VALLEY CLEAN ENERGY ALLIANCE

Staff Report – Agenda Item 8

TO: Valley Clean Energy Alliance Community Advisory Committee (CAC)

FROM: Mitch Sears, Interim General Manager
Olof Bystrom, Sacramento Municipal Utility District (SMUD)

SUBJECT: CPUC Integrated Resource Plan and Required Action Plan (IRP)

DATE: July 2, 2018

RECOMMENDATION

1. Review the draft IRP, including the associated 3 year action plan.

2. Support staff recommendation to approve the draft IRP, including the prioritization of Action Plan items and the recommended IRP Portfolio among the alternatives considered as the Preferred Portfolio.

BACKGROUND

In accordance with state Senate Bill (SB) 350 (2015, DeLeón), as well as modifications to those sections added by SB 338 (2016, Skinner) and Assembly Bill (AB) 759 (2017, Dahle) to implement Public Utilities Code Sections 454.51 and 454.52, the California Public Utilities Commission (CPUC) has enacted rulemakings requiring load servicing entities in the state over which the CPUC exercises regulatory authority to file Integrated Resource Plans by August 1, 2018. The IRP must be approved by the Valley Clean Energy (VCEA) Board prior to submission to the CPUC, including the adoption of a "Preferred Portfolio" to indicate which of the alternative resource scenarios contained in the IRP is preferred by the VCEA Board. The IRP process calls for an update every two years, which means VCEA will have regular opportunities to adjust its plan.

In addition to the development of various possible renewable and clean portfolios, and the required selection of a preferred portfolio, the IRP report must also identify VCEA's action plan for how it intends to achieve the objectives of the Preferred Portfolio.

ANALYSIS AND PREFERRED PORTFOLIO

The IRP report that is attached to this Staff Report provides a detailed analysis of long term resource options for VCEA, including specific resource portfolios of renewable energy such as solar, wind, biomass and geothermal resources. The report analyzes three portfolios:

- A “Base” portfolio that meets statutory requirements with respect to greenhouse gas emissions and the Renewable Portfolio Standard (RPS). This portfolio seeks to minimize costs for new resources without any additional emphasis on local energy or cleaner energy (beyond regulatory requirements). This portfolio can be seen as the minimum that VCEA must achieve in terms of renewable energy and greenhouse gas emissions.
- A “Cleaner Base” portfolio that seeks higher amounts of RPS eligible renewable energy as well as procuring all of VCEA’s market-procured energy from non-GHG sources, resulting in a portfolio that uses 80% RPS eligible renewables by 2030. This portfolio is otherwise similar to the Base portfolio and is the lowest cost portfolio among the three options.
- A “Local” portfolio that emphasizes the use of local solar, biomass and geothermal resources that are sourced from Yolo county and surrounding areas. The portfolio seeks to achieve the same level of clean energy and RPS as the Base portfolio. The cost of this portfolio exceeds the lowest cost portfolio by about 13 %.

  Note: Both the Base and Cleaner Base portfolios assume that VCEA will prioritize procurement from local renewable projects where cost effective.

The three resource portfolios indicate that solar PV energy from large scale solar installations is the lowest cost option for VCEA and that local smaller cost installations come at a premium. This is especially true for biomass and geothermal resources that are considerably more costly than other resources. Thus, a resource portfolio that focuses on local resources is assumed to be somewhat more costly than other options. However, based on our assessment, the difference between a strict adherence to lowest cost principles and a more locally sourced portfolio need not be significant. We also note that there is significant uncertainty regarding the development of costs over the next 12 years that could impact the relative costs of the portfolios assessed as part of this IRP.

A key feature of the IRP is the Action Plan (discussed below) that will include issuing an RFP for long term procurement of renewables. Through this process it is expected that VCEA will gain insight into the detailed cost of both local and non-local renewable resources. VCEA will use this information to subsequently adjust its resource plan.

ACTION PLAN

The 3 year Action Plan outlines the actions VCEA plans to take to achieve the goals and objectives set out in the IRP. The Action Plan can but is not required to include additional actions contemplated by VCEA to achieve its short and long-term vision. The action plan, included as Attachment B, was developed as an outcome of the public IRP workshop held on April 16, 2018. The list was further vetted and prioritized with input from the Community Advisory committee at its May 30, 2018 meeting. Subsequently, the CAC members individually provided proposed priority ranking of the action plan items, which is included as Attachment C.

The attached Action Plan is the proposed final action plan that will also be included in the IRP Report. The action plan reflects the guidance to date from the CAC regarding key actions and their prioritization.

REQUESTED BOARD ACTION

Staff will be making the following recommendations to the Board for their action on July 12, 2018:

That the Board adopt a resolution establishing the following:

- Approving the attached Integrated Resource Plan in substantially the form attached, and adopting the Cleaner Base as its Preferred Portfolio
- Adopting the attached IRP action plan, which is a required element of the IRP.

CONCLUSION

Staff makes the specific aforementioned recommendations for the CAC's consideration.

Attachment A
Proposed Integrated Resource Plan

ATTACHMENT A

Standard LSE Plan

Valley Clean Energy Alliance

2018 INTEGRATED RESOURCE PLAN Draft, June 25, 2018

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Executive Summary

Valley Clean Energy Alliance (VCEA) is a joint-powers authority working to implement a state-authorized Community Choice Energy (CCE) program. Participating VCEA governments include the City of Davis, the City of Woodland and County of Yolo. The purpose of VCEA is to enable the participating jurisdictions to determine the sources, modes of production, and costs of the electricity they procure for the residential, commercial, agricultural, and industrial users in their areas. PG&E continues to deliver the electricity procured by VCEA and perform billing, metering, and other electric distribution utility functions and services. Customers within the participating jurisdictions have the choice not to participate in the VCEA program. VCEA's vision as an organization and as adopted by its Board in 2017 is shown in Figure 1.

Figure 1. VCEA Vision

The near-term vision for VCEA is to provide electricity users with greater choice over the sources and prices of the electricity they use, by:

- Offering basic electricity service with higher renewable electricity content, at a rate competitive with PG&E;
- Developing and offering additional low-carbon or local generation options at modest price premiums;
- Establishing an energy planning framework for developing local energy efficiency programs and local energy resources and infrastructure; and
- Accomplishing the goals enumerated above while accumulating reserve funds for future VCEA energy programs and mitigation of future energy costs and risks.

The long -term vision for VCEA is to continuously improve the electricity choices available to VCEA customers, while expanding local energy-related economic opportunities, by:

- Causing the deployment of new renewable and low carbon energy sources;
- Evaluating and adopting best practices of the electricity service industry for planning and operational management;
- Substantially increasing the renewable electricity content of basic electricity service, with the ultimate goal of achieving zero carbon emissions electricity;
- Developing and managing customized programs for energy efficiency, on-site electricity production and storage;
- Accelerating deployment of local energy resources to increase localized investment, employment, innovation and resilience;
- Working to achieve the climate action goals of participating jurisdictions to shape a sustainable energy future; and
- Saving money for ratepayers on their energy bills.
- Remaining open to the participation of additional jurisdictions.

This report was prepared in accordance with decision D.18-02-018 by the California Public Utilities Commission (Commission) under proceeding R.16-02-007. The report follows the format laid out in Annex A to the Decision. The objective of this report is to provide materials to help the Commission perform its modeling of load and resources in the 2018-2030 period. VCEA views this IRP report as an important but preliminary plan for its resource supply over the 2018-2030 period. Considering that VCEA only started to serve load in June of 2018, VCEA does not yet have any resources under long term contract – instead VCEA relies on market purchases of energy, Resource Adequacy (RA), and Renewable Energy Credits (RECs) in order to serve its electric demand and meet regulatory requirements with respect to resource adequacy and renewable energy. Therefore, a key part of this report is the Action Plan contained in Section 4 of this report. The Action Plan lays out VCEA's near term plans for developing short and long term studies and supply contracts to meet its load while implementing its vision and complying with regulatory requirements.

For the purposes of this report VCEA three resource portfolios, all of which conform to Commission and statutory requirements, and that are consistent with the input assumptions and Reference System Plan identified by the Commission. The first portfolio, entitled Base, provides a continuation of VCEA's current service offering, namely 42% Renewable Portfolio Standard (RPS) eligible renewable energy and an overall portfolio that is supported by carbon free sources for 75% of its annual energy content on an annual basis. Over the course of the 2018-2030 period, the renewable energy content of the portfolio is adjusted to meet statutory and regulatory RPS requirements as well as the Greenhouse gas benchmark values stipulated by the Commission.

The second portfolio, entitled Local, considers a resource path that covers more local and distributed resources. While more costly than the Base Portfolio, the Local portfolio is competitive with the

Commission Reference System Plan RESOLVE model results, which were taken as a proxy for the overall generation costs in California for the 2018-2030 period. The Local is VCEA's Preferred Portfolio. However, we emphasize that the choice of resource path is uncertain and will to a large extent depend on future market and policy developments as well as on the evolving preferences of our customers. We therefore expect to adjust the resource plan as needed over the next several years.

The Third Portfolio, entitled Cleaner Base, considers a lowest cost resource portfolio that has more ambitious renewable energy targets and seeks to achieve 50% RPS-eligible renewable energy content by 2020 and 80% by 2030. In addition, this portfolio

Figure 2 shows a comparison of the estimated generation costs for each of the Portfolios considered in this report in relation to the RESOLVE Reference System Plan results for the same period.

