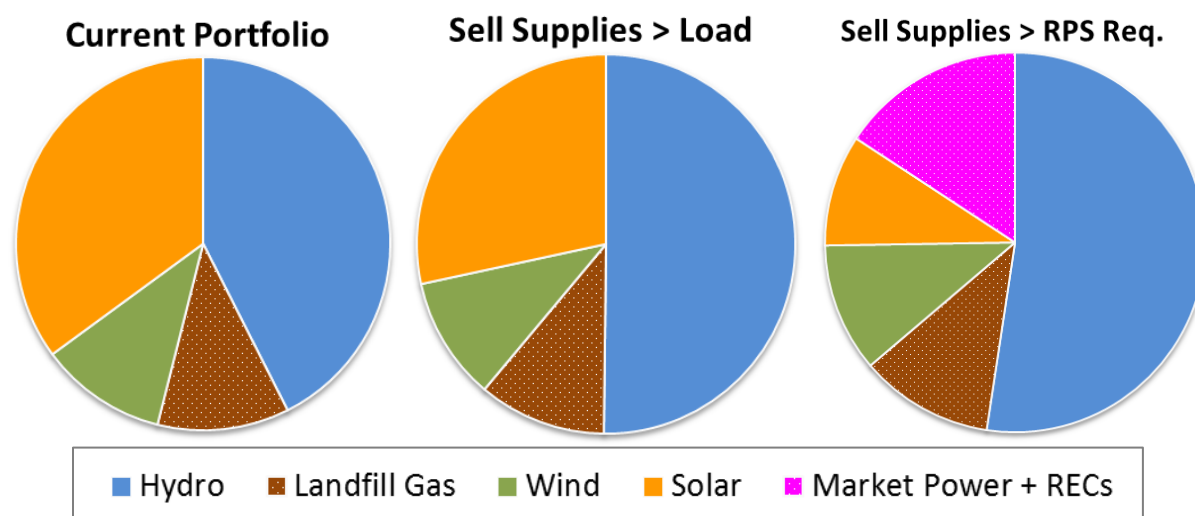
**Figure 5: PCL Emissions Intensities under Various RPS Compliance Strategies (2019-2030)**



And finally, Figure 6 below illustrates how customers would see the portfolio supply mix depicted on their annual Power Content Label for the year 2020, for the three primary RPS compliance strategy options listed above.

<sup>9</sup> U.S. Environmental Protection Agency’s eGRID 2016 data for the “CAMX” region: [https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016\\_summarytables.pdf](https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016_summarytables.pdf)

**Figure 6: Power Content Label Supply Charts for Various RPS Compliance Strategies in 2020**



The information in the figures above, comparing the three major RPS compliance strategy options discussed in this report, is summarized in Table 2 below.

**Table 2: Summary Comparison of Various RPS Compliance Strategy Options  
(Average Impacts over 2019-2030 Timeframe)**

	Status Quo	Sell Supplies > Load (While Remaining Carbon Neutral)	Sell Supplies Exceeding RPS Requirement
<b>Supply Cost Savings (\$M/year)</b>	---	\$1.2M	+\$1.9M (\$3.1M total)
<b>Retail Rate Savings (%)</b>	---	0.7%	+1.2% (1.9% total)
<b>RPS Level (%)*</b>	60%	51%	40%
<b>Hourly Carbon Accounting</b>			
<b>Emissions Intensity (lb CO<sub>2</sub>/MWh)</b>	(79)	0	137 (w/o RECs) 0 (with RECs)
<b>PCL Emissions Intensity (lb CO<sub>2</sub>/MWh)**</b>	(119)	(43)	97

\*The average annual RPS level required under state RPS regulations during this period is 45.4%. The average RPS level for the “Sell Supplies Exceeding RPS Requirement” approach is less than this due to the SB 100 exemption for municipal utilities with high concentrations of large hydro resources, as described above.

\*\*The average emissions intensity for market power in California is assumed to be 944 lb CO<sub>2</sub>/MWh, while the average emissions intensity of the state’s overall fuel mix is 528 lb CO<sub>2</sub>/MWh.

### **Premium Rate Options**

As discussed above, another possibility that the City could consider for its RPS compliance strategy is to provide customers with a choice of different rate options—similar to how commercial customers in Palo Alto today have the option of signing up for the PaloAltoGreen rate in order to purchase additional RECs. For example, customers could be given the choice of continuing to receive the current electric supply mix (the Status Quo approach) or a lower cost

option (the Sell Supplies Exceeding RPS Requirement approach). They could even be given the option of receiving a supply mix that is guaranteed to provide them with a carbon neutral power supply every hour of the year.

