CITY OF MENLO PARK

## REGULAR MEETING AGENDA

**Date:** **10/28/2015**
**Time:** **6:30 p.m.**
**City Hall/Administration Building**
**City Council Conference Room, 1st Floor**
**701 Laurel St., Menlo Park, CA 94025**

**A. Call To Order**

**B. Roll Call – Barnes, Chair Bedwell, DeCardy, Kuntz-Duriseti, Marshall, Vice Chair Martin, Smolke**

**C. Public Comment**

Under "Public Comment," the public may address the Commission on any subject not listed on the agenda. Each speaker may address the Commission once under Public Comment for a limit of three minutes. Please clearly state your name and address or political jurisdiction in which you live. The Commission cannot act on items not listed on the agenda and, therefore, the Commission cannot respond to non-agenda issues brought up under Public Comment other than to provide general information.

**D. Regular Business**

D1. Discuss and possibly recommend to City Council the Bicycle Commission proposed Oak Grove-University bike boulevard – 15 mins

D2. Receive informational arborist report– 30 mins

D3. Discuss and potentially make a recommendation to City Council on San Mateo County Community Choice Energy (Attachment) – 30 mins

D4. Discuss quarterly report to City Council – 10 mins

D5. Discuss EQC Work Plan items upcoming (Attachment) – 15 mins

D6. Receive quarterly recycling update – 10 mins

D7. Discuss and possibly approve the December 9, 2015 EQC meeting location – 2 mins

D8. Approve September 30, 2015 Environmental Quality Commission special meeting minutes (Attachment) – 2 mins

## E. Committee/Subcommittee Reports

E1. General Plan Subcommittee – Briefing from committee regarding comments delivered to City Council on October 6, 2015 and meeting with Planning Department staff– 10 mins

E2. Future agenda items – 5 mins

## F. Reports and Announcements

F1. Update on WELO informational item delivered to City Council on October 6, 2015 (Attachment) – 2 mins

F2. Menlo Park blog update from October 9, 2015 – 2 mins

F3. Climate Action Plan (CAP) update on informational item delivered to City Council on October 20, 2015 (Attachment) – 2 mins

F4. Future agenda items – 2 mins

## G. Adjournment

Agendas are posted in accordance with Government Code Section 54954.2(a) or Section 54956. Members of the public can view electronic agendas and staff reports by accessing the City website at www.menlopark.org and can receive e-mail notification of agenda and staff report postings by subscribing to the "Notify Me" service at menlopark.org/notifyme. Agendas and staff reports may also be obtained by contacting Heather Abrams, Environmental Services Manager, at 650-330-6765. (Posted: 10/23/2015)

At every Regular Meeting of the Commission, in addition to the Public Comment period where the public shall have the right to address the Commission on any matters of public interest not listed on the agenda, members of the public have the right to directly address the Commission on any item listed on the agenda at a time designated by the Chair, either before or during the Commission's consideration of the item.

At every Special Meeting of the Commission, members of the public have the right to directly address the Commission on any item listed on the agenda at a time designated by the Chair, either before or during consideration of the item.

Any writing that is distributed to a majority of the Commission by any person in connection with an agenda item is a public record (subject to any exemption under the Public Records Act) and is available for inspection at the City Clerk's Office, 701 Laurel St., Menlo Park, CA 94025 during regular business hours.

Persons with disabilities, who require auxiliary aids or services in attending or participating in Commission meetings, may call the City Clerk's Office at 650-330-6620.

CITY OF MENLO PARK

## STAFF REPORT

**Environmental Quality Commission**
**Meeting Date:** **10/28/2015**
**Staff Report Number:** **15-007-EQC**

**Regular Business:** **Discuss Peninsula Clean Energy, a Community Choice Energy effort sponsored by San Mateo County**

### Recommendation

Staff requests that the Environmental Quality Commission (EQC) review and provide feedback on Peninsula Clean Energy (PCE), a Community Choice Energy (CCE) effort sponsored by San Mateo County (SMC).

### Policy Issues

The Menlo Park 2015 Climate Action Plan (CAP) describes a number of programs that are planned in order to meet the City Council adopted target of 27% reduction in greenhouse gas (GHG) by 2020 from 2005 levels. The following is a link to the 2015 CAP: http://www.menlopark.org/DocumentCenter/View/8414

One of the most significant programs is Community Choice Energy (CCE), because CCE has the possibility of significantly reducing the GHG emissions associated with electricity use throughout Menlo Park, without requiring building or behavior changes. CCE would provide the largest single contribution to reducing Menlo Park's GHG emissions. If the City decides to participate in San Mateo County's CCE, future Council action will be needed to:

- Join the Peninsula Clean Energy (PCE) Joint Powers Authority (JPA) that will direct the PCE (Attachment A); and
- Adopt an ordinance to implement the PCE for Menlo Park (Attachment B shows the model ordinance).

### Background

San Mateo County (SMC) Office of Sustainability has been organizing efforts to initiate a San Mateo countywide Community Choice Energy (CCE) option, which could reduce Greenhouse Gas (GHG) emissions from energy sources.

In September 2015, SMC released its draft technical feasibility study on the CCE (Attachment C), which estimates GHG reductions and costs for three levels of renewable electrical power. The study provides enough information for the City to begin considering SMC's CCE option, called PCE.

If the City joins the JPA and adopts the ordinance, residents and businesses within the City will receive electrical power purchased through PCE and delivered through the Pacific Gas & Electric (PG&E) grid. CCEs by their nature are an opt out process, thus all customers will participate, unless they opt out to stay with PG&E purchased power. Because the electrical grid maintenance and billing would continue to be provided by PG&E, CCEs are frequently characterized as "the biggest change you will never notice".

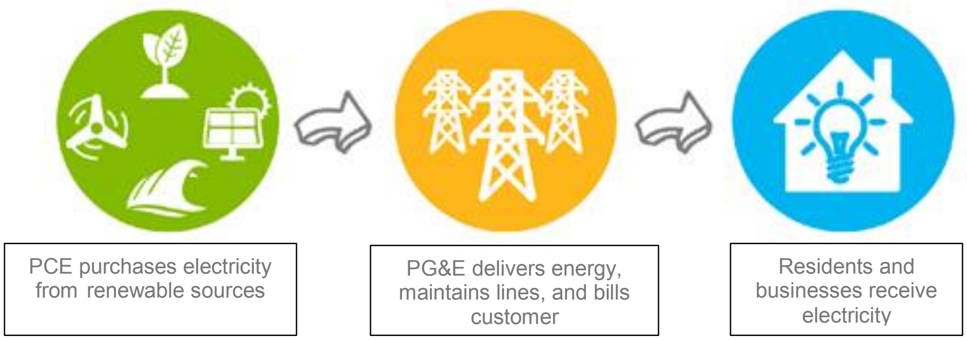
Staff is asking the City Council to provide the following:

- Feedback on the PCE technical study and JPA documents
- Identify any outstanding questions, information or analysis needs

State Law and Precedent

In 2002 the State of California enacted AB 117, which enabled Community Choice Aggregation (CCA), also known as CCE. This enables local governments individually or together in a JPA to purchase energy which will then be fed onto the distribution grid. In Menlo Park and San Mateo County electricity and natural gas is distributed by the Investor Owned Utility (IOU), PG&E.

Below is an infographic provided by PCE that helps explain where it fits in the electricity supply chain:




In California, there are currently three operating CCEs:

- Marin Clean Energy (MCE) began operation in 2010 and serves approximately 80% of businesses and residents in Marin County, the Cities within Marin County, and several Cities outside of Marin County
- Sonoma Clean Power (SCP) began operation in 2012 and serves approximately 80% of businesses and residents in Sonoma County and the Cities within Sonoma County
- Lancaster Choice Energy (LCE) began operation in 2015 and currently serves the City of Lancaster operations and plans to phase in service to businesses and residents in the near future

Each of the three operating CCEs in California provides electrical power, and two of them provide electrical power through the PG&E grid. There are several other CCEs in development within California, including Clean SF which plans to launch in 2016, Silicon Valley Community Choice Energy Partnership (member cities include Sunnyvale, Mountain View, Cupertino and the City of Santa Clara), Contra Costa County, and CCE advocacy efforts in Oakland and the Central Coast. There are also many more CCEs throughout the nation, some of which provide electrical and natural gas power.