Figure 2. Annual Generation Costs by Resource Portfolio and Year

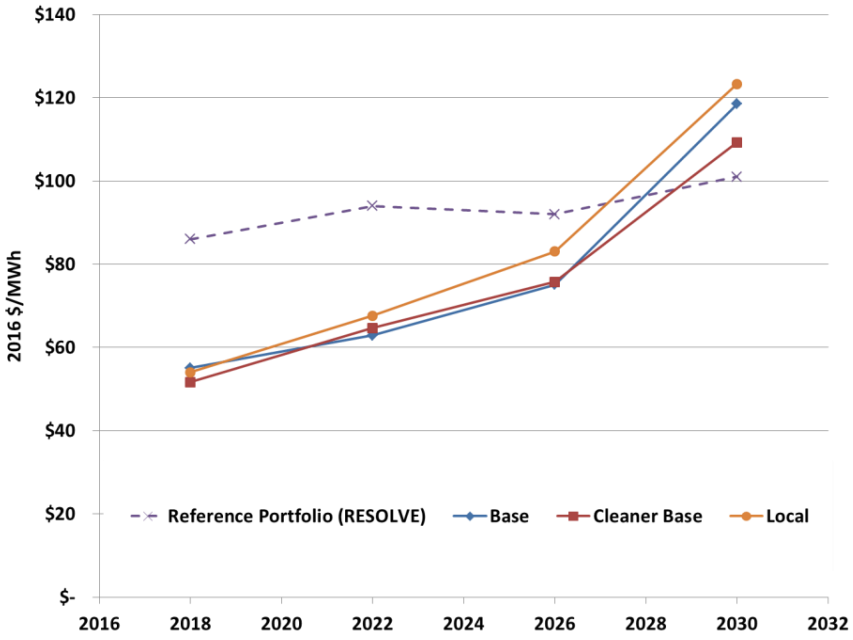


Figure 2 suggests that VCEA's portfolio costs would cross over the ones of the Reference System Plan by the year 2030. However, this result is likely driven largely by a discrepancy in assumptions – VCEA is factoring in a gradual tightening of capacity markets drives up the cost of RA while at the same time the Commission requires that incremental solar capacity is given a near zero ELCC value. In contrast, VCEA understands that the RESOVLVE model results of the Reference System Plan does not factor in any costs for RA and also use a higher ELCC value for incremental solar capacity. Against this background, the difference between the solutions for the year 2030 may not be material.

There are several important limitations and assumptions of VCEA's IRP analysis provided in this report that should be considered:

- The resource portfolios include only the type of renewable energy resources that VCEA expects to contract with over the 2018-2030 period. VCEA does not envision building, owning or entering into long term contracts for fossil-fueled generating sources and instead expects to meet such needs by purchasing electricity in the CAISO and bilateral electricity markets

- The modeling and analysis is based on using assumptions and prices available in the Reference System Plan Results for the RESOLVE model that was developed for the Commission and that were made public on April 23, 2018.[1]
- VCEA considers the analyses and conclusions of this IRP report to be tentative and subject to adjustments as market conditions change and technology and customer preferences evolve.
- VCEA's analysis considers only the generation portion of electric services delivered to VCEA's customers since this is the only part which VCEA is responsible for. It is anticipated that the IRP filing by PG&E will cover the other aspects, such as transmission, distribution, and DSM programs
- ETC ADD MORE CAVEATS

The estimated GHG emissions using Commission's Clean Net Short Tool is shown in Figure 3, below for each of the resource portfolios considered, as well as the Commission GHG benchmark value of 129,000 tons per year for the year 2030.

Table 1. Estimated GHG Emissions in 2030 by Resource Portfolio using the Commission GHG Calculator (metric tons 000)

Commission Mandated Benchmark	Base	Cleaner Base	Local
129	86.0	81.8	87.8

VCEA's IRP analysis is based on a simplified hourly production cost modeling of VCEA's portfolio, where it is assumed that California as a whole follows the resource plan outlined in the Reference System plan and that VCEA can freely buy and sell energy into the CAISO electricity and ancillary service markets at the market prices expected in the Reference System Plan provided by the Commission. VCEA's analysis also uses the same assumptions that the Reference System Plan was based on, including the same assumptions regarding levelized costs for new generating resources and the same renewable energy resource classifications, renewable energy profiles and geographical naming conventions (e.g. "Solano Wind" or "CAISO Solar for CAISO")

VCEA's Action Plan outlines key activities over the next several years for VCEA. Among the more important steps in the action is to conduct a public solicitation for long term renewable energy contracts that will help VCEA to cost-effectively meet it load obligations in a manner that meets regulatory requirements and is consistent with VCEA's vision and strategy. The Action Plan also outlines other key activities over the next 1-3 years, including establishing long term greenhouse gas goals and key performance indicators that will allow VCEA and its constituent members to track progress on key issues such as climate change, programs and energy efficiency. Section 4 of this report describes VCEA's action plan in more detail.

Study Design

The study was designed to inform VCEA, its Board, management, and community on the relative energy supply cost differences between different portfolios that would meet the minimum required to achieve compliance with RPS requirements and the 2030 GHG target established by the Commission for VCEA. Three portfolios were modeled: 1. A conforming portfolio that meets the minimum renewable content

[1] http://cpuc.ca.gov/General.aspx?id=6442457210

and GHG emissions requirement at least cost ("Base"); 2. An alternative Portfolio with a higher percentage of RPS-eligible renewable energy content that is expected to be contracted at the lowest cost without considering the geographical location of resources ("Cleaner Base"); 3. A Portfolio that seeks to meet regulatory and statutory requirements with a higher percentage of local resources compared to the Base and Cleaner Base portfolios (Local). VCEA's vision includes supplying electricity from local energy sources at prices that are competitive with PG&E rates – VCEA therefore looked at these important aspects of its portfolio in separate Portfolios.

The IRP study period required by the Commission covers 2018 through 2030. VCEA began operations in June of 2018 and therefore 2018 is modeled for the June 1 – December 31 period. VCEA's approach is based on utilizing current market data for the front years of the IRP study period (2018-2021), and using available data and assumptions from Commission to the extent possible as a basis for resource portfolio choices in the 2022-2030 period.

Our modeling approach is based on considering VCEA as a "price taker" in the CAISO market wherein it is assumed that VCEA, due to its small peak load and energy demand relative to the rest of the CAISO market, cannot influence prices and therefore can buy and sell power at CAISO spot market prices, as represented by the RESOLVE model results for the 42 MMT Reference System Plan, wherein CO2 allowance prices are implicitly reflected in the CAISO price.

The GHG planning price is not used in the VCEA model runs, because VCEA does not propose to own or otherwise sign long term contracts for fossil-fueled generation. VCEA's only exposure to GHG avoidance costs is from the cost of GHG mitigation implicit in power market pricing for net purchases of load from the CAISO and for sales of renewables into the CAISO market.

a. Objectives

The objective of the IRP is to provide guidance for VCEA's Board, executive management, and the public regarding the relative power supply cost impact of various long term resource options for meeting electric demand in the 2018-2030 period and to ensure that these options are strategically aligned with VCEA's short and long term vision (see Figure 1).

The resource portfolios identified in this IRP illustrate tradeoffs in terms of costs and greenhouse gas emissions between different resource options and levels of ambition in terms of renewable sources and local generating sources used by VCEA to meet its load obligations. Three portfolio scenarios are considered to reflect resource choice alternatives as well as potential outcomes in terms of load using the 2017 IEPR load forecast update for the mid AAEE and mid AAPV cases. The cases and resource portfolio choices are discussed in the assumptions section below.

b. Methodology

Based on the California Energy Commission's (CEC's) IEPR forecasts, annual electric consumption for VCEA in the 2018-2030 period represents less than half a percent of the statewide electric consumption (0.28%). It is therefore expected that VCEA will have little or no opportunity to influence market prices of any of the components of the electric supply for this IRP. In other words, VCEA is a price taker. Under this expectation, VCEA can transact energy, capacity, and resource adequacy and enter into short or long term contracts without impacting the overall market prices for these items. This philosophy is reflected in our methodology. In a further effort to make the IRP consistent with Commission's requirements and assumptions for California as a whole, our methodology for quantifying the costs and greenhouse gas impacts of portfolio alternatives rely exclusively on publicly available data provided by the Commission to

support this IRP process as well as on CEC's updated 2017 IEPR forecast that includes a forecast of energy demand for VCEA.

Three load and resource portfolios are considered in this IRP:

1. Base Portfolio (aka conforming portfolio)
2. Cleaner Base Portfolio (aka Preferred Portfolio)
3. Local Portfolio (to reflect more ambitious local resource choices)

The detailed assumptions for each portfolio as well as the individual resource components of each portfolio are shown in the Modeling Approach Section below.

i. Modeling Tool(s)

VCEA's resource plan is based on a simplified production cost modeling approach that utilizes publicly available data from the various tools provided by the Commission as well as the IEPR load forecast from the CEC. With this data, VCEA developed a spreadsheet model that captures the expected costs of providing electricity to VCEA's customers in the 2018-2030 period under different resource portfolio alternatives. Thus, no formal commercially available production cost model is used, but the analysis is consistent with the data and assumptions of the RESOLVE model, the GHG calculator, and the RPS calculator.

The RESOLVE model provides a simplified representation of the entire WECC system and performs a cost-based simulation and forecast for the 2018-2030 period that selects resources and provides estimates of total and marginal costs as well as emissions and reliability parameters. With this model, only 37 representative days per year are modeled and subsequently aggregated to provide an estimate of full-year impacts. In contrast, the spreadsheet model utilized by VCEA assumes that prices and resources are given. VCEA is treated as a price taker in the CAISO market, wherein VCEA's objective is to minimize costs for meeting its resource needs at given prices for capacity, energy, and new resources. The input assumptions used for this model are drawn from RESOLVE model results and input assumptions as well as from Commission's GHG Calculator tool and CEC's IEPR load forecast. This approach provides a view of VCEA's resource costs and portfolio options in the 2018-2030 period that is consistent with the RESOLVE model.