It should be noted, however, that the customer rate option approach would involve some significant logistical hurdles and staff effort, particularly in terms of customer communication. (Staff estimates that implementing this option would involve an initial cost of around \$400,000, followed by ongoing costs of about \$200,000 per year. The level of staff effort required to implement this approach is estimated at about 0.5 FTE.) The City would have to choose, for example, which rate option to make the “default” option and which to make the “opt-in” one, all of which would likely lead to some level of customer confusion and frustration. And from a logistical standpoint, allowing customers to choose from different supply mix options would create a significant amount of uncertainty in total customer demand for the different types of resources, which would likely cause some challenges for staff as they procure resources. Whether all of these challenges are worth it to provide customers a choice of rates that would likely only differ by about 2% (or 0.34 cents/kWh) is an open question for the UAC to consider.

## **CONCLUSION**

In previous meetings, the UAC expressed a preference for adopting a lower-cost RPS procurement strategy (December 2017) and for employing a carbon accounting methodology that uses hourly average emissions factors (May 2019). The analysis in this report indicates that opting for those two approaches would yield significant supply cost savings, particularly if the City also chooses to continue the use of unbundled RECs to abate the residual emissions associated with the portfolio’s reliance on wholesale market power purchases in dry years. And staff concurs with the UAC’s preference for adopting a more accurate/granular carbon accounting methodology that uses hourly average emissions factors.

As for what balance to strike between maintaining the City’s existing portfolio of in-state resources versus reducing supply costs and relying on out-of-state resources, staff feels that increasing the City’s reliance on out-of-state Bucket 3 RECs is justifiable on an environmental value basis. However, before recommending a more aggressive RPS sales approach in order to reduce supply costs, staff is interested in receiving feedback from both the UAC and other members of the community (particularly the environmental community) on that issue. At this time, staff has begun selling some of the City’s renewable resources that exceed its load for 2019 (a position that the UAC appeared to agree with at the June meeting) while awaiting a final decision on whether to take a more aggressive approach to selling resources.

As discussed above, one possible option is to have multiple rate options for customers who have different cost and/or portfolio content preferences (e.g., a low-cost option, an option like the current portfolio, or even a more expensive, carbon-neutral-every-hour option) instead of imposing a single portfolio approach on everyone in Palo Alto. However, it should be noted that implementing this approach would require a significant amount of time and staff resources.

## **NEXT STEPS**

Staff intends to return to the UAC in the coming months to request a formal recommendation on the changes discussed in this report. However, prior to returning to the UAC with a recommendation on these changes, staff plans to engage with members of the environmental community to request input on staff's position with respect to the environmental benefits of Bucket 3 RECs. After that, staff will take the UAC recommendation to the Finance Committee and the City Council. The City's carbon accounting methodology is codified in the Council-approved Carbon Neutral Plan ([Staff Report 3550](#), [Resolution 9322](#)) and therefore requires Council approval to modify. And although the City's RPS procurement strategy is not currently codified, staff will still discuss the current approach with Council and seek validation of any significant changes, given the level of financial implications associated with this decision. If the Council supports selling some of the City's excess renewable supplies, staff would then begin soliciting interest from CCAs and others in short- or long-term acquisition of these resources.

In addition, in the first half of next year staff plans to return to the UAC with a broader and longer-term look at potential options for rebalancing the City's electric supply portfolio. This analysis will be presented in the context of making a decision on whether to renew the City's Western Base Resource hydro contract after the current one expires at the end of 2024. It will also take into account options for utilizing the City's share of the California-Oregon Transmission Project, after that resource reverts to the City's control at the end of 2023.

Staff will also continue to closely follow (and comment upon) the CEC's AB 1110 rulemaking process. Depending on the accounting methodology the CEC finally adopts, staff will work to understand how the City's methodology can be aligned with the CEC approach, and, to the degree that it cannot, determine how to explain this difference to customers.