Once a CCE is formed, the CCE will purchase power from private power companies that routinely build renewable and conventional power plants and sell power to utilities and direct purchase customers.

SMC CCE Efforts to Date

On December 9, 2014 SMC first presented CCA to the Board of Supervisors (http://www.menlopark.org/DocumentCenter/View/8562)

On February 24, 2015 SMC appropriated funds to begin the CCE process (http://www.menlopark.org/DocumentCenter/View/8563)

On May 19, 2015, SMC approved a consulting agreement to complete a technical feasibility study for a San Mateo Countywide CCE (http://www.menlopark.org/DocumentCenter/View/8564)

On October 6, 2015 the SMC Board hosted a study session on the PCE technical study.

(http://www.menlopark.org/DocumentCenter/View/8561)

On October 20, 2015 the SMC Board completed the first reading of its CCE ordinance.

(http://www.menlopark.org/DocumentCenter/View/8565)

SMC plans to fund the costs for PCE start up. In the future, SMC anticipates recouping its costs as part of the PCE rate structure.

The SMC Department of Sustainability established a CCE Community Advisory Committee (CAC) in May 2015, on which Mayor Carlton has served as a member and Heather Abrams, the City Environmental Programs Manager, has attended as an alternate. More information about the CCE CAC can be found on the County's webpage: http://green.smcgov.org/san-mateo-county-cce-advisory-committee-page

SMC has been providing outreach to the public regarding PCE (http://green.smcgov.org/outreach-kit) and once a JPA is formed and the member agencies adopt their CCE ordinances, PCE will provide outreach to the public regarding its services and opt-out options.

## Analysis

Menlo Park EQC Consideration of CCE

Since January 2015, the Environmental Quality Commission (EQC), has been investigating CCE options, including a number of presentations from local non-profits regarding CCEs. In August 2015, the EQC hosted a presentation on CCEs by Jim Eggemeyer, SMC Office of Sustainability Director (Attachment D). In September 2015, the EQC had a presentation from PG&E to understand the "base case" of renewable power portfolio options that PG&E provides. The EQC has provided City Council with a letter regarding the City's Climate Action Plan that emphasizes the GHG reduction benefits of a CCE that purchases 100% renewable power; however, the EQC has not yet had an opportunity to provide a recommendation following the release of the PCE technical study (Attachment E is a copy of the EQC's letter) .

PCE Draft Technical Feasibility Study Results

PCE's draft technical study was released in September to better understand and explain the benefits and liabilities of forming a CCE. The study establishes that PCE will be financially viable, and includes a cost benefit analysis for the entire PCE, a sensitivity analysis to show the range of rates for each of three scenarios, and a risk analysis. Attachment E contains a full copy of the September 24, 2015 presentation to the CCE CAC regarding the technical feasibility study.

The PCE technical study evaluated three main options:

- Scenario 1: 35% renewable power portfolio
- Scenario 2: 50% renewable power portfolio
- Scenario 3:100% renewable power portfolio

Below is a summary of the study results comparing each of the three options in the first year of operation:

Figure 2

## Summary of Scenario Results: Year 1

| Key Considerations | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| General Environmental Benefits | 35% Renewable<br>35% GHG-Free | 50% Renewable<br>63% GHG-Free | 100% Renewable<br>100% GHG-Free |
| Rate Competitiveness | Average 6% savings relative to PG&E rate projections | Average 4% savings relative to PG&E rate projections | Average 2% increase relative to PG&E rate projections |
| Projected Residential Customer Cost Impacts[1]<br>[1]Average monthly usage for PCE residential customers ≈ 450 kWh | Average $5.40 monthly cost savings relative to PG&E rate projections | Average $4.05 monthly cost savings relative to PG&E rate projections | Average $1.80 monthly cost increase relative to PG&E rate projections |
| Assumed PCE Participation | 85% customer participation rate assumed across all customer groups | 85% customer participation rate assumed across all customer groups | 75% customer participation rate assumed for residential and small commercial customers; 50% for all other groups |
| Comparative GHG Emissions Impacts | 0.278 metric tons $CO_2$/MWh emissions rate; additional GHG emissions of ≈136,000 metric tons in Year 1 | 0.115 metric tons $CO_2$/MWh emissions rate; ≈75,000 metric ton GHG emissions reduction in Year 1 | Zero emissions rate; ≈130,000 metric ton GHG emissions reduction in Year 1 |

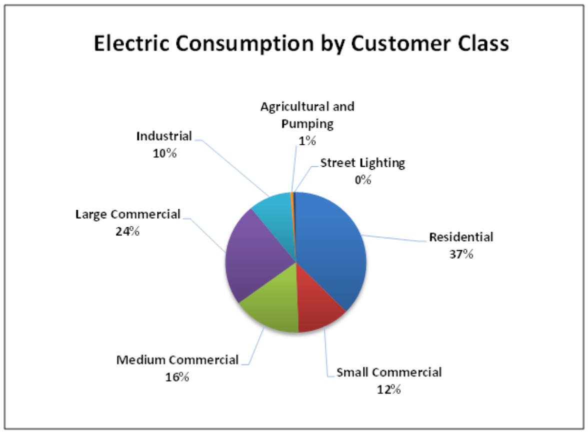
For the purposes of the study, SMC's consultants Pacific Energy Advisors, Inc. (PEA) evaluated the above three scenarios over a 10 year planning horizon, however, once the JPA is formed, it will establish the specific offerings and its Board of Directors will continue to evaluate the energy portfolio and program offerings. It is expected that PCE would follow the model of MCE and SPC by initially provide one main offering (with an opt out provision) and would expand over time to offer additional options. For example, MCE and SPC both offer 50% renewable as their base option at slightly lower cost than PG&E. Customers who do not wish to participate can opt out and go back to PG&E without penalty nor disruption of their service. Customers who wish to purchase a higher percentage of renewable power may opt in to a 100% renewable power or a local solar program at prices slightly higher than current PG&E rates.

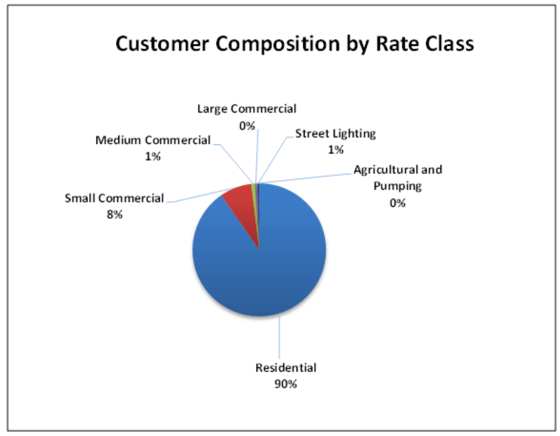
PCE Decision Points

To summarize the Scenario Results table above, Scenario 1 does not appear viable as it does not meet PCE's objective of reducing GHG emissions. Scenario 2 appears attractive because it meets PCE's objectives of reducing GHG emissions and reducing costs to customers. Scenario 3 provides an even more attractive GHG reduction; however it comes at a small additional cost (estimated to be 2% above PG&E's current rates, which provide 27% renewable power). Because of the additional cost, PEA estimates a larger number of customers will opt out of Scenario 3, especially among larger commercial customers.

As shown in the Chart below from Attachment F, which is the SMC Technical Study Results Presentation dated September 24, 2015, residential customers out number commercial customers significantly; however commercial customers use more electricity overall than residential customers.

Figure 3




<u>Options for 100% Renewable Power</u>

Procuring 100% renewable power could have a very significant impact in lowering Menlo Park's GHG emissions, no other single program promises a comparable amount of GHG reduction. Since some Menlo Park community members have expressed a deep interest in 100% renewable power, the CCE CAC has established that it is possible for individual communities within PCE to set a base offering of 100% renewable power, with an individual customer option to opt down to 50% renewable power, or opt out to PG&E.

Below is an overview of the sensitivity analysis performed by PEA, which illustrates that the ranges of rates in each of the scenarios (measured in cents per kilowatt hours) are quite close. PEA estimates that 100% renewable power will cost 2% more than current PG&E rates, however, the range of Scenario 3 100% renewable power and the range of PG&E bundled power have significant overlap. Once PCE procures specific power contracts and PG&E rates continue to change, it is possible that the cost difference will shrink or expand.