For the purpose of this IRP and in order to capture the hourly impacts of using the Mid-Mid load forecast from the CEC, VCEA uses the CEC published load shape for the PGE area as an approximation for VCEA's hourly load. While VCEA would consider it preferable to use a load shape that is more reflective of actual conditions in Yolo County, the CEC load shape was used to maintain consistency and to ensure the hourly impacts of AAEE and AAPV under the Mid-Mid Case are incorporated. VCEA's load forecast and load shape, as provided by the CEC, are based on a forecast for all 8760 hours of a normal year. The GHG Calculator is also based on using 8760h per year to calculate the clean net short and the GHG emissions using 8760h per year renewable energy profiles. Therefore, in order to be able to use the hourly RESOLVE marginal costs for CAISO power, these were re-calculated to an 8760 price series, whereby the RESOLVE prices were first compacted into a monthly 24h hourly power price and subsequently extrapolated to create an 8760 price series. This means that with this approach, there are only 24 hourly prices in each month – every first hour of each day has the same price, and so on. While simplified, this approach provides a view of marginal electricity costs in the CAISO market that is consistent with the RESOLVE model results and also captures the impact of carbon prices on the CAISO market price for electricity.

ii. Modeling Approach

The IRP covers the period 2018-2030. However, not every year is modeled. For the first 3.5 years of the forecast, June 1, 2018 through December 31, 2021, our outlook is based on market forecasts and expectations of market prices rather than a production cost model. We feel that this provides a more realistic approach to near term resource costs. We also expect that in the 2018-2021 period, the majority of resources used to meet VCEA's load will be based on short term contracts and market purchases that will cover VCEA's need for energy, capacity and RPS-eligible renewable energy (and/or RECs).

For the period 2022-2030, VCEA relies on the materials available from the Commission as described under Modeling Tools above as well as in the assumptions section of this chapter. As a result, only the years 2022, 2026 and 2030 are analyzed into hourly detail and only for these years are the detailed portfolio choices considered.

Resource Portfolio Alternatives Considered

VCEA considered three alternative resource portfolios provide a range of potential outcomes that will help guide future procurement and illustrate trade-offs in terms of costs, renewable energy contracting and the amount of energy bought in the CAISO market. All resource portfolios are designed to comply with California's 2030 RPS goals as well as with the Commission GHG emissions benchmark of 129,000 tons by 2030.

The three scenarios considered were constructed around shifting three policy parameters that are important to VCEA: The overall carbon footprint of the portfolio, the amount of RPS-eligible renewable energy, and the resource mix, including the amount of energy that is sourced from locally available renewable energy sources. Note that since VCEA currently does not have any resources under ownership or long term contracts, the IRP portfolio alternatives are mainly for illustration of options and potential trade-offs.

As discussed in the Action Plan section of this report, we expect that the actual resource trade-offs and costs will be discovered only following more detailed studies and evaluation of actual offers for long term supply. Table 2 below provides an overview of the Resource Portfolios.

Table 2 Resource Portfolios

Portfolio	Portfolio Aspect	2018	2022	2026	2030
Base	Load Forecast	IEPR			
	Resource Mix	Least cost California resources. Local renewables if cost effective.			
	RPS	42%	42%	45%	50%
	Carbon Free	75%	75%	75%	75%
Cleaner Base	Load Forecast	IEPR			
	Resource Mix	Least cost California resources. Local renewables if cost effective.			
	RPS	42%	60%	70%	80%
	Carbon Free	75%	100%	100%	100%
Local	Load Forecast	IEPR			
	Resource Mix	Expand local wind, biomass, geothermal and solar from 2022.			
	RPS	42%	42%	45%	50%
	Carbon Free	75%	75%	75%	75%

VCEA plans to secure RPS resources from RPS-eligible California resources as well as through PCC1 RECs. Carbon free resources are expected to be purchased under long or short term contracts that do not qualify for RECs but are otherwise carbon free, such as large scale hydro resources from California or the Pacific Northwest. The Carbon Free energy is also not synced with VCEA's load which means that even though VCEA plans to directly or indirectly offset 75%-100% of its electricity consumption with energy from carbon free sources, VCEA will still have a carbon footprint when using the Commission GHG calculator tool. The detailed resource mix under each of these portfolios is shown in separate Excel files that are submitted together with this IRP. It should be noted, that for near term supply, VCEA will rely on available generic non-resource-specific power in the CAISO market for energy and capacity and on RECs to meet RPS requirements.

Modeling Approach Details

For the 2018-2021 period, VCEA models costs and resource portfolio impacts based on expected market conditions, as described by currently available price in bilateral markets for energy and capacity as well as electric power futures from the Intercontinental Exchange (ICE) for NP15. Electric demand is based on CEC's 2017 IEPR Baseline Electric Mid Demand Mid AAEE and AAPV forecast, as published in April 2018[2]. Since CEC does not publish hourly demand profiles for VCEA, we elected to use an hourly demand forecast for the PGE area that reflects the shape for the "Mid-Mid" case. We note that the actual shape for VCEA's service territory is likely different from PG&E's overall shape since the area is smaller and also has a different climate compared to both the Bay Area and the rest of the Central Valley.

For the 2022-2030 period, VCEA relies on data from the GHG calculator and the RESOLVE model's updated results for the 42MMT Reference System Plan, as made available by the Commission in April 2018[3]. The following RESOLVE model results and assumptions were used: hourly CAISO market price forecast (extrapolated to cover 8760 hours per year), levelized costs of new entry of renewable energy capacity and lithium ion batteries, resource potential for new capacity in California. The resource alternatives and costs considered for each portfolio include

Table 3 Resource Options Used

Resource Type	RESOLVE (and GHG Calculator) resource name(s)	2022 Levelized Cost (2016 $/MWh)	Note
Wind	Contracted_NW Wind Northern_California Wind Solano_Wind CAISO_Wind_for_CAISO	79	Used interchangably assuming same cost [4]
Solar	CAISO_Solar_for_CAISO Northern_California_Solar	51	Used interchangably for large scale solar resources not located in Yolo County assuming same cost [4]
Local Solar	Solano_Solar	139	Used to denote local small scale solar resources of less than 1 MW (e.g. parking lot and rooftop PV)
Local Solar	Central_Valley_North_Los_Banos_Solar	56	Used to denote local medium scale solar resources between 1 and 10 MW

[2] https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=17-IEPR-03

[3] http://cpuc.ca.gov/General.aspx?id=6442457210

[4] VCEA does not have long term contracts in place – the exact sourcing of renewable energy will therefore depend on prices, deliverability and proximity to VCEA's service territory

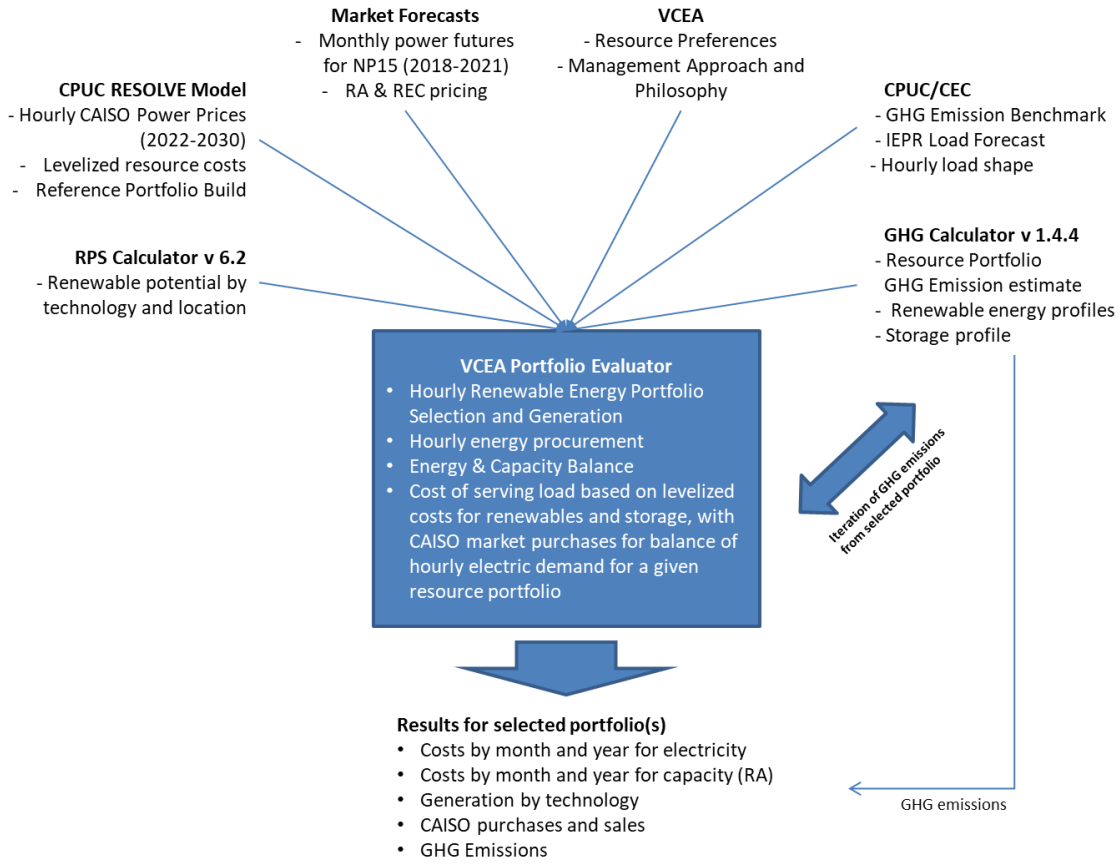
Biomass	Biomass	158	Assumed to be in Yolo cCounty or adjoining County
Geothermal	Geothermal	88	Assumed to be in county adjacent to Yolo
Small Hydro	Small Hydro	163	In Yolo county
Large Hydro	Large Hydro	N/A	Used as proxy for GHG free energy (non source-specific) in GHG Calculator
4h Energy Storage	Battery Storage	$143 /kW-yr	

The spreadsheet model was developed based on existing tools and data from the Commission and uses renewable energy profiles from the GHG Calculator together with the resource selection under each resource portfolio to calculate the amount generated by resources under contract as well as the hourly need for additional energy from the CAISO market. CAISO energy purchases are then assumed to be made at the hourly marginal electricity prices developed by the RESOLVE model for the Reference System Plan.[5]

Figure 3 below provides an overview of the modeling methodology used in this IRP for the 2022-2030 period.