## **RESOURCE IMPACT**

Staff estimates that switching to a more aggressive sales approach to RPS compliance could result in a decrease in supply costs on the order of \$3 million per year through 2030 (equivalent to a rate reduction of 0.34 cents/kWh). (This estimate incorporates the effects of switching to an hourly carbon accounting methodology, using average hourly emissions intensity factors, which could result in an increase in supply costs of approximately \$60,000 in an average hydrological year.) However, if the City instead chooses to sell only its renewable energy supplies that exceed its annual load (and which are not needed to maintain an overall carbon neutral supply portfolio), the average supply cost savings are estimated to be about \$1.2 million per year through 2030 (equivalent to a rate reduction of 0.13 cents/kWh).

## **POLICY IMPLICATIONS**

This report satisfies Initiatives #4 and #5 of the [EIRP Work Plan](#). This report is also in line with the Sustainability and Climate Action Plan goals of continuing to lower the carbon footprint of the community.

## **ENVIRONMENTAL REVIEW**

The Utilities Advisory Commission's discussion of the City's RPS procurement strategy and carbon accounting methodology does not meet the definition of a project under Public

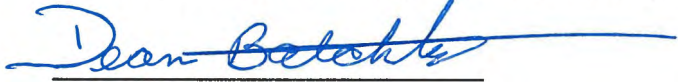
Resources Code 21065 and therefore California Environmental Quality Act (CEQA) review is not required.

**ATTACHMENTS**

- A. RPS Portfolio Detail and Financial Opportunities Associated with Various Alternative Strategies
- B. Environmental Value of Bucket 3 and Bucket 1 RECs

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                                      Director of Utilities