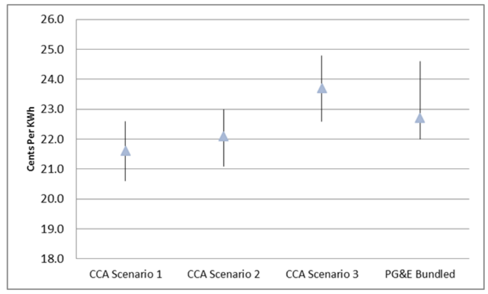
Figure 4

## Sensitivity Analysis Overview

- Six sensitivities were tested (high and low cases):
  - Natural gas prices
  - Renewable energy prices*
  - Carbon Free energy prices
  - PG&E generation rates*
  - PG&E exit fees*
  - Opt-out rates

*Key comparative influences

**Range of Electric Rate Impacts by Scenario**




<u>Risk Analysis</u>

The main risks associated with CCEs can be summarized in the following four categories:

- Rate risk – the risks that PCE rates are higher than PG&E's rates
- Opt out risk – the risk that opt out rates are higher than expected and PCE is thus not financially viable
- Operational risk – the risks associated with commodity, credit, vendor default, poor management and oversight
- Regulatory risk – the risk that unfavorable state legislation or regulations could disrupt PCE's operation or threaten its viability

SMC's technical study provides clarity in addressing rate and opt out risks, and indicates that PCE appears viable. Operational risk will be addressed in the formation of the JPA, procurement of its power sources, and selection of its staff. Regulatory risk appears to be low as CCE's goals generally align with state goals to reduce GHG emissions and three CCEs are now successfully serving customers in California.

Based on experience with other California CCEs, there is no risk that customers will suffer power outages, switching issues, or customer service degradation by participating in the PCE. Many CCEs have been able to offer more attractive rates for residents and businesses that install distributed solar projects on their properties, and more attractive rates for distributed solar is considered a community benefit. In all CCEs, customers who opt out may opt in later (often after a waiting period). MCE and SPC have grown their market share as customers who originally opted out are now opting in based on the performance these established CCEs have now demonstrated.
If Menlo Park joins the PCE, its customers will still have access to PG&E energy efficiency programs, and may have access to additional programs through the PCE. The JPA structure insulates individual cites from the financial risks of PCE's business, and allows public input in the form of a JPA Board of Directors. In the current market, there appears to be adequate renewable power to supply PCE, hydropower is more uncertain than it has been in past years due to the drought; however economically competitive renewable solar and wind power plants continue to be built in California and the Western United States. Joining the PCE could create jobs and opportunities to build renewable power projects within SMC.

Additional Considerations:

- PCE would be governed by a Board of Directors, likely made up of elected officials from the member cities
  - Some customers prefer a private business model, some prefer public governance
  - Decisions will be made by the Board, so individual cities will not have control of all decisions; however Board formation and voting rules in other CCEs appear to provide a fair balance of decision making power between members
- Formation of PCE is a complex topic
  - Community engagement and outreach will be required from SMC and the prospective PCE member cities
  - Legal review of JPA documents will be required form the Cities and SMC
- Additional CCE options exist
  - Several private CCA providers offer individual Cities an option to from their own CCA and establish their power portfolio and rates individually
  - Existing and forming CCAs may be willing to accept new members in the future, which creates an additional option for cities that choose not to join PCE

Questions to Consider

- What additional information is needed to consider joining PCE?
- Which of the key considerations in Figure 2 are most important to Menlo Park?
- Which of the three Scenarios in Figure 2 does EQC recommend as a base offering?
- Does the City require specialized legal or consulting review of PCE?
- Does the EQC recommend devoting resources and time to investigate other CCA options, outside of PCE?
- If the City considers other CCA options, what are the main goals in selecting a CCA option; are there unacceptable options?
- How do one or two main goal track with the criteria the EQC has adopted for evaluating CCA options?
- Does the EQC recommend that consideration of PCE is a high, medium, or low priority?
- Is the consideration of other CCA options a high, medium, or low priority?

Next Steps

On October 20, 2015, the City Council received an informational item on PCE. The following is a link to the report: http://www.menlopark.org/DocumentCenter/View/8415

As a follow up, this study session was scheduled to include a presentation by SMC and to widen the discussion regarding PCE.

SMC has set a tentative deadline for Cities to join the PCE JPA and adopt the PCE ordinance by the end of February to be an initial member. Once the initial member Cities join PCE, they will form the JPA Board and determine the policies of PCE. Staff is currently working with SMC to determine if there is flexibility in this deadline.

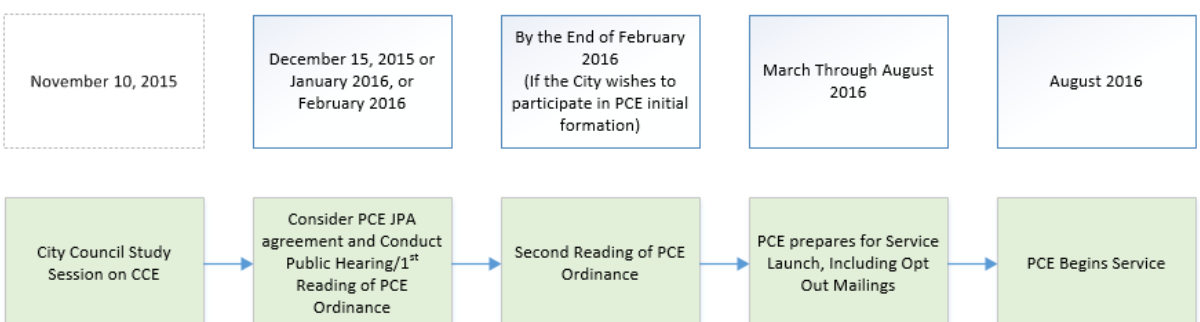
For any Cities that do not meet the February deadline or opt not to participate in PCE formation, there may be an opportunity to join at a later date. However joining later may require a fee to join. Cities that join later will have less influence over the formation of PCE, but they will join with a clearer understanding of the services and rates PCE will ultimately offer. SMC has proposed the following timeline for PCE formation. Once formation is complete, PCE will conduct required noticing to customers regarding the opt out period and then begin providing service.

*San Mateo County proposes an August 2016 Launch.*


| January -September 2015 | Oct 2015 – February 2016 | March – August 2016 |
|---|---|---|
| **Pre-Planning & Due Diligence** | **Community Outreach; PCE Planning & Development** | **Preparing for Launch** |
| • Internal planning team<br>• Initial outreach to cities and key stakeholders<br>• Workshops & education<br>• Formation of CCE advisory committee<br>• CCE technical study complete (go/no-go) | • PCE Program & JPA design<br>• City outreach/Passage of local ordinances<br>• Impl. Plan Submitted<br>• RFP for Energy Services<br>• Plan for JPA staffing/working capital<br>• Community outreach | • First JPA Board meeting<br>• Energy supply and other service contracts<br>• Utility Service Agmt.<br>• Regulatory Registrations<br>• Marketing Campaign<br>• Call Center & Customer Enrollment |

Timeline for Menlo Park Action

The graphic below shows a timeline for the City in considering PCE in order to participate in the formation of the PCE.




## Impact on City Resources

The cost and staff time for consideration of PCE and other CCA options were budgeted in the City's Capital Improvement Program for 2015-2016. No additional funds are currently being requested.

## Environmental Review

An Environmental Review is not required for this item.

**Public Notice**

Public Notification was achieved by posting the agenda, with the agenda items being listed, at least 72 hours prior to the meeting.

**Attachments**

A. PCE Draft JPA agreement
B. PCE Draft Model Ordinance
C. Draft PCE Technical Study, dated September 18, 2015
D. EQC staff report dated August 26, 2015 regarding EQC consideration of CCE and including presentation slides from SMC
E. EQC letter regarding the City's Climate Action Plan and the role of 100% renewable power in a CCE in meeting the City's GJHG reduction targets
F. SMC Community Choice Aggregation: Technical Study Results Presentation dated September 24, 2015

Report prepared by:
Heather Abrams, Environmental Programs Manager

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## JOINT EXERCISE OF POWERS AGREEMENT RELATING TO

## AND CREATING THE

# PENINSULA CLEAN ENERGY AUTHORITY OF SAN MATEO COUNTY

This Joint Exercise of Powers Agreement ("Agreement"), effective as of ___________________, is made and entered into pursuant to the provisions of Title 1, Division 7, Chapter 5, Article 1 (Sections 6500 et seq.) of the California Government Code relating to the joint exercise of powers among the parties set forth in Exhibit B ("Parties"), and establishes the Peninsula Clean Energy Authority, is by and between the County of San Mateo ("County") and those cities and towns within the County of San Mateo who become signatories to this Agreement, and relates to the joint exercise of powers among the signatories hereto, hereafter individually referred to as "Party" and collectively referred to as "Parties."