[5] While largely the same as the RESOLVE renewable energy profiles, the GHG calculator provides for full 8760h per year renewable energy profiles that are more useful for VCEA's mode.

Figure 3. Modeling Methodology



iii. Assumptions

Load

The load forecast is based on the "mid Baseline mid AAEE mid AAPV" version of Form 1.1c of the CEC's adopted 2017 IEPR forecast, that was published in February of 2018 (henceforth IEPR forecast).[6] The annual energy demand in this forecast is shown in Table 4, below. No modification was made to this forecast other than fitting the annual energy demand to the hourly demand shape for PG&E that was also made available by CEC under the IEPR docket.[7] This load shape is not specific to VCEA and is likely to underestimate the "peakiness" and annual peak load for VCEA, since Yolo County tends to have very warm summer peak temperatures while at the same time experiencing a significant cool off during the night time in the summer. VCEA expects that these effects and other diurnal and or seasonal effects will be better captured in the next IRP update once VCEA has gained operational experience and has a track record for its hourly load relative to PG&E's. The expected annual energy and peak demand using the IEPR load forecast are shown in Table 4. Energy demand is unchanged across the resource portfolios considered in this IRP report.

[6] https://efiling.energy.ca.gov/GetDocument.aspx?tn=222582

[7] https://efiling.energy.ca.gov/GetDocument.aspx?tn=222554

Table 4. Updated IEPR retail demand forecast and VCEA load forecast. (Annual Energy and Peak Demand) under the updated 2017 IEPR forecast Mid AAEE, Mid AAPV case

	2018	2019	2020	2021	2022	2026	2030
2017 IEPR forecast Mid AAEE, Mid AAPV case	456	762	756	753	752	738	726
Expected annual peak load in IEPR forecast (MW)	148	153	152	153	153	154	155

Expected Power Market Prices and Resource Costs

2018-2021

In the early part of the IRP planning horizon, covering the 2018-2020 period, VCEA expects to rely mainly on short-term contracted resources to meet resource needs. By 2021, VCEA will need to have in place long term renewable supply contracts of terms of at least 10 years in duration for at least 65% of its minimum RPS obligations. Those long term contracts are expected to begin phasing in during 2020. For the short term resource supply, VCEA expects to procure them at current market prices and that these market prices will remain relatively stable in the 2018-2021 period. For this period, our estimates of costs for generation are therefore based on current market conditions for electricity and RA.

For the 2020-2021 period, we use the ICE power forwards for NP15 as a guidance to expected spot market prices. We also expect RA costs to remain stable in the 2018-2020 period and then start to increase as California supply and demand tightens. The latter assumption is supported by forecasts by CAISO and NERC that suggest that California reserve margins will remain above California's 15% planning reserve margin until at least 2024 when the Diablo Canyon nuclear facility retires. Table 5, below shows the expected electricity prices, resource adequacy and REC prices for the 2018-2021 period.

Table 5. Power, RA, REC and Carbon Free Prices 2018-2021

	2018	2019	2020	2021
Wholesale electric power prices ($/MWh)	29.5	29.5	31.9	35.0
Resource Adequacy ($kW-yr)	44.3	44.3	44.3	65.4
PCC1 RECs ($/MWh)	16.0	16.0	16.0	16.0
Carbon Free Price Premium ($/MWh)	2.3	4.0	4.0	4.0

For modeling purposes VCEA does not expect that the long term renewable supply contracts put in place to meet the 2021 requirement that will start delivery of substantial quantities of energy enter into any ownership or long term PPAs that will have a material impact on power supply in the 2018-2020 period.

2022-2030

From 2022 onwards, the IRP relies on results and assumptions from the RESOLVE model as an approximation of expected market conditions, including CAISO power prices, value of additional capacity to meet planning reserve margins and local capacity margins, and the cost of new entry for new capacity with which VCEA is assumed to be able to contract. Table 5 summarizes the annual expected values for power, RA, and the estimated price Premium for Carbon Free key energy.

VCEA's assumption regarding the costs for resource adequacy is based on a combination of market assumptions and costs of new resources reported in the RESOLVE model's input assumptions. We note that the RESOLVE model results does not show any shortage of capacity in the forecast and consequently prices resource adequacy at zero (the shadow price of the reserve margin requirement). In this report, it is

instead assumed that RA will continue to have a non-zero price and that RA prices will rise towards the cost of entry for new capacity by the middle of the next decade following the retirements of Diablo Canyon and California's once-through cooling capacity. Based on the costs of new capacity shown in the input assumptions for the RESOLVE model, battery storage will also become the lowest cost of RA capacity and flexible capacity from the mid 2020's. VCEA therefore bases its RA cost assumptions on the predicted levelized cost for a 4-hour new lithium ion battery following a ramp up of capacity prices that result from a tightening of California reserve margins as noted above.

The IRP portfolios analyzed in this report does not use RECs in the 2022-2030 period, instead, all renewable energy capacity is modeled directly as renewable resources using the templates and naming conventions devised by the Commission. As part of its 2018-2019 resource mix, VCEA procures carbon free energy from non-RPS resources to maintain a 75% carbon-free portfolio. VCEA will likely continue procuring such clean resources in the future and assumes that the price premium for carbon free energy will remain similar to today's levels also during the 2022-2030.

For new or existing renewable energy capacity that VCEA will contract for in the 2018-2030 period, VCEA relies on the RESOLVE model's cost of new capacity entry. As part of the Action Plan described in Section 4 of this report, VCEA expects to conduct a solicitation for new resource in 2018 and in 2019. As part of that process, it is anticipated that more detailed insights will be gained regarding near term costs for new capacity that will eventually replace the RESOLVE model assumptions used in this report. Note that in the 2022-2030 period, VCEA only performs a detailed assessment of resource needs and resource portfolios for the years that were covered in the RESOLVE model, namely 2022, 2026 and 2030.

Table 6. Power, RA, REC and Carbon Free Prices 2022-2030

	2022	2026	2030
Wholesale electric power prices ($/MWh)	36.8	47.9	99.1
Resource Adequacy ($kW-yr)	83.6	116.4	110.2
Carbon Free Price Premium ($/MWh)	4.0	4.0	4.0

VCEA Market Modeling Assumptions

There are several assumptions that may influence the results of the IRP as shown in this study. For example, per the instructions offered in the guidelines to this IRP template provided by the Commission as attachment A to R.16-02-007 COM/LR1/lil/jt2, load serving entities (LSEs) are directed to "*.. assume that other LSEs procure in a manner consistent with the Reference System Plan"* . VCEA is a small LSE that represent only 0.3% of the anticipated CAISO electricity consumption in the 2018-2030 period. It is therefore assumed that VCEA's resource decisions will not impact decisions by other LSEs, market prices for power, capacity, or new renewable energy resource costs during the 2018-2030 period. Thus, if other LSEs perform in accordance with the Reference System Plan, then VCEA will be able to buy and sell power at the prices modeled in RESOLVE (as a price taker) and will be able to enter into long term contracts at the levelized cost levels shown in the RESOLVE model's results for the Reference System plan.

The RESOLVE model Reference System Plan suggests that planning reserve margins in California will exceed 15% for the entire 2022-2030 period. As a result we can expect that sufficient capacity is available for procurement of resource adequacy as well as energy in the 2022-2030 period from the market.

VCEA's resource plan assumes that its resource portfolio will include only RPS-eligible renewable energy resources, and that the balance of its electricity and resource adequacy supply will be procured in CAISO electricity markets or by pursuing other bilateral procurement opportunities. Consistent with VCEA's long term vision of increasingly procuring local resources and contributing to the development of new capacity, VCEA expects its portfolio of resources to be located primarily in northern California. It is also assumed

that any additional capacity needed to meet electric demand in any hour during the 2022-2030 period can be met with RA and energy resources that are available in the CAISO market. Thus, all resource portfolios envision contracting for less than 100 percent of VCEA's total anticipated energy and capacity need.

Planning Reserve Margins, Local RA, and Flexible Resource needs

All resource portfolios in this IRP are based on contracting and procuring energy and capacity to meet the annual energy demand as well as the expected monthly capacity need, including a 15% planning reserve margin to meet resource adequacy needs. It is also assumed that in procuring capacity to meet a 15% reserve margin, the procured capacity will be able to also meet local and flexible ramping needs. As a result, no additional capacity is envisioned to meet this need. This is consistent with the modeling results of RESOLVE for the Reference System Plan, which suggests that sufficient capacity will be available in CAISO and in the North Bay area without additional procurement (by VCEA or other LSEs) of additional new thermal capacity. VCEA expects to perform

Inflation

Unless otherwise indicated, all cost impacts shown in this IRP are in constant 2016 dollars. For the purpose of estimating nominal costs or for converting nominal dollars to real, the IEPR deflator posted on Commission's IRP website was used[8].

Greenhouse Gas Planning Price and Emissions Benchmark

The greenhouse gas planning price is not explicitly used in this IRP since all of the resources identified by VCEA are renewable resources not emitting any greenhouse gas. Instead, we utilize as an estimate of future prices, RESOLVE's hourly CAISO prices for the Reference System Plan, in which the Greenhouse gas planning price should be reflected implicitly and therefore does not need to be considered separately.

This IRP includes three conforming resource plan options, of which VCEA's Board has adopted the Cleaner Base Portfolio as its Preferred Portfolio. All of the resource portfolios show that the expected greenhouse gas emissions are lower than the Greenhouse Gas Emissions Benchmark for VCEA of 129,000 metric tons by 2030. This is a result of focusing mainly on renewable energy and storage as well as the stated policy of VCEA to be at least 75% carbon free – i.e. a portfolio that is 75% free of greenhouse gas emissions, through the use of RPS resources and hydroelectric energy which may or may not be matching the load shape for VCEA. In VCEA's modeling it is assumed that non RPS GHG free energy is procured in blocks that are not matched with VCEA load and therefore does not offset all GHG emissions resulting from the use of Commission's Clean Net Short methodology, Enclosed with this IRP, VCEA also submits the GHG calculator tool showing the estimated 2030 emissions from its 2030 Preferred Portfolio.