**ATTACHMENT A: RPS Portfolio Detail and Financial Opportunities Associated with Various Alternative Strategies**

	CY:	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Projected Load	MWh	918,878	912,332	905,627	899,248	893,197	887,490	882,089	877,067	872,403	868,132	864,123	860,444
Projected Retail Sales	MWh	886,717	880,401	873,930	867,774	861,935	856,428	851,216	846,370	841,869	837,747	833,879	830,328
Total RPS Requirement	%	31%	33%	35.75%	38.50%	41.25%	44%	47%	50%	52%	54.67%	57.33%	60%
Bucket 1 Min	%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
Bucket 3 Max	%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Total RPS Requirement	MWh	274,882	290,532	312,430	334,093	355,548	376,828	400,072	423,185	437,772	457,969	478,091	498,197
Bucket 1 Min	MWh	206,162	217,899	234,323	250,570	266,661	282,621	300,054	317,389	328,329	343,476	358,568	373,648
Bucket 3 Max	MWh	27,488	29,053	31,243	33,409	35,555	37,683	40,007	42,319	43,777	45,797	47,809	49,820
<b>Current Portfolio by Type</b>													
Large Hydro	MWh	544,217	477,993	491,618	485,957	485,957	485,957	478,671	478,671	478,671	478,671	478,671	478,671
Small Hydro	MWh	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Solar	MWh	320,668	320,149	318,574	317,006	390,072	388,045	386,029	384,024	382,030	380,046	378,073	376,111
Wind	MWh	99,958	100,178	100,087	42,708	42,672	42,672	42,672	42,672	42,672	21,336	-	-
Landfill Gas	MWh	103,489	103,773	103,489	103,489	103,489	103,489	103,489	95,275	94,528	94,528	56,922	38,242
Total Renewables	MWh	534,114	534,100	532,150	473,203	546,232	544,206	542,190	531,971	529,230	505,910	444,996	424,353
Bucket 0	MWh	213,447	213,951	213,576	156,197	156,161	156,161	156,161	147,946	147,200	125,864	66,922	48,242
Bucket 1	MWh	320,668	320,149	318,574	317,006	390,072	388,045	386,029	384,024	382,030	380,046	378,073	376,111
<b>RPS Level</b>	<b>%</b>	<b>60.2%</b>	<b>60.7%</b>	<b>60.9%</b>	<b>54.5%</b>	<b>63.4%</b>	<b>63.5%</b>	<b>63.7%</b>	<b>62.9%</b>	<b>62.9%</b>	<b>60.4%</b>	<b>53.4%</b>	<b>51.1%</b>
Large Hydro Level	%	61.4%	54.3%	56.3%	56.0%	56.4%	56.7%	56.2%	56.6%	56.9%	57.1%	57.4%	57.6%
Hydro-Adjusted RPS Requirement	%	31.0%	33.0%	35.8%	38.5%	41.3%	43.3%	43.8%	43.4%	43.1%	42.9%	42.6%	42.4%
Hydro-Adjusted RPS Requirement	MWh	274,882	290,532	312,430	334,093	355,548	370,471	372,545	367,699	363,198	359,076	355,207	351,657
Total RECs Available	MWh	534,114	534,100	532,150	473,203	546,232	544,206	542,190	531,971	529,230	505,910	444,996	424,353
Total RECs to Sell (Bucket 1)	MWh	286,720	272,621	250,963	172,520	226,239	210,782	206,900	201,042	202,352	182,742	125,309	107,862
Total Bucket 3 to Buy	MWh	27,488	29,053	31,243	33,409	35,555	37,047	37,254	36,770	36,320	35,908	35,521	35,166
Bucket 1 Premium	\$/MWh	\$ 18.00	\$ 18.00	\$ 17.50	\$ 17.00	\$ 16.50	\$ 16.50	\$ 16.00	\$ 16.00	\$ 15.50	\$ 15.50	\$ 15.00	\$ 15.00
Bucket 3 Premium	\$/MWh	\$ 1.25	\$ 1.50	\$ 1.60	\$ 1.70	\$ 1.80	\$ 1.90	\$ 2.00	\$ 2.10	\$ 2.20	\$ 2.30	\$ 2.40	\$ 2.50
<b>Total Financial Opportunities</b>													
<b>Sell RPS Supplies &gt; Load (Stay CN)</b>	<b>\$M</b>	<b>\$ (2.2)</b>	<b>\$ (1.1)</b>	<b>\$ (1.4)</b>	<b>\$ (0.3)</b>	<b>\$ (1.6)</b>	<b>\$ (1.7)</b>	<b>\$ (1.6)</b>	<b>\$ (1.5)</b>	<b>\$ (1.5)</b>	<b>\$ (1.2)</b>	<b>\$ (0.3)</b>	<b>\$ (0.0)</b>
<b>Sell RPS Supplies &gt; RPS Req. Total</b>	<b>\$M</b>	<b>\$ (5.0)</b>	<b>\$ (4.6)</b>	<b>\$ (4.1)</b>	<b>\$ (2.7)</b>	<b>\$ (3.5)</b>	<b>\$ (3.3)</b>	<b>\$ (3.1)</b>	<b>\$ (3.0)</b>	<b>\$ (2.9)</b>	<b>\$ (2.6)</b>	<b>\$ (1.6)</b>	<b>\$ (1.4)</b>
Bucket Swapping	\$M	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.5)	\$ (0.4)	\$ (0.4)
Residual Emissions Cleanup	\$M	\$ 0.2	\$ 0.3	\$ 0.2	\$ 0.2	\$ 0.2	\$ 0.1	\$ 0.1	\$ 0.1	\$ 0.1	\$ 0.2	\$ 0.2	\$ 0.2
Sell RPS Supplies > RPS Req.	\$M	\$ (4.7)	\$ (4.4)	\$ (3.8)	\$ (2.4)	\$ (3.1)	\$ (2.9)	\$ (2.7)	\$ (2.6)	\$ (2.6)	\$ (2.3)	\$ (1.3)	\$ (1.1)

## ATTACHMENT B: Environmental Value of Bucket 3 and Bucket 1 RECs

Both of the changes discussed in this report—to the City’s carbon accounting methodology and its RPS procurement strategy—have the potential to increase the City’s reliance on unbundled, out-of-state RECs (also known as “Bucket 3 RECs”). Particularly if the City chooses the “Sell Supplies Exceeding RPS Requirement” approach to RPS compliance, as this would involve selling a large volume of its in-state (Bucket 1) RECs and replacing them with much less expensive Bucket 3 RECs. Given this potential shift in approach, it is worth considering the relative environmental value of Bucket 1 and Bucket 3 RECs. After all, given that Bucket 1 RECs currently cost about 12 times as much as Bucket 3 RECs, there is sometimes a perception that Bucket 1 RECs have much greater environmental value as well.

First off, it should be noted that according to all industry accounting protocols (other than the CEC’s PCL accounting standard), “a REC is a multi-attribute commodity that embodies all of the non-energy benefits associated with the generation of renewable energy. A REC can be separated from the underlying electricity and applied to other electricity use to substantiate renewable electricity use and ownership.”<sup>10</sup> So although it would be very difficult to determine what generating resource reduced its output as a result of that renewable energy generator being on the grid, all RECs by definition embody the avoided emissions associated with renewable energy (i.e., the carbon attribute).