## RECITALS

A. The Parties share various powers under California law, including but not limited to the power to purchase, supply, and aggregate electricity for themselves and customers within their jurisdictions.

B. In 2006, the State Legislature adopted AB 32, the Global Warming Solutions Act, which mandates a reduction in greenhouse gas emissions in 2020 to 1990 levels. The California Air Resources Board is promulgating regulations to implement AB 32 which will require local governments to develop programs to reduce greenhouse gas emissions.

C. The purposes for the entering into this Agreement include:

   a. Reducing greenhouse gas emissions related to the use of power in San Mateo County and neighboring regions;

   b. Providing electric power and other forms of energy to customers at a competitive cost;

   c. Carrying out programs to reduce energy consumption;

   d. Stimulating and sustaining the local economy by developing local jobs in renewable energy; and

   e. Promoting long-term electric rate stability and energy security and reliability for residents through local control of electric generation resources.

D. It is the intent of this Agreement to promote the development and use of a wide range of renewable energy sources and energy efficiency programs, including but not limited to solar, wind, and biomass energy production. The purchase of renewable power and greenhouse gas-free energy sources will be the desired approach to decrease regional greenhouse gas emissions and accelerate the State's transition to clean power resources.

The Agency will also add increasing levels of locally generated renewable resources as these projects are developed and customer energy needs expand.

E. The Parties desire to establish a separate public agency, known as the Peninsula Clean Energy Authority (“Authority”), under the provisions of the Joint Exercise of Powers Act of the State of California (Government Code Section 6500 et seq.) (“Act”) in order to collectively study, promote, develop, conduct, operate, and manage energy programs.

F. The Parties anticipate adopting an ordinance electing to implement through the Authority a common Community Choice Aggregation program, an electric service enterprise available to cities and counties pursuant to California Public Utilities Code Sections 331.1(c) and 366.2 (“CCA Program”). The first priority of the Authority will be the consideration of those actions necessary to implement the CCA Program.

## AGREEMENT

NOW, THEREFORE, in consideration of the mutual promises, covenants, and conditions hereinafter set forth, it is agreed by and among the Parties as follows:

## ARTICLE 1: DEFINITIONS AND EXHIBITS

1.1 Definitions. Capitalized terms used in the Agreement shall have the meanings specified in Exhibit A, unless the context requires otherwise.

1.2 Documents Included. This Agreement consists of this document and the following exhibits, all of which are hereby incorporated into this Agreement.

Exhibit A: Definitions
Exhibit B: List of the Parties and Participants
Exhibit C: Annual Energy Use
Exhibit D: Voting Shares

## ARTICLE 2: FORMATION OF PENINSULA CLEAN ENERGY AUTHORITY

2.1 Effective Date and Term. This Agreement shall become effective and Peninsula Clean Energy Authority shall exist as a separate public agency on the date this Agreement is executed by the Parties. The Authority shall provide notice to the Parties of the Effective Date. The Authority shall continue to exist, and this Agreement shall be effective, until this Agreement is terminated in accordance with Section 7.4, subject to the rights of the Parties to withdraw from the Authority.

2.2 Formation. There is formed as of the Effective Date a public agency named the Peninsula Clean Energy Authority. Pursuant to Sections 6506 and 6507 of the Act, the Authority is a public agency separate from the Parties. Pursuant to Sections 6508.1 of the Act, the debts, liabilities or obligations of the Authority shall not be debts, liabilities or obligations of the individual Parties unless the governing board of a Party agrees in writing to assume any of the debts, liabilities or obligations of the Authority. A Party who has not agreed to assume an Authority debt, liability or obligation shall not be responsible in any way for such debt, liability or obligation even if a majority of the Parties agree to assume the debt, liability or obligation of the Authority. Notwithstanding Section 8.4 of this Agreement, this Section 2.2 may not be amended unless such amendment is approved by the governing board of each Party.

2.3 Purpose. The purpose of this Agreement is to establish an independent public agency in order to exercise powers common to each Party to study, promote, develop, conduct, operate, and manage energy, energy efficiency and conservation, and other energy-related programs, and to exercise all other powers necessary and incidental to accomplishing this purpose. Without limiting the generality of the foregoing, the Parties intend for this Agreement to be used as a contractual mechanism by which the Parties and Participants are authorized to participate in the CCA Program, as further described in Section 5.1. The Parties intend that other agreements shall define the terms and conditions associated with the implementation of the CCA Program and any other energy programs approved by the Authority.

2.4 Powers. The Authority shall have all powers common to the Parties and such additional powers accorded to it by law. The Authority is authorized, in its own name, to exercise all powers and do all acts necessary and proper to carry out the provisions of this Agreement and fulfill its purposes, including, but not limited to, each of the following powers, subject to the voting requirements set forth in Section 4.7 through 4.7.6:

2.4.1 to make and enter into contracts;

2.4.2 to employ agents and employees, including but not limited to a Chief Executive Officer;

2.4.3 to acquire, contract, manage, maintain, and operate any buildings, infrastructure, works, or improvements;

2.4.4 to acquire property by eminent domain, or otherwise, except as limited under Section 6508 of the Act, and to hold or dispose of any property;

2.4.5 to lease any property;

2.4.6 to sue and be sued in its own name;

2.4.7 to incur debts, liabilities, and obligations, including but not limited to loans from private lending sources pursuant to its temporary borrowing powers such as Government Code Sections 53850 et seq. and authority under the Act;

2.4.8 to form subsidiary or independent corporations or entities, if necessary to carry out energy supply and energy conservation programs at the lowest possible cost or to take advantage of legislative or regulatory changes;

2.4.9 to issue revenue bonds and other forms of indebtedness;

2.4.10 to apply for, accept, and receive all licenses, permits, grants, loans or other aids from any federal, state, or local public agency;

2.4.11 to submit documentation and notices, register, and comply with orders, tariffs and agreements for the establishment and implementation of the CCA Program and other energy programs;

2.4.12 to adopt rules, regulations, policies, bylaws and procedures governing the operation of the Authority ("Operating Rules and Regulations"); and

2.4.13 to make and enter into service agreements relating to the provision of services necessary to plan, implement, operate and administer the CCA Program and other energy programs, including the acquisition of electric power supply and the provision of retail and regulatory support services.

2.5 Limitation on Powers. As required by Government Code Section 6509, the power of the Authority is subject to the restrictions upon the manner of exercising power possessed by San Mateo County.

2.6 Compliance with Local Zoning and Building Laws and CEQA. Unless state or federal law provides otherwise, any facilities, buildings or structures located, constructed, or caused to be constructed by the Authority within the territory of the Authority shall comply with the General Plan, zoning and building laws of the local jurisdiction within which the facilities, buildings or structures are constructed and comply with the California Environmental Quality Act (CEQA).

## ARTICLE 3: AUTHORITY PARTICIPATION

3.1 Participation in CCA Program. The Parties may participate in the CCA Program upon the adoption of an ordinance required by Public Utilities Code Section 366.2(c)(12). Other incorporated municipalities and counties ("Participants") may participate in the CCA Program upon (a) the adoption of a resolution by the governing body of such incorporated municipality or such county requesting that the incorporated municipality or county, as the case may be, become a participant in the CCA Program, (b) the adoption, by an affirmative vote of the Board satisfying the requirements described in Section 4.7.3 (or, if demanded by any Director, 4.7.4), of a resolution authorizing the participation of the additional incorporated municipality or county, specifying the participation payment, if any, to be made by the additional incorporated municipality or county to reflect its pro rata share of organizational, planning, and other pre-existing expenditures, and describing additional conditions, if any, associated with participation, (c) the adoption of an ordinance required by Public Utilities Code Section 366.2(c)(12) and execution of any necessary program agreements by the incorporated municipality or county, (d) payment of the membership payment, if any, and (e) satisfaction of any conditions established by the Board.

3.2 Continuing Participation. The Parties acknowledge that participation in the CCA Program may change by the addition or withdrawal or termination of Participants. The Parties agree to participate with such other Participants as may later be added, as described in Section 3.1. The Parties also agree that the withdrawal or termination of a Participant shall not affect this Agreement or the remaining Parties' or Participants' continuing obligations under this Agreement.