Pursuant to the May 25, 2018 ruling by the Commission regarding GHG Benchmarks, VCEA calculated its estimated greenhouse gas emissions for 2030 using the Clean Net Short method by utilizing version 1.4.4 of the GHG Calculator tool (aka Clean Net Short calculator).

3. Study Results

This section shows study results for the three different IRP portfolios that were considered by VCEA. Detailed portfolio selection results are shown in Excel spreadsheets that were filed together with this IRP. However, we emphasize the tentative and hypothetical nature of this IRP. Due to the fact that VCEA just

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8 http://cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/ElectPowerProcurementGeneration/irp/2018/IEPR_dollar_deflator_series_2018-04.xlsx

started its operations in June of 2018 and the fact that VCEA has not yet entered into any long term contracts for new or existing resources, the identified resource portfolios should be understood as preliminary options and broad direction rather than precise results. VCEA expects that its resource and contracts portfolio will evolve significantly in the 2018-2021 period.

a. Portfolio Results

Three resource portfolios were considered by VCEA in this IRP in order to obtain directional insights on future resource investment alternatives that are aligned with VCEA's long term vision for how to serve its customers in the future. Since VCEA does not yet have any resources under contracts spanning beyond 2019, the results shown in this section as well as in the attached spreadsheets that provide details on the portfolio selection, are necessarily approximations that should be viewed as options and guidance on general direction rather than providing specific detailed procurement targets. VCEA expects that in the next 1-3 years, as it conducts additional studies and gains operational experience, it will develop more detailed procurement plans for short and long term contracting of resources. These planned activities are described in Section 4 of this report.

Table 7 below shows a summary of resource portfolio results for each of the three portfolios considered. Except for the portfolio entitled Cleaner VCEA, all resource portfolios shown in Table 7 could be considered Conforming Portfolios, i.e. they meet all Commission and regulatory requirements. VCEA's Board utilized these alternative portfolios in its consideration of future resource policy. The portfolio entitled Cleaner Base was selected as VCEA's Preferred Portfolio and Section 3b provides a detailed overview of this portfolio and how it complies with regulatory and statutory requirements. The detailed resource choices for each portfolio are also shown in the following Excel files that were submitted together with this IRP: INSERT NAMES OF XLS FILES

Table 7. Portfolio results summary (MW Nameplate Capacity)

	Base				CleanerBase				Local			
	2018	**2022**	**2026**	**2030**	**2018**	**2022**	**2026**	**2030**	**2018**	**2022**	**2026**	**2030**
Wind	0	49	33	46	0	51	55	50	0	41	20	30
BTM Solar	0	39	52	65	0	39	52	65	0	39	52	65
Solar	0	69	91.5	91.5	0	120	140	173	0	22	22	22
Local Solar	0	0	0	0	0	0	0	0	0	30	42	44
Geothermal	0	0	0	0	0	0	0	0	0	6	6	6
Biomass	0	0	0	0	0	0	0	0	0	0	5	5
Small Hydro	2	2	2	2	0	0	0	0	2	2	2	2
4 hour Li-Ion Battery Storage	0	0	3	20	0	3	7	20	0	3	3	3
Percent RPS Delivered	42	42	45	50	42	60	70	80	42	42	45	50
Percent Carbon Free	75	75	75	75	75	100	100	100	75	75	75	75

b. Preferred Portfolio

VCEA's Board of Directors at its meeting on July 12, 2018, approved this resource plan, including the Cleaner Base Portfolio which was selected by the Board as its Preferred Portfolio. This portfolio represents an ambitious combination of renewable and carbon free energy that will allow VCEA to reach an 80% RPS level by 2030 and to offset up to 100 percent of its annual electric demand from zero emission sources by 20022 through a combination contracted renewable energy resources, REC purchases and procurement of energy from carbon free resources such as large scale hydro. A summary of the resource choices in this portfolio is shown in Table 7, above. The resulting generation from the Preferred portfolio as well as the estimated annual electric demand is summarized in Table 8, below. Portfolio details for the Preferred Portfolio are also shown in the Excel files TBD and TBD.

Table 8. Summary of annual electric demand and generation by resource group for the Preferred Portfolio Cleaner Base (MWh).

	2018	2022	2026	2030
Retail Electric Demand	456,000	752,000	738,000	726,000
Wholesale Energy Demand (accounting for losses)	488,226	804,926	789,678	776,575
ST Contracted Energy	351,040			
CAISO Energy	(10,154)	54,597	57,954	73,786
Carbon Free Energy[9]	147,340	296,472	221,312	142,081
Wind	-	141,461	153,647	139,579
Solar	-	314,176	363,075	444,342
Storage	-	(1,780)	(6,309)	(23,213)
RPS Delivered (% of Retail load)	42	60	70	80
Percent Carbon Free Supply (of Retail Load)	75	100	100	100
Estimated Portfolio GHG Emissions (MT 000)	N/A	29	49	82

The portfolio generation summarized in Table 8, above, shows the performance of a tentative resource portfolio for VCEA that is consistent with VCEA's long term vision while at the same time meeting Commission and statutory requirements as well as delivering a cost-effective portfolio. The resource choices are based on estimated short term and long term costs for energy, capacity, renewables and carbon-free energy.

VCEA's long term operational goals include maintaining electricity prices that are competitive with PG&E retail prices while at the same time delivering a supply portfolio that is both cleaner and more locally sourced than PG&E's portfolio. Considering these priorities, the long term portfolio mix is likely to be adjusted compared to the above in line with changes in market prices.

The main renewable resource available to VCEA for new development is solar PV. In Yolo County and its surrounding areas, there are very few options for other types of renewable energy such as wind, biomass,

[9] Carbon Free Energy is supply of electricity that is certified to be carbon free but typically not RPS eligible or synced with hourly load for VCEA. Sources likely include in state or out of state large hydro facilities

and geothermal energy. VCEA expects to explore such supply options opportunistically depending on what prices and terms can be obtained from new and/or existing RPS-eligible resources.

Based on the levelized cost estimates that were included in the RESOLVE model, VCEA expects solar PV along with wind to be the lowest cost supply alternative for supply from existing and new sources in the 2018-2030 period. As part of VCEA's action plan that is described in Section 4 of this report, we plan to conduct solicitations for near term and long term renewable energy supply, which we expect result in PPAs for VCEA's future supply, As part of this process, we also expect to develop a deeper understanding of what resources can be developed locally and the estimated costs for such resources. It should therefore be emphasized that the specific resource groups identified in the Excel files submitted with this IRP (Large Hydro, Northern California Solar, etc) are only indicative sources of potential supply that may change depending on availability and price of resources – if VCEA were to have the opportunity to secure lower cost renewable energy supply from other sources, those would most likely be considered and perhaps used for contracting.

In line with many other industry analysts, the RESOLVE model's levelized costs for battery storage also suggests a long term declining trend. Declining costs for battery storage suggest that in the next ten years, batteries are likely to become the most cost-effective means of meeting VCEA's resource adequacy needs, surpassing traditional gas-fired generation in terms of resource costs. Therefore, the Preferred portfolio includes up to 20MW of battery capacity by 2030, far surpassing the statutory mandate of 1 percent of VCEA's demand. If battery storage costs decline faster than anticipated, VCEA may consider increasing its reliance on batteries, and conversely, if battery costs remain at close to 2018-2020 levels, then VCEA is likely to rely more on market purchases for its RA needs.

The estimated Greenhouse gas emissions from the Preferred portfolio are far below the 2030 Greenhouse Gas Emissions Benchmark that was mandated by Commission in its April 3, 2018 ruling on GHG benchmarks, which stipulated a GHG Emissions Benchmark for VCEA of 129,000 tons per year. There are two reasons why VCEA's GHG emissions are expected to be significantly below this benchmark. First, the modeling performed by VCEA suggests that higher RPS levels can be achieved at little or no incremental cost compared to other more carbon intensive portfolios. This result is of course a direct result of the expected market prices for energy and the expected levelized costs for new renewable energy resources - should costs change significantly, VCEA expects to also re-prioritize its portfolio. Second, VCEA already delivers electricity that is 75% carbon free. By increasing its procurement of carbon free energy, VCEA hopes to be able to fully offset its retail energy sales with RPS eligible energy or carbon free resources. Procurement of carbon free (non RPS) resources manifests itself in the GHG Calculator as procuring energy from "Large Hydro" as a proxy for generic carbon free energy. This result is however contingent on a continued low to moderate price premium for carbon free energy. If demand for carbon free energy were to increase significantly, VCEA may need to adjust its portfolio to ensure that costs of serving load remain competitive,

Based on using the GHG Calculator tool, the estimated GHG emissions from VCEA's portfolio increase dramatically even though the RPS content of the portfolio increases. This is a direct result of the clean Net Short methodology used by the GHG Calculator tool: In the 2022-2030 period, the Cleaner VCEA portfolio gradually shifts towards a higher proportion of RPS-eligible resources, almost exclusively solar. At the same time, the use of generic carbon free resources (represented in the tool as Large Hydro) decreases. This means that the clean generation of the portfolio is gradually shifted towards day-time hours where the emission factor is already low or zero and drives increasing procurement of off-peak energy from the CAISO grid, resulting in an overall increase in VCEA's GHG emissions in this period.