The intent with all of the environmental products that staff has considered (including RECs, carbon offsets, carbon allowances, etc.) is to have a direct impact on mitigating carbon emissions—to provide some “additionality,” in the parlance of environmental product markets. To determine whether Bucket 3 RECs pass the additionality test, one would have to know whether the expectation of this additional (small) source of revenue directly contributed to the deployment of an individual renewable energy project. In most cases, of course, this would be difficult, if not impossible, to know. But regardless of one’s view on whether Bucket 3 REC purchases result in additional renewable energy being built on the grid, the City has already contributed to the construction of additional California-based renewable energy through its past efforts. The ““Sell Supplies Exceeding RPS Requirement”” approach is only intended to trade one form of renewable energy for another, freeing up money for additional decarbonization efforts.

Fortunately, there is a fairly large body of academic research on the environmental value of unbundled RECs. Based on staff’s review of this literature, it appears that allowing the trading of a significant volume of unbundled RECs (up to 25% of all RECs generated) throughout the Western US electrical grid (known as the Western Electricity Coordinating Council, or WECC) can result in a lowering of the overall cost of electricity without having any net effect on carbon emissions within the WECC.<sup>11</sup> (Note that Palo Alto is only contemplating using Bucket 3 RECs for up to 10% of its

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<sup>10</sup> “Renewable Energy Certificates, Carbon Offsets, and Carbon Claims: Best Practices and Frequently Asked Questions,” Center for Resource Solutions, April 2012. Accessed May 12, 2019. <https://resource-solutions.org/wp-content/uploads/2015/08/RECsOffsetsQA.pdf>.

<sup>11</sup> Perez, A., Sauma, E., Munoz, F., and Hobbs, B. (2016). “The Economic Effects of Interregional Trading of Renewable Energy Certificates in the U.S. WECC,” *The Energy Journal*, Volume 37(4). <http://dx.doi.org/10.5547/01956574.37.4.aper>.

overall RPS requirement—or about 5% of its total load—as that is the limit set by the state’s RPS legislation.)

Furthermore, it should be noted that buying unbundled RECs that are produced by generators operating in the dirtiest parts of the grid—for example, from a wind farm located in a state with a heavy reliance on coal—could actually yield even greater carbon savings than buying in-state RECs, given how relatively low-carbon California’s electricity mix is. Purchasing out-of-state RECs from more carbon-intensive regions incentivizes additional development of renewable energy generation in those areas, and thus makes coal-fired power plants less and less economic to maintain and operate.<sup>12</sup> (By depressing wholesale market prices, wind and solar generators eat into coal plants’ revenues and also force them to run less frequently.)

Based on the two points above, staff believes that the City could conceivably maximize its use of Bucket 3 RECs, save a significant amount of money, and have about the same impact on the grid’s carbon emissions as the current portfolio does, at least in the near- to mid-term. If some of the money saved were to be devoted to other deep decarbonization efforts (for example, electrification of transportation and building energy use) it could result in a greater carbon impact per dollar spent. At a minimum, the academic research supports the current City position that Bucket 3 RECs are a valid tool to use in dry hydro years to ensure that the electricity portfolio is carbon neutral.

It is also worth noting that the primary justification for the high requirement for Bucket 1 RECs in California’s RPS legislation is to improve in-state air quality and create in-state jobs. If Palo Alto were to use some of the money saved from maximizing its use of Bucket 3 RECs towards local electric ratepayer benefits, perhaps including building decarbonization and increasing the use of electric vehicles, these efforts would similarly improve local air quality and create local jobs.

Given the amount of money involved in such a change in the City’s RPS policies, and the impact it would have on the portfolio, staff is still investigating the merits of these claims about the value of Bucket 3 RECs. In addition, based on the concerns expressed by some commissioners at the June UAC meeting about the public perception of such a policy shift, staff also plans to meet with various environmental community stakeholders to get their input on such a change. Staff will return to the UAC to share this feedback before making a recommendation on which RPS procurement strategy to follow.

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<sup>12</sup> Bistline, J., Santen, N., and Young, D. (2019). “The Economic Geography of Variable Renewable Energy and Impacts of Trade Formulations for Renewable Mandates,” *Renewable and Sustainable Energy Reviews*, Volume 106, Pages 79-96. <https://doi.org/10.1016/j.rser.2019.02.026>.