3.3 Participants Not Liable for Authority Debts. The debts, liabilities or obligations of the Authority shall not be debts, liabilities or obligations of the individual Participants unless the governing board of a Participant agrees in writing to assume any of the debts, liabilities or obligations of the Authority. A Participant who has not agreed to assume an Authority debt, liability or obligation shall not be responsible in any way for such debt, liability or obligation even if a majority of the Parties and Participants agree to assume the debt, liability or obligation of the Authority. Notwithstanding Section 8.4 of this Agreement, this Section 3.3 may not be amended unless such amendment is approved by the governing board of each Participant.

## ARTICLE 4: GOVERNANCE AND INTERNAL ORGANIZATION

4.1 Board of Directors. The governing body of the Authority shall be a Board of Directors ("Board"). The Board shall initially consist of 2 (two) directors appointed by the San Mateo County Board of Supervisors, and shall upon the addition of additional Participants be comprised as set forth in Section 4.7. Each Director shall serve at the pleasure of the governing board of the Party or Participant who appointed such Director, and may be removed as Director by such governing board at any time. If at any time a vacancy occurs on the Board, a replacement shall be appointed to fill the position of the previous Director within 90 days of the date that such position becomes vacant. Directors may be (but need not be) members of the Board of Supervisors or members of the governing board of any municipality or county electing to participate in the CCA Program.

4.2 Quorum. A majority of the Directors shall constitute a quorum, except that less than a quorum may adjourn from time to time in accordance with law.

4.3 Powers and Functions of the Board. The Board shall exercise general governance and oversight over the business and activities of the Authority, consistent with this Agreement and applicable law. The Board shall provide general policy guidance to the CCA Program. The Board shall be required to approve any of the following actions:

4.3.1 The issuance of bonds or any other financing even if program revenues are expected to pay for such financing.

4.3.2 The hiring of a Chief Executive Officer and General Counsel.

4.3.3 The appointment or removal of an officer.

4.3.4 The adoption of the Annual Budget.

4.3.5 The adoption of an ordinance.

4.3.6 The initiation of litigation where the Authority will be the plaintiff, petitioner, cross complainant or cross petitioner, or intervenor; provided, however, that the Chief Executive Officer or General Counsel, on behalf of the Authority, may intervene in, become a party to, or file comments with respect to any proceeding pending at the California Public Utilities Commission, the Federal Energy Regulatory Commission, or any other administrative agency, without approval of the Board.

4.3.7 The setting of rates for power sold by the Authority and the setting of charges for any other category of service provided by the Authority.

4.3.8 Termination of the CCA Program.

4.4 Chief Executive Officer. The Board of Directors shall appoint a Chief Executive Officer for the Authority, who shall be responsible for the day-to-day operation and management of the Authority and the CCA Program. The Chief Executive Officer may exercise all powers of the Authority, except the powers specifically set forth in Section 4.3 or those powers which by law must be exercised by the Board of Directors. The Board of Directors shall approve any agreement between the Authority and any Party or Participant if the total amount payable under the agreement and other agreements with the Party or Participant is more than $100,000 in any fiscal year.

4.5 Commissions, Boards, and Committees. The Board may establish any advisory commissions, boards, and committees as the Board deems appropriate to assist the Board in carrying out its functions and implementing the CCA Program, other energy programs and the provisions of this Agreement which shall comply with the requirements of the Ralph M. Brown Act. The Board will consider appointing a Ratepayer Advisory Committee and/or a Business Operations Committee within the Board's discretion. The Board may establish rules, regulations, policies, bylaws or procedures to govern any such commissions, boards, or committees, including a Ratepayer Advisory Committee and a Business Operations Committee, if the Board deems appropriate to appoint, and shall determine whether members shall be compensated or entitled to reimbursement for expenses.

4.6 Director Compensation. Directors shall serve without compensation from the Authority. However, Directors may be compensated by their respective appointing authorities. The Board, however, may adopt by resolution a policy relating to the reimbursement by the Authority of expenses incurred by Directors.

4.7 Board of Directors Composition upon Participation by Cities or Counties in CCA Program Under Section 3.1. Except as provided in Section 4.7.6, upon the approval of the Board of the participation of any other incorporated municipality or county (the "Participant" or "Additional Participant") in the CCA Program pursuant to Section 3.1, the Additional Participant shall be entitled to appoint one additional member to the Board of Directors. Each Party or Participant may appoint an alternate(s) to serve in the absence of its Director(s). Upon such appointment, the voting shares of Directors and approval requirements for actions of the Board shall be as follows:

4.7.1. Voting Shares.

Each Director shall have a voting share as determined by the following formula: (Annual Energy Use/Total Annual Energy) multiplied by 100, where

(a) "Annual Energy Use" means, (i) with respect to the first year following the Effective Date, the annual electricity usage, expressed in kilowatt hours ("kWh"), within the Party's or Participant's respective jurisdiction and (ii) with respect to the period after the anniversary of the Effective Date, the annual electricity usage, expressed in kWh, of accounts within a Party's respective jurisdiction that are served by the Authority; and

(b) "Total Annual Energy" means the sum of all Parties' and Participants' Annual Energy Use. The initial values for Annual Energy use are designated in Exhibit C, and shall be adjusted annually as soon as reasonably practicable after January 1, but no later than March 1 of each year.

(c) The combined voting share of all Directors representing the County of San Mateo shall be based upon the annual electricity usage within the unincorporated area of San Mateo County.

For the purposes of Weighted Voting, if a Party or Participant has more than one director, then the voting shares allocated to the entity shall be equally divided amongst its directors.

4.7.2. <u>Exhibit Showing Voting Shares</u>. The initial voting shares are set forth in Exhibit D. Exhibit D shall be revised no less than annually as necessary to account for changes in the number of Parties or Participants and changes in the Parties' and Participants' Annual Energy Use.

4.7.3. <u>Approval Requirements Relating to CCA Program</u>. Except as provided in Sections 4.7.4 and 4.7.5 below, action of the Board shall require the affirmative vote of a majority of Directors present at the meeting.

4.7.4. <u>Option for Approval by Voting Shares</u>. Notwithstanding Section 4.7.3, any Director present at a meeting may demand that approval of any matter related to the CCA Program be determined on the basis of voting shares and by the affirmative vote of a majority of Directors present at the meeting. If a Director makes such a demand with respect to approval of any such matter, then approval of such matter shall require the affirmative vote of a majority of Directors present at the meeting and the affirmative vote of Directors having a majority of voting shares, as determined by Section 4.7.1 except as provided in Section 4.7.5.

4.7.5. <u>Special Voting Requirements for Certain Matters</u>.

(a) <u>Two-Thirds and Weighted Voting Approval Requirements Relating to Sections 7.2 and 8.4</u>. Action of the Board on the matters set forth in Section 7.2 (involuntary termination of a Party or Participant), or Section 8.4 (amendment of this Agreement) shall require the affirmative vote of at least two-thirds of Directors; provided, however, that (a) notwithstanding the foregoing, any Director present at the meeting may demand that the vote be determined on the basis of voting shares and by the affirmative vote of Directors, and if a Director makes such a demand, then approval shall require the affirmative vote of at least two-thirds of Directors and the affirmative vote of Directors having at least two-thirds of the voting shares, as determined by Section 4.7.1; (b) when a Director has demanded that the vote be determined on the basis of voting shares and by the affirmative vote of Directors, if any individual Party or Participant's voting share exceeds 33% and the Director(s) for that Party or Participant votes in the negative or abstains or is absent from the meeting, then the matter shall be deemed approved, unless at least one other Director representing a different Party or Participant votes in the negative; and (c) for votes to involuntarily terminate a Party or Participant under Section 7.2, the Director(s) for the Party or Participant subject to involuntary termination may not vote, and the number of Directors constituting two-thirds of all Directors, and weighted vote of each Party or Participant, shall be recalculated as if the Party or Participant subject to possible termination were not a Party or Participant.

(b) Seventy Five Percent Special Voting Requirements for Eminent Domain and Participant Contributions or Pledge of Assets.

(i) A decision to exercise the power of eminent domain on behalf of the Authority to acquire any property interest other than an easement, right-of-way, or temporary construction easement shall require a vote of at least 75% of all Directors.