Statutory Requirements under PUC 454.52 (a) (1)

Section 454.52 (a) (1) of the Public Utility Code sets out a number of requirements which LSE's must demonstrate that they meet the following requirements in their IRP:

- **Meet GHG emissions reduction targets established by the State Air Resources Board.** VCEA's Preferred Resource Portfolio shows estimated GHG emissions of 82,000 metric tons per year by 2030, which is well below the 129,000 tons per year planning target established for VCEA.
- **Procure at least 50 percent eligible renewable energy resources by December 31, 2030.** All portfolios considered in this IRP will meet the statutory RPS requirements. The Preferred Portfolio will significantly exceed the RPS mandate by getting 80 of its energy supply from RPS-eligible renewable energy by 2030. As noted above, the actual level achieved is subject to continuous evaluation by VCEA and will depend on how market conditions and prices for renewable energy evolve. While VCEA has a strong commitment to a clean local supply of energy, maintaining competitive retail electric prices are also a key consideration in the balancing of priorities for VCEA.
- **Enable each electrical corporation to fulfill its obligation to serve its customers at just and reasonable rates.** Although technically not applicable to VCEA as it is a CCA and not an electrical corporation, VCEA's goal is to keep its rates competitive with PG&E (see Figure 1). As an example, VCEA in 2018 adopted rates that were set to be 2.5 percent below PG&E's for customers' generation portion of the bill.
- **Minimize impacts on ratepayers' bills.** See section 3.b.ii below.
- **Ensure system and local reliability.** Since VCEA is not a distribution utility, most of the obligations 7in this area do not apply. However, VCEA, in its resource plan have incorporated the need for providing system and local RA at 115% of the expected monthly peak load for VCEA. The estimated costs for such capacity are incorporated in the resource costs for all portfolios, including the Preferred Portfolio. Additionally, VCEA will incorporate into its long-term power purchase agreements with intermittent renewable resources the ability to curtail output in the face of negative market prices.
- **Strengthen the diversity, sustainability, and resilience of the bulk transmission and distribution systems, and local communities.** VCEA is not responsible for the transmission and distribution systems and this requirement is therefore not applicable to VCEA.
- **Enhance distribution systems and demand-side energy management.** At this point in its short existence, VCEA has not taken any action regarding demand side energy management. As highlighted in the Action Plan in section 4 below, VCEA plans to conduct studies regarding commencing programs that could include energy efficiency, demand response and other incentives for VCEA customers, once VCEA accrues sufficient financial reserves to start such activities. Until such time that VCEA starts any demand or efficiency programs, all such activities and programs will be the responsibility of PG&E as the distribution utility for VCEA.
- **Minimize localized air pollutants and other greenhouse gas emissions, with early priority on disadvantaged communities identified pursuant to Section 39711 of the Health and Safety Code.** See section 3.b.i below.

i. Local Air Pollutant Minimization

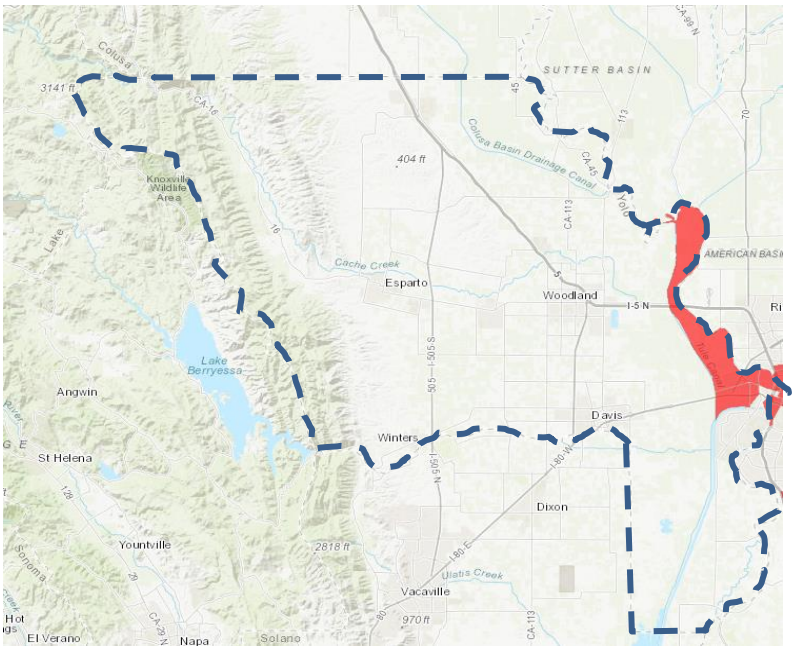
VCEA's Preferred Portfolio includes only renewable energy resources. These will be supplemented by additional market purchases of energy and resource adequacy to ensure a complete supply portfolio. VCEA's contract portfolio is therefore not expected to include any resources that adversely impact local air pollution.

CalEnviroScreen 3.0 shows that within Yolo County there are four census tracts that meet the Commission's criteria of identifying the top 25% of impacted areas. Of these, only one, namely area 101.02 is partially located in VCEA's service territory. The total number of households in this census tract

was 2,408 in 2016[10]. Based on a cross-comparison with VCEA customer addresses in this area, we estimate that less than 100 VCEA customer service accounts are located within this impacted area. According to the CalEnviroscreen 3.0 tool[11], the key reasons for this census tract falling within the top 25% appears to be risks associated with a combination of low income and environmental factors such as groundwater risks, cleanup sites, hazardous waste and air pollution. There are no power plants in this area. It should also be noted that the impacted areas are situated close to major transportation hubs that likely contribute to the rating.

VCEA owns no fossil fuel-fired generation, has no plans to procure energy under long term contract from, or to construct and own, fossil fuel-fired generation. Instead, VCEA will be procuring resources with a focus on renewable and carbon free energy which are not expected to have a significant impact on the census tracts identified by the CalEnviroScreen. To the extent there are any impacts we expect those to be beneficial through an overall focus on cleaner energy.

Figure 4. CalEnviroScreen 3.0 Results for Yolo County



VCEA's rate is designed to provide economic benefits for all rate payers, including disadvantaged communities. As part of the Action Plan described in chapter 4, we also plan to conduct studies to determine suitable programs and incentives that can be launched once VCEA accumulates sufficient financial reserves and cash flow to be able to run programs. Until further notice, PG&E will continue to make its programs for energy efficiency and demand response available to VCEA customers.

ii. Cost and Rate Analysis

VCEA's cost and rate analysis includes only an assessment of generation costs. VCEA recognizes that while areas such as transmission, distribution and programs are very important for the overall energy cost for

[10] 2016 US Census Bureau statistics for census tract 101.02 (https://www.census.gov/data/data-tools.html)
[11] https://oehha.ca.gov/media/downloads/calenviroscreen/document/ces3results.xlsx

VCEA customers , PG&E is responsible for the energy delivery infrastructure and any costs associated with this will likely be covered in PG&E's IRP filing.

Figure 5, shows a comparison of the estimated generation costs for VCEA in each of the years, 2018, 2022, 2026 and 2030 for the Preferred Portfolio as well as the other portfolios considered. The Figure also contrasts the estimated costs for VCEA's generation supply with the expected generation costs reported in the RESOLVE model's Reference System Plan. The results for VCEA's portfolios were derived by using the Commission provided tools, including the GHG Calculator and the RESOLVE modeling results and assumptions, as described in Section 2, above. Table 9 shows these results in Table format.

Figure 5. Estimated annual generation costs by resource portfolio (2016 $/MWh)

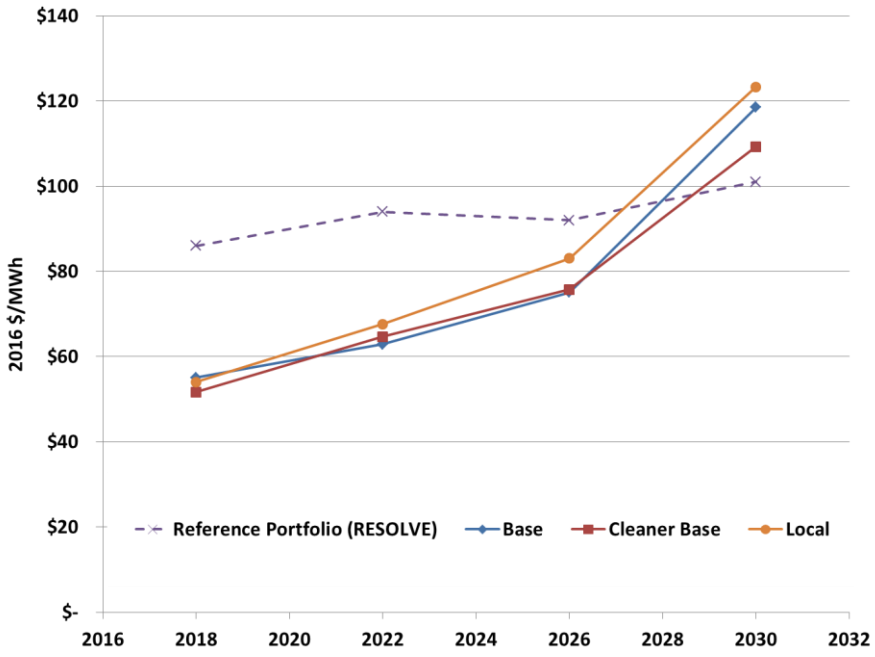


Table 9. Estimated annual generation costs ($/MWh)

Resource Portfolio	2018	2022	2026	2030
Base	$55.08	$62.90	$75.08	$118.49
Cleaner Base	$55.08	$64.65	$75.76	$109.28
Local	$55.08	$67.62	$83.05	$123.33
Reference System Plan (RESOLVE)	$86.00	$94.00	$92.00	$101.00

Table 9 and Figure 5 show that the Preferred Portfolio will remain below the RESOLVE model's estimated generation costs for the Reference System Plan except in the year 2030 when the Preferred portfolio will be slightly above the Reference System Plan's modeled generation costs. The main reason that VCEA's estimated portfolio costs exceed the results of the RESOLVE model, is likely that VCEA's model assumes that new capacity and RA will be procured at costs that are at or close to the levelized fixed cost of new storage whereas the RESOLVE model appears to have a (near) zero value for capacity in 2030. This implies

that if electricity markets get constrained to the point of needing new investments in capacity by 2030, market costs for energy and RA could be substantially higher than those approximated by the RESOLVE curve. Conversely, if the electricity market remains over-supplied with capacity as a result of declining demand and/or investments in capacity that are not motivated by reserve margin needs, the estimated costs for VCEA's portfolio alternative could go down to levels that are at or below the RESOLVE model generation cost benchmark.