(ii) The imposition on any Party or Participant of any obligation to make contributions or pledge assets as a condition of continued participation in the CCA Program shall require a vote of at least 75% of all Directors and the approval of the governing boards of the Parties and Participants who are being asked to make such contribution or pledge.

(iii) Notwithstanding the foregoing, any Director present at the meeting may demand that a vote under subsections (i) or (ii) be determined on the basis of voting shares and by the affirmative vote of Directors, and if a Director makes such a demand, then approval shall require the affirmative vote of at least 75% of Directors and the affirmative vote of Directors having at least 75% of the voting shares, as determined by Section 4.7.1, and when a Director has demanded that the vote be determined on the basis of voting shares and by the affirmative vote of Directors, if any individual Party or Participant's voting share exceeds 25% and the Director(s) for that Party or Participant votes in the negative or abstains or is absent from the meeting, then the matter shall be deemed approved, unless at least one other Director representing a different Party or Participant votes in the negative. For purposes of this section, "imposition on any Party or Participant of any obligation to make contributions or pledge assets as a condition of continued participation in the CCA Program" does not include any liabilities or obligations of a withdrawing or terminated party imposed under Section 7.3.

4.8 Meetings and Special Meetings of the Board. The Board shall hold at least four regular meetings per year, but the Board may provide for the holding of regular meetings at more frequent intervals. The date, hour and place of each regular meeting shall be fixed by resolution or ordinance of the Board. Regular meetings may be adjourned to another meeting time. Special meetings of the Board may be called in accordance with the provisions of California Government Code Section 54956. Directors may participate in meetings telephonically, with full voting rights, only to the extent permitted by law. All meetings of the Board, the Ratepayer Advisory Committee, the Business Operations Committee, or the governing body of any subsidiary entity or independent corporation established by the Authority shall be conducted in accordance with the provisions of the Ralph M. Brown Act (California Government Code Sections 54950 et seq.).

4.9 Selection of Board Officers.

4.9.1 Chair and Vice Chair. The Directors shall select, from among themselves, a Chair, who shall be the presiding officer of all Board meetings, and a Vice Chair, who shall serve in the absence of the Chair. The term of office of the Chair and Vice Chair shall continue for one year, but there shall be no limit on the number of terms held by either the Chair or Vice Chair. The office of either the Chair or Vice Chair shall be declared vacant and a new selection shall be made if:

(a) the person serving dies, resigns, or the Party that the person represents removes the person as its representative on the Board or
(b) the Party that he or she represents withdraws from the Authority pursuant to the provisions of this Agreement.

4.9.2 Secretary. The Board shall appoint a Secretary, who need not be a member of the Board, who shall be responsible for keeping the minutes of all meetings of the Board and all other official records of the Authority.

4.9.3 Treasurer and Auditor. The San Mateo County Auditor-Controller-Treasurer-Tax Collector shall act as the Treasurer and the Auditor for the Authority. Unless otherwise exempted from such requirement, the Authority shall cause an independent audit to be made by a certified public accountant, or public accountant, in compliance with Section 6505 of the Act. The Treasurer shall act as the depositary of the Authority and have custody of all the money of the Authority, from whatever source, and as such, shall have all of the duties and responsibilities specified in Section 6505.5 of the Act. The Treasurer shall report directly to the Board and shall comply with the requirements of treasurers of incorporated municipalities. The Board may transfer the responsibilities of Treasurer to any person or entity as the law may provide at the time. The duties and obligations of the Treasurer are further specified in Article 6.

4.10 Administrative Services Provider. The Board may appoint one or more administrative services providers to serve as the Authority's agent for planning, implementing, operating and administering the CCA Program, and any other program approved by the Board, in accordance with the provisions of a written agreement between the Authority and the appointed administrative services provider or providers (an "Administrative Services Agreement"). The appointed administrative services provider may be one of the Parties. An Administrative Services Agreement shall set forth the terms and conditions by which the appointed administrative services provider shall perform or cause to be performed all tasks necessary for planning, implementing, operating and administering the CCA Program and other approved programs. The Administrative Services Agreement shall set forth the term of the Agreement and the circumstances under which the Administrative Services Agreement may be terminated by the Authority. This section shall not in any way be construed to limit the discretion of the Authority to hire its own employees to administer the CCA Program or any other program.

## ARTICLE 5: IMPLEMENTATION ACTION AND AUTHORITY DOCUMENTS

5.1 Preliminary Implementation of the CCA Program.

5.1.1 Enabling Ordinance. Except as otherwise provided by Section 3.1, each Party shall adopt an ordinance in accordance with Public Utilities Code Section 366.2(c)(12) for the purpose of specifying that the Party intends to implement a CCA Program by and through its participation in the Authority.

5.1.2 Implementation Plan. The Authority shall cause to be prepared an Implementation Plan meeting the requirements of Public Utilities Code Section 366.2 and any applicable Public Utilities Commission regulations as soon after the Effective Date as reasonably practicable. The Implementation Plan shall not be filed with the Public Utilities Commission until it is approved by the Board in the manner provided by Section 4.7.3.

5.1.3 Termination of CCA Program. Nothing contained in this Article or this Agreement shall be construed to limit the discretion of the Authority to terminate the implementation or operation of the CCA Program at any time in accordance with any applicable requirements of state law.

5.2 Authority Documents. The Parties acknowledge and agree that the affairs of the Authority will be implemented through various documents duly adopted by the Board through Board resolution. The Parties agree to abide by and comply with the terms and conditions of all such documents that may be adopted by the Board, subject to the Parties' right to withdraw from the Authority as described in Article 7.

## ARTICLE 6: FINANCIAL PROVISIONS

6.1 Fiscal Year. The Authority's fiscal year shall be 12 months commencing July 1 [or the date selected by the Agency] and ending June 30. The fiscal year may be changed by Board resolution.

6.2 Depository.

6.2.1 All funds of the Authority shall be held in separate accounts in the name of the Authority and not commingled with funds of any Party or Participant or any other person or entity.

6.2.2 All funds of the Authority shall be strictly and separately accounted for, and regular reports shall be rendered of all receipts and disbursements, at least quarterly during the fiscal year. The books and records of the Authority shall be open to inspection by the Parties and Participants at all reasonable times. The Board shall contract with a certified public accountant or public accountant to make an annual audit of the accounts and records of the Authority, which shall be conducted in accordance with the requirements of Section 6505 of the Act.

6.2.3 All expenditures shall be made in accordance with the approved budget and upon the approval of any officer so authorized by the Board in accordance with its Operating Rules and Regulations. The Treasurer shall draw checks or warrants or make payments by other means for claims or disbursements not within an applicable budget only upon the prior approval of the Board.

6.3 Budget and Recovery of Costs.

6.3.1 Budget. The initial budget shall be approved by the Board. The Board may revise the budget from time to time through an Authority Document as may be reasonably necessary to address contingencies and unexpected expenses. All subsequent budgets of the Authority shall be approved by the Board in accordance with the Operating Rules and Regulations.

6.3.2 Funding of Initial Costs. The County of San Mateo has funded certain activities necessary to implement the CCA Program. If the CCA Program becomes operational, these initial costs paid by the County of San Mateo shall be included in the customer charges for electric services as provided by Section 6.3.3 to the extent permitted by law, and the County of San Mateo shall be reimbursed from the payment of such charges by customers of the Authority. Prior to such reimbursement, the County of San Mateo shall provide such documentation of costs paid as the Board may request. The Authority may establish a reasonable time period over which such costs are recovered. In the event that the CCA Program does not become operational, the County of San Mateo shall not be entitled to any reimbursement of the initial costs it has paid from the Authority or any Party.

6.3.3 CCA Program Costs. The Parties desire that all costs incurred by the Authority that are directly or indirectly attributable to the provision of electric, conservation, efficiency, incentives, financing, or other services provided under the CCA Program, including but limited to the establishment and maintenance of various reserves and performance funds and administrative, accounting, legal, consulting, and other similar costs, shall be recovered through charges to CCA customers receiving such electric services, or from revenues from grants or other third-party sources.

## ARTICLE 7: WITHDRAWAL AND TERMINATION

7.1 Withdrawal.

7.1.1 Right to Withdraw. A Party or Participant may withdraw its participation in the CCA Program, effective as of the beginning of the Authority's fiscal year, by giving no less than 6 months advance written notice of its election to do so, which notice shall be given to the Authority and each Party and Participant Withdrawal of a Party or Participant shall require an affirmative vote of its governing board.

7.1.2 Right to Withdraw After Amendment. Notwithstanding Section 7.1.1, a Party or Participant may withdraw its membership in the Authority following an amendment to this Agreement adopted by the Board which the Party or Participant's Director(s) voted against provided such notice is given in writing within thirty (30) days following the date of the vote. Withdrawal of a Party or Participant shall require an affirmative vote of its governing board and shall not be subject to the six month advance notice provided in Section 7.1.1. In the event of such withdrawal, the Party or Participant shall be subject to the provisions of Section 7.3.

7.1.3 Continuing Liability; Further Assurances. A Party or Participant that withdraws its participation in the CCA Program may be subject to certain continuing liabilities, as described in Section 7.3. The withdrawing Party or Participant and the Authority shall execute and deliver all further instruments and documents, and take any further action that may be reasonably necessary, as determined by the Board, to effectuate the orderly withdrawal of such Party or Participant from participation in the CCA Program.

7.2 Involuntary Termination of a Party or Participant. Participation of a Party or Participant in the CCA program may be terminated for material non-compliance with provisions of this Agreement or any other agreement relating to the Party's or Additional Participant's participation in the CCA Program upon a vote of Board members as provided in Section 4.7.5. Prior to any vote to terminate participation with respect to a Party or Participant, written notice of the proposed termination and the reason(s) for such termination shall be delivered to the Party or Participant whose termination is proposed at least 30 days prior to the regular Board meeting at which such matter shall first be discussed as an agenda item. The written notice of proposed termination shall specify the particular provisions of this Agreement or other agreement that the Party or Participant has allegedly violated. The Party or Participant subject to possible termination shall have the opportunity at the next regular Board meeting to respond to any reasons and allegations that may be cited as a basis for termination prior to a vote regarding termination. A Party or Participant that has had its participation in the CCA Program terminated may be subject to certain continuing liabilities, as described in Section 7.3.

7.3 Continuing Liability; Refund. Upon a withdrawal or involuntary termination of a Party or Participant, the Party or Participant shall remain responsible for any claims, demands, damages, or liabilities arising from the Party or Participant's membership or participation in the CCA Program through the date of its withdrawal or involuntary termination, it being agreed that the Party or Participant shall not be responsible for any liabilities arising after the date of the Party or Participant's withdrawal or involuntary termination. Claims, demands, damages, or liabilities for which a withdrawing or terminated Party or Participant may remain liable include, but are not limited to, losses from the resale of power contracted for by the Authority to serve the Party or Participant's load. With respect to such liability, upon notice by a Participant that it wishes to withdraw from the program, the Authority shall notify the Party or Participant of the minimum waiting period under which the Participant would have no costs for withdrawal if the Participant agrees to stay in the CCA Program for such period. The waiting period will be set to the minimum duration such that there are no costs transferred to remaining ratepayers. If the Party or Participant elects to withdraw before the end of the minimum waiting period, the charge for exiting shall be set at a dollar amount that would offset actual costs to the remaining ratepayers, and may not include punitive charges that exceed actual costs. In addition, such Party or Participant also shall be responsible for any costs or obligations associated with the Party or Participant's participation in any program in accordance with the provisions of any agreements relating to such program provided such costs or obligations were incurred prior to the withdrawal of the Party or Participant. The Authority may withhold funds otherwise owing to the Party or Participant or may require the Party or Participant to deposit sufficient funds with the Authority, as reasonably determined by the Authority and approved by a vote of the Board of Directors, to cover the Party's or Participant's liability for the costs described above. Any amount of the Party's or Participant's funds held on deposit with the Authority above that which is required to pay any liabilities or obligations shall be returned to the Party or Participant. The liability of any Party or Participant under this section 7.3 is subject and subordinate to the provisions of Sections 2.2 and 3.3, and nothing in this section 7.3 shall reduce, impair, or eliminate any immunity from liability provided by Sections 2.2 or 3.3.

7.4 Mutual Termination. This Agreement may be terminated by mutual agreement of all the Parties; provided, however, the foregoing shall not be construed as limiting the rights of a Participant to withdraw its participation in the CCA Program, as described in Section 7.1.

7.5 Disposition of Property upon Termination of Authority. Upon termination of this Agreement, any surplus money or assets in possession of the Authority for use under this Agreement, after payment of all liabilities, costs, expenses, and charges incurred under this Agreement and under any program documents, shall be returned to the then-existing Parties and Participants in proportion to the contributions made by each.

7.6 Negotiations with Participants. If the Parties wish to terminate this Agreement, or if the Parties elect to withdraw from the CCA Program following an amendment to this Agreement as provided in Section 7.1.2, but two or more Participants wish to continue to participate in the CCA Program, the Parties will negotiate in good faith with such Participants to allow the Participants to become parties to this Agreement or to effect a transfer of CCA Program operations to another entity.

## ARTICLE 8: MISCELLANEOUS PROVISIONS

8.1 Dispute Resolution. The Parties, Participants, and the Authority shall make reasonable efforts to settle all disputes arising out of or in connection with this Agreement. Should such efforts to settle a dispute, after reasonable efforts, fail, the dispute shall be settled by binding arbitration in accordance with policies and procedures established by the Board.

8.2 Liability of Directors, Officers, and Employees. The Directors, officers, and employees of the Authority shall use ordinary care and reasonable diligence in the exercise of their powers and in the performance of their duties pursuant to this Agreement. No current or former Director, officer, or employee will be responsible for any act or omission by another Director, officer, or employee. The Authority shall defend, indemnify and hold harmless the individual current and former Directors, officers, and employees for any acts or omissions in the scope of their employment or duties in the manner provided by Government Code Sections 995 et seq. Nothing in this section shall be construed to limit the defenses available under the law, to the Parties, the Participants, the Authority, or its Directors, officers, or employees.

8.3 Indemnification of Parties and Participants. The Authority shall acquire such insurance coverage as is necessary to protect the interests of the Authority, the Parties, the Participants, and the public. The Authority shall defend, indemnify, and hold harmless the Parties and Participants, and each of their respective Board or Council members, officers, agents and employees, from any and all claims, losses, damages, costs, injuries, and liabilities of every kind arising directly or indirectly from the conduct, activities, operations, acts, and omissions of the Authority under this Agreement.

8.4 Amendment of this Agreement. This Agreement may not be amended except by a written amendment approved by a vote of Board members as provided in Section 4.7.5. The Authority shall provide written notice to all Parties and Participants of amendments to this Agreement, including the effective date of such amendments, at least 30 days prior to the date upon which the Board votes on such amendments.

8.5 Assignment. Except as otherwise expressly provided in this Agreement, the rights and duties of the Parties or Participants may not be assigned or delegated without the advance written consent of all of the other Parties and Participants, and any attempt to assign or delegate such rights or duties in contravention of this Section 8.5 shall be null and void. This Agreement shall inure to the benefit of, and be binding upon, the successors and assigns of the Parties and Participants. This Section 8.5 does not prohibit a Party or Participant from entering into an independent agreement with another agency, person, or entity regarding the financing of that Party's or Participant's contributions to the Authority, or the disposition of proceeds which that Party or Participant receives under this Agreement, so long as such independent agreement does not affect, or purport to affect, the rights and duties of the Authority or the Parties or Participants under this Agreement.

8.6 Severability. If one or more clauses, sentences, paragraphs or provisions of this Agreement shall be held to be unlawful, invalid or unenforceable, it is hereby agreed by the Parties, that the remainder of the Agreement shall not be affected thereby. Such clauses, sentences, paragraphs or provision shall be deemed reformed so as to be lawful, valid and enforced to the maximum extent possible.

8.7 Further Assurances. Each Party agrees to execute and deliver all further instruments and documents, and take any further action that may be reasonably necessary, to effectuate the purposes and intent of this Agreement.

8.8 Execution by Counterparts. This Agreement may be executed in any number of counterparts, and upon execution by all Parties, each executed counterpart shall have the same force and effect as an original instrument and as if all Parties had signed the same instrument. Any signature page of this Agreement may be detached from any counterpart of this Agreement without impairing the legal effect of any signatures thereon, and may be attached to another counterpart of this Agreement identical in form hereto but having attached to it one or more signature pages.