VCEA's estimated costs include the estimated levelized costs for resources under contract. It is assumed that all renewable resources, existing or new, can be contracted at the estimated levelized costs for new resources of the RESOLVE model. It is further assumed that VCEA will get access to all attributes of resources that are under contract – energy, RA, RECs, local RA and ramping. VCEA plans to rely on market purchases for all energy and capacity needed beyond the renewable energy and capacity that will be under contract.

For market purchases, it is assumed that in the 2018-2021 period, energy and RA will be available at prices indicated through current RA prices in bilateral (or OTC) markets. Energy is expected to be available at prices corresponding to ICE's power futures prices for NP15. In the 2022-2030 period it is assumed that energy can be procured at the estimated hourly CAISO price reported for RESOLVE's Reference System Plan. It is also assumed that RA can be secured at a capacity corresponding to the lowest capacity cost between the traditional provider of capacity, a Gas-fired combustion turbine and the emerging capacity resource - 4-hour lithium ion batteries. Cost estimates displayed in the RESOLVE model suggests that from 2022 onwards, 4 hour battery storage capacity will be a lower cost alternative than conventional gas fired generation. This expectation is based on the assumption that the RA resource will operate for energy only infrequently and that sufficient resources will be available in the system to meet night time and winter energy demand.

When compared to the RESOLVE model's results, the Preferred portfolio compares favorably in terms of generation costs and by extension also rate impacts over the forecast period. However, the difference in the estimated costs of VCEA's portfolio and the RESOLVE model results implies that other LSEs could find a lower cost solution than the RESOLVE Reference System Plan, mainly due to new renewable resources having lower costs than the marginal cost of CAISO power. This, in turn, makes the RESOLVE model outcome increasingly unlikely as a market outcome and could potentially leave existing assets unable to recover their full costs. VCEA recommends that the Commission looks into this potential outcome to better understand overall results when aggregating individual LSE IRPs.

The generation cost estimates shown in Figure 5 and Table 9 do not include Power Charge Indifference Adjustment (PCIA). The PCIA is an important component of VCEA's generation that will significantly influence VCEA's ability to meet all statutory requirements versus its customers in line with 454.52.(a)(1).

The 2018 Year Ahead CAM List Final Allocation published by the Commission, indicates that there is a total of 1375.36MW of CAM resources available for the month of August[12]t. Using the estimated VCEA load share for 2030 published by the Commission in its 2030 GHG Benchmark ruling, VCEA would benefit from 0.9% of this capacity, or about 12MW, which in turn corresponds to about 5% of VCEA's anticipated RA requirement in the 2018-2030 period[13]. The financial costs or benefits of using CAM resources rather than generally available resources to meet VCEA's RA need in the forecast has not been accounted for in this IRP, but it is anticipated that the difference in cost should be small.

[12] http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442454905

[13] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M214/K459/214459514.PDF

b. Deviations from Current Resource Plans

At the time this report was prepared, there were no deviations from any other filed plans, considering that VCEA commenced operations only in June of 2018.

d. Local Needs Analysis

VCEA is not located in a defined Local Capacity Area. Furthermore, the CAISO's 2017-2018 Transmission Plan as well as the most recent local capacity assessment by the CAISO, suggests that the Central Valley where VCEA is located will not have any shortage of local capacity for the 2018-2027 period. However, VCEA will continue to procure its share of Resource Adequacy from defined constrained Local Capacity Areas as required by Resource Adequacy mandates. This may include Resource Adequacy available from renewable projects that VCEA may procure the output of that happen to be located in Local Capacity Areas within the NP-15 zone. VCEA expects that sufficient local capacity and flexible capacity will be available in the market throughout the forecast period.

4. Action Plan

VCEA only started to serve load for its customers on June 1, 2018. With the exception of one small hydro contract, VCEA's Initial operations are entirely based on energy and capacity procurement under short term contracts. VCEA also does not yet administer any programs relating to energy efficiency, demand response, or programs to stimulate electrification. Due to its short operational tenure to date, it is therefore important to perform a number of studies and resource solicitations to firm up VCEA's long term planning, resource choices, and strategy. In particular, key issues such as what resource types to focus on, the importance of a local resource supply and potential trade-offs between resource costs and other portfolio attributes still remain to be completed. The action plan items below highlights the key near term actions to be taken in the next 1-3 years, including activities to be performed in 2018.

a. Proposed Activities

VCEA expects that solar PV and battery storage will likely be key resources in any resource portfolio. However, the extent to which VCEA pursues local solar resources and the level of battery deployment will depend in part on the costs for solar and battery storage in different locations and at different scales. Developing better information on costs for local resources and the criteria under which VCEA wishes to engage contracting counterparties are therefore key actions in this Action Plan.

i. Long Term Renewable Procurement

VCEA will be conducting a long term solicitation in 2018 in which it will be seeking renewable power from RPS-qualifying renewable energy projects, with an expectation that power purchase agreements will be executed in early 2019. In support of this solicitation, VCEA will:

- Develop criteria/information requests to evaluate new renewable sources for projects implementing responsible siting practices (both environmental and land use).
- Develop Criteria for acceptable and preferred renewable technologies and locations.
- Develop criteria for, position on, procuring out-of-state renewable resources.
- Develop definition of "local" for renewable resource procurement.
- Determine whether to include battery or other storage options in solicitation.
- Develop criteria for assessing the portfolio content of local versus non local for short-list selection.
- Do a literature review on the economic impacts/value of locally sited renewable resources that could include values not typically included, such as secondary emissions benefits, job creation, environmental impacts, etc
- Determine whether to accept or give preference renewable project proposals that include integrated battery storage.

As part of the siting criteria established for the solicitation, VCEA will require that bidders identify whether their projects are located in areas with disadvantaged communities. For proposed projects located in disadvantaged communities, as defined in PUC 399.13(a)(7)(A-B), that can demonstrate that their project will provide environmental and economic benefits to that community, additional credit may be given in the selection scoring and ranking.

This long term renewable procurement directly supports achievement of the Preferred Portfolio, and will help make sure VCEA identifies sufficient capacity to meet RPS requirements for long term contracts.

ii. Establish Long Term Renewable and GHG Targets for 2030

VCEA's Preferred Portfolio is presented as a planned target for VCEA to achieve compliance with RPS requirements and the Commission's GHG emissions target and go beyond statutory mandates. One of VCEA's long term goals is to exceed the renewable portfolio content and have lower GHG emissions intensity than PG&E, the legacy utility for Yolo County. VCEA will continue to assess the most cost-effective ways to achieve a cleaner supply portfolio and plan on using the results from resource solicitations to discover the local cost of renewable energy options and storage in Yolo County and surrounding areas. This activity will also involve

- Assess whether VCEA should bifurcate its portfolio to meet the varying sustainability goals of its Members
- Conduct document review of other entities' climate action plans to inform on extent of aggressive goals established by other entities
- Develop policy proposal for tradeoffs between costs, GHG emissions, local renewable content, etc

iii. Key Portfolio Performance Indicators

Develop metrics to track aspects of the portfolio performance relative to a baseline/comparison metrics. These indicators are also intended to facilitate member jurisdiction's work on their own policy such as Climate Action Plans.

iv. Evaluate Impacts of Climate Change on Load Forecast

Evaluate methods for incorporating the impacts of climate change on expected future loads (particularly peak loads).

v. Evaluate impacts of electrification on Load Forecast

Evaluate methods for incorporating electrification initiatives (e.g., all electric buildings, clean local mobility services, ag pumping conversion) on expected future loads (load profiles as well as peak loads).

vi. Evaluate options for assuming responsibility for energy efficiency/demand side programs from PG&E

Evaluate the scope of effort to assume control of energy efficiency and demand side management programs for VCEA and determine what kinds of programs VCEA would implement if pursuing such programs

vii. Evaluate non-battery storage and flexible demand options

Investigate non-battery storage technologies and demand response options

- Identify trends that may impact VCEA's long term demand forecast and/or load shifting opportunities
- Determine program options or investments consistent with market and technology trends and cost of service goals.

b. Barrier Analysis

VCEA does not own any generating assets and does , nor does it have any Long Term power purchase agreements with existing facilities. VCEA expects to enter into long term contracts for renewable energy capacity in 2018 and 2019 to meet its resource needs in line with the Preferred Portfolio identified in this report. It is anticipated that sufficient competitive offers are submitted. If costs are higher or resource offers fewer than anticipated, this could trigger changes in the Preferred Portfolio.

One of the challenges for VCEA as a recently formed JPA is to obtain and manage the financial security required by counterparties to successfully enter into the amount of long term contracts for renewable energy required by SB350 (399.13 (b)). This cost will be factored in the evaluation of proposed projects during the solicitation process.

An ongoing risk for VCEA as well as all parties entering into long term contracts in line with the requirement in PUC Section 399.13 (b) is falling costs of new renewable energy and battery storage. If costs for new resources continue to fall in line with historical trends, there is a risk that VCEA and other CCAs entering into long term contracts will eventually encounter above-market costs in their contracted portfolios that need to be accounted for through the PCIA or similar mechanism by which CCA customers opting out of a CCA program can be subject to PCIA charges in the same manners as IOUs use the PCIA today.

VCEA does not anticipate securing all of its resource needs through long term contracts. In fact, VCEA plans to only contract for renewable energy resources and procure the remaining balancing capacity and energy needed for its load through short term contracts and spot market purchases of energy, RECs, and capacity. This exposes VCEA to market price risks. In line with the results shown in the RESOLVE model as well as recent work by the CAISO for RA, VCEA expects sufficient energy and capacity resources to be available throughout the 2018-2030 period. Natural gas market forecasts also suggest that gas prices (and thereby marginal power prices) are expected to remain low over the foreseeable future, which means electric power prices also should remain low or moderate. Should market conditions tighten, for example through gas price increases or faster than expected tightening of the supply and demand balance in California's power markets, this could result in higher costs for meeting load and therefore also higher rates. VCEA plans to manage this risk by continuously assessing risks and opportunities associated with contracting in line with its risk policy.

c. Proposed Commission Direction

Not Applicable. VCEA is not seeking direction from the Commission at this time

5. Data

In this report, VCEA has considered three resource portfolios. The files with resource templates for new and existing resources are referenced below and were submitted separately using the Commission mandated spreadsheet templates. For the purposes of this IRP, VCEA has not modified the IEPR load forecast or any of the associated load modifiers, including the load shape, which is based on PG&E's hourly load shape.

[3] Available at: http://www.cpuc.ca.gov/irp/filingtemplates/.

[4] Available at: http://www.cpuc.ca.gov/irp/filingtemplates/.

a. Baseline Resource Data Template

To be completed

b. New Resource Data Template

To be completed

c. Other Data Reporting Guidelines

6. Lessons Learned

To be completed

Glossary of Terms

Alternative Portfolio – LSEs are permitted to submit "Alternative Portfolios" developed from scenarios using different assumptions from those used in the Reference System Plan. Any deviations from the Conforming Portfolio must be explained and justified.

Conforming Portfolio – Each LSE must produce a "Conforming Portfolio" that is demonstrated to be consistent with the Reference System Portfolio according to the following criteria: (1) use of either the GHG Planning Prices or the LSE-Specific 2030 GHG Emissions Benchmark, and (2) use of input assumptions matching those used in developing the Reference System Portfolio

Data Template – Data provided by the LSE should be reported in the "Baseline Resource Data Template" and the "New Resource Data Template" provided by the Commission. "Baseline" means existing resources and costs, including resources already contracted but not yet online. "New" means any new (incremental to the baseline) resources and costs associated with a particular LSE portfolio.

Disadvantaged Communities – For the purposes of IRP, and consistent with the results of the California Communities Environmental Health Screening Tool Version 3 (CalEnviroScreen 3.0), "disadvantaged communities" refer to the 25% highest scoring census tracts in the state along with the 22 census tracts that score in the highest 5% of CalEnviroScreen's pollution burden, but which do not have an overall CalEnviroScreen score because of unreliable socioeconomic or health data.

GHG Emissions Benchmark – Each LSE filing a Standard LSE Plan must use either the GHG Emissions Benchmark or GHG Planning Price in developing its Conforming Portfolio. The LSE-specific benchmarks and calculation method are provided in Table B. If the total emissions attributable to the LSE's preferred portfolio exceed its GHG Emissions Benchmark for 2030, the LSE must explain the difference and describe additional measures it would take over the following 1 - 3 years to close the gap, along with the cost of those measures.

GHG Planning Price –The GHG Planning Price is equivalent to the marginal cost of GHG abatement associated with the 42 MMT Scenario for the years 2018 to 2026 (i.e., a curve that slopes upward from ~$15/ton to ~$23/ton), followed by a straight-line increase from ~$23/ton in 2026 to $150/ton in 2030, as shown in Table A. Each LSE must use either the GHG Planning Price or GHG Emissions Benchmark in developing its Conforming Portfolio.

IRP Planning Horizon – The IRP Planning Horizon will typically cover 20 years. However, for the purposes of this IRP 2017-18 cycle, the IRP Planning Horizon will cover only up to the year 2030.

Long term – 10 or more years (unless otherwise specified)

Portfolio – A portfolio is a set of supply and/or demand resources with certain attributes that together serve a particular level of load.

Preferred Portfolio – Among all the portfolios developed by the LSE, the LSE will identify one as the most suitable to its own needs, deemed its "Preferred Portfolio." Any deviations from the Conforming Portfolio must be justified and explained.

Reference System Plan – The Reference System Plan refers to the Commission-approved integrated resource plan that includes an optimal portfolio (Reference System Portfolio) of future resources for

serving load in the CAISO balancing authority area and meeting multiple state goals, including meeting GHG reduction and reliability targets at least cost.

Reference System Portfolio – The Reference System Plan refers to the Commission-approved portfolio that is responsive to statutory requirements per Pub. Util. Code 454.51; it is part of the Reference System Plan.

Scenario – A scenario is a portfolio together with a set of assumptions about future conditions.

Short term – 1 to 3 years (unless otherwise specified)

Standard LSE Plan – A Standard LSE Plan is the type of integrated resource plan that an LSE is required to file if its assigned load forecast is ≥ 700 GWh in any of the first five years of the IRP planning horizon.

Standard LSE Plan Template – Each LSE required to file a Standard LSE Plan must use the Standard LSE Plan Template according to the instructions provided herein.

(End of Attachment A)

Attachment B
Proposed Final Action Plan

1. Long Term Renewable Procurement

In 2018, VCEA will conduct a solicitation and evaluation of proposals for the purchase of energy from existing or new RPS qualifying renewable energy resources with the ultimate goal of executing long term power purchase agreements, and an expectation that resulting power purchase agreements will be executed in 2019.

Additional related actions planned:

- Develop criteria/information requests to evaluate new renewables for projects implementing responsible siting practices (both environmental and land use). Develop associated evaluation criteria.
- Develop criteria for acceptable and preferred renewable technologies and locations (e.g. local vs. remote).
- Develop position on procuring out-of-state resources. Develop criteria defining limits on which states VCEA will procure long term renewables from.
- Develop a position on the definition of "local" for renewable resource procurement.
- Determine whether to include battery or other storage options in solicitation.
- Develop criteria for assessing the portfolio content of local versus non local for short-list selection.
- Do a literature review on the economic impacts/value of locally sited renewable resources.

As part of the siting criteria established for the solicitation, VCEA will require that bidders identify whether their projects are located in areas with disadvantaged communities. For proposed projects located in disadvantaged communities, as defined in PUC 399.13(a)(7)(A-B), that can demonstrate that their project will provide environmental and economic benefits to that community, additional credit may be given in the selection scoring and ranking.

This long term renewable procurement directly supports achievement of the Preferred Portfolio, and will help make sure VCEA identifies sufficient capacity to meet RPS requirements for long term contracts.

2. Establish Renewable and GHG Targets for 2030

VCEA's Preferred Portfolio is presented as a planned target for VCEA to achieve compliance with RPS requirements and the Commission's GHG emissions target and go beyond statutory mandates. One of VCEA's long term goals is to exceed the renewable portfolio content and have lower GHG emissions intensity than PG&E, the legacy utility for Yolo County. VCEA will continue to assess the most cost-effective ways to achieve a cleaner supply portfolio and plan on using the results from resource solicitations to discover the local cost of renewable energy options and storage in Yolo County and surrounding areas. This activity will also involve

Additional related actions planned:

- Assess whether VCEA should bifurcate its portfolio to meet the varying sustainability goals of its Members.
- Conduct document review of other entities' climate action plans to inform on extent of aggressive goals established by other entities.
- Develop policy proposal for tradeoffs between costs, GHG emissions, local renewable content, out-of-state resources, impact to different stakeholder groups and disadvantaged communities, etc.

3. Key Portfolio Performance Indicator

Develop metrics to track aspects of the portfolio performance relative to a baseline/comparison metrics. These indicators are also intended to facilitate member jurisdiction's work on their own policy such as Climate Action Plans and impact on disadvantaged communities.

4. Evaluate impacts of electrification on load forecast

Evaluate methods for incorporating electrification initiatives (e.g., all electric buildings, clean local mobility services, ag pumping conversion) on expected future loads (load profiles as well as peak loads).

5. Evaluate Impacts of Climate Change on Load Forecast

Evaluate methods for incorporating the impacts of climate change on expected future loads (particularly peak loads).

6. Evaluate Options for Assuming Responsibility for Energy Efficiency/Demand Side Programs from PG&E

Evaluate the scope and costs of effort to assume control of energy efficiency and demand side management programs required by CPUC or other regulations, and what kinds of programs VCEA would implement if it assumed control.

7. Evaluate Non-Battery Storage and Demand Response Options

Investigate other demand response program options and non-battery storage technologies and their cost effectiveness.

- Identify trends that may impact VCEA's long term demand forecast and/or load shifting opportunities.
- Determine program options or investments consistent with market and technology trends and cost of service goals.

Attachment C
CAC Members Priority Ranking

CAC IRP Proposed Prioritization of Action Plan Activities				
	Suggested Priority Ranking			
List of Action Plan Activities	***SMUD-GB-LK-MA**	**Tom Flynn (TF)**	**Christine Shewmaker (CR)**	**Suggested Changes/Comments:**
Long Term Procurement	1	1	1	TF: Suggested the following additions/revisions: 3. Develop position on producing out of state resources. Develop criteria defining limits on which states to procure long term renewables from. 4. Develop a definition of "local" renewable resource procurement. 5. Determine whether to continue battery or other storage options in solicitation.
Establish Renewables	2	2	2	TF: Commented that the first sentence "[c]conduct studies to evaluate in more detail the costs and ability of VCEA to achieve greater than 50% RPS by 2030, when carbon neutrality might be able to be **achieved**" stating that "this sentence is confusing and could have different meanings depending on what is intended here. Do we want to know when we can achieve carbon neutrality? It is our hope that this can occur by 2030?" 3. add verbiage to this sentence " develop ... local renewable content, **out-of-state** resources, etc.".
Key Portfolio Performance Indicators	3	3	5	
Evaluate Impacts of Climate Change on Load Forecast	4	4	3	
Evaluate Impacts of Electrification on Load Forecast	-	-	4	
Evaluate Options for Assuming Responsibility for Energy Efficiency/Demand Side Programs from PG&E	5	5	7	TF: Suggested to insert "including cost" after the word "effort", to read as "... scope of effort **including cost** to assume control..."
Evaluate Non-Battery Storage and Demand Response Options	6	6	6	

*** SMUD's original list with comments/suggestions from Gerry Braun, Lorenzo Kristov, and Mark Aulman incorporated.**

7/2/2018