8.9 Parties to be Served Notice. Any notice authorized or required to be given pursuant to this Agreement shall be validly given if served in writing either personally, by deposit in the United States mail, first class postage prepaid with return receipt requested, or by a recognized courier service. Notices given (a) personally or by courier service shall be conclusively deemed received at the time of delivery and receipt and (b) by mail shall be conclusively deemed given 48 hours after the deposit thereof (excluding Saturdays, Sundays and holidays) if the sender receives the return receipt. All notices shall be addressed to the office of the clerk or secretary of the Authority or Party, as the case may be, or such other person designated in writing by the Authority or Party. Notices given to one Party shall be copied to all other Parties. Notices given to the Authority shall be copied to all Parties and Participants.

8.10 Commitment to Consider Amendments. At one of its first three meetings after [insert Date], the Board of Directors shall consider all amendments to this Agreement that have been requested by any city that adopts, by [insert date], the resolution and ordinance required by Section 3.1 to become a Participant in the CCA Program. Any such amendments shall be subject to the voting requirements of Section 8.4. Nothing in this Section 8.10 requires the Board of Directors to approve any specific amendment to this Agreement.

## Exhibit A

## Definitions

"AB 117" means Assembly Bill 117 (Stat. 2002, ch. 838, codified at Public Utilities Code Section 366.2), which created CCA.

"Act" means the Joint Exercise of Powers Act of the State of California (Government Code Section 6500 *et seq*.)

"Administrative Services Agreement" means an agreement or agreements entered into after the Effective Date by the Authority with an entity that will perform tasks necessary for planning, implementing, operating and administering the CCA Program or any other energy programs adopted by the Authority.

"Agreement" means this Joint Powers Agreement.

"Annual Energy Use" has the meaning given in Section 4.7.1.

"Authority" means the Peninsula Clean Energy Authority.

"Authority Document(s)" means document(s) duly adopted by the Board by resolution or motion implementing the powers, functions, and activities of the Authority, including but not limited to the Operating Rules and Regulations, the annual budget, and plans and policies.

"Board" means the Board of Directors of the Authority.

"CCA" or "Community Choice Aggregation" means an electric service option available to cities and counties pursuant to Public Utilities Code Section 366.2.

"CCA Program" means the Authority's program relating to CCA that is principally described in Sections 2.3, 2.4, and 5.1.

"Director" means a member of the Board of Directors representing a Party or an Additional Participant.

"Effective Date" means the date on which this Agreement shall become effective and the Peninsula Clean Energy Authority shall exist as a separate public agency, as further described in Section 2.1.

"Implementation Plan" means the plan generally described in Section 5.1.2 of this Agreement that is required under Public Utilities Code Section 366.2 to be filed with the California Public Utilities Commission for the purpose of describing a proposed CCA Program.

"Initial Costs" means all costs incurred by the Authority relating to the establishment and initial operation of the Authority, such as the hiring of a Chief Executive Officer and any administrative staff, any required accounting, administrative, technical, or legal services in support of the Authority's initial activities or in support of the negotiation, preparation, and approval of one or more Administrative Services Provider Agreements and Program Agreement 1. Administrative and operational costs incurred after the approval of Program Agreement 1 shall not be considered Initial Costs.

“Operating Rules and Regulations” means the rules, regulations, policies, bylaws and procedures governing the operation of the Authority.

“Participant” or “Additional Participant” means any incorporated municipality or county electing to participate in the CCA Program.

“Parties” means, collectively, the County of San Mateo.

“Party” means the County of San Mateo.

“Total Annual Energy” has the meaning given in Section 4.7.1.

## Exhibit B

## List of Parties and Participants

Parties: County of San Mateo

Participants:

**Exhibits C and D**

**Annual Energy Use and Voting Shares**

| **ANNUAL ENERGY USE WITHIN PCE JURISDICTIONS AND VOTING SHARES** | | |
|---|---|---|
| Twelve Months Ended November [date] | | |
| | | |
| Party/Participant | Total KWh | Voting Share |
| | | |
| | | |
| | | |
| | | |
| | | |
| SAN MATEO COUNTY | | |
| | | |
| | | |
| Total | | 100 |

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**ORDINANCE NO.______________**
**BOARD OF SUPERVISORS, COUNTY OF SAN MATEO,**
**STATE OF CALIFORNIA**

* * * * * *

**ORDINANCE AUTHORIZING THE IMPLEMENTATION OF A COMMUNITY CHOICE AGGREGATION PROGRAM**

The Board of Supervisors of the County of San Mateo, State of California, **ORDAINS** as follows:

**SECTION 1. FINDINGS.** The Board of Supervisors of the County of San Mateo has investigated options to provide electric services to customers within the County, including incorporated and unincorporated areas, with the intent of achieving greater local control and involvement over the provision of electric services, competitive electric rates, the development of clean, local, renewable energy projects, reduced greenhouse gas emissions, and the wider implementation of energy conservation and efficiency projects and programs; and hereby finds and declares as follows:

**WHEREAS**, the County of San Mateo has prepared a Feasibility Study for a community choice aggregation ("CCA") program in San Mateo County under the provisions of the Public Utilities Code section 366.2. The Feasibility Study shows that implementing a community choice aggregation program would provide multiple benefits, including:

- Providing customers a choice of power providers;
- Increasing local control and involvement in and collaboration on energy rates and other energy-related matters;
- Providing more stable long-term electric rates that are competitive with those provided by the incumbent utility;
- Reducing greenhouse gas emissions arising from electricity use within San Mateo County;
- Increasing local renewable generation capacity;
- Increasing energy conservation and efficiency projects and programs;
- Increasing regional energy self-sufficiency;
- Improving the local economy resulting from the implementation of local renewable and energy conservation and efficiency projects; and

**WHEREAS**, the County of San Mateo approved a Joint Powers Agreement creating the Peninsula Clean Energy Authority ("Authority"). Under the Joint Powers Agreements, cities and towns within San Mateo County may participate in the Peninsula Clean Energy CCA program by adopting the resolution and ordinance required by Public Utilities Code section 366.2. Cities and towns choosing to participate in the CCA program will have membership on the Board of Directors of the Authority as provided in the Joint Powers Agreements; and

**WHEREAS**, the Authority will enter into Agreements with electric power suppliers and other service providers, and based upon those Agreements the Authority will be able to provide power to residents and business at rates that are competitive with those of the incumbent utility ("PG&E"). Once the California Public Utilities Commission approves the implementation plan created by the Authority, the Authority will provide service to customers within the unincorporated area of San Mateo County and within the jurisdiction of those cities who have chosen to participate in the CCA program; and

**WHEREAS**, under Public Utilities Code section 366.2, customers have the right to opt-out of a CCA program and continue to receive service from the incumbent utility. Customers who wish to continue to receive service from the incumbent utility will be able to do so; and

**WHEREAS**, on [insert dates], the Board of Supervisors of San Mateo County held public hearings at which time interested persons had an opportunity to testify either in support or opposition to implementation of the Peninsula Clean Energy CCA program in the unincorporated area of San Mateo County.

**WHEREAS**, this ordinance is exempt from the requirements of the California Environmental Quality Act (CEQA) pursuant to the CEQA Guidelines, as it is not a "project" as it has no potential to result in a direct or reasonably foreseeable indirect physical change to the environment. (14 Cal. Code Regs. § 15378(a)). Further, the ordinance is exempt from CEQA as there is no possibility that the ordinance or its implementation would have a significant effect on the environment. (14 Cal. Code Regs. § 15061(b)(3)). The ordinance is also categorically exempt because it is an action taken by a regulatory agency to assume the maintenance, restoration, enhancement or protection of the environment. (14 Cal. Code Regs. § 15308). The Director of Office of Sustainability Agreements shall cause a Notice of Exemption to be filed as authorized by CEQA and the CEQA guidelines.

**NOW, THEREFORE, LET IT BE RESOLVED** the County of San Mateo Board of Supervisors does ordain as follows:

**SECTION 1.** The above recitations are true and correct and material to this Ordinance.

**SECTION 2. Authorization to Implement a Community Choice Aggregation Program.**

Based upon the forgoing, and in order to provide business and residents within the unincorporated area of San Mateo County with a choice of power providers and with the benefits described above, the County of San Mateo Board of Supervisors ordains that it shall implement a community choice aggregation program within the jurisdiction of the unincorporated area of San Mateo County by participating as a group with other cities and towns as described above in the Community Choice Aggregation program of the Peninsula Clean Energy Authority, as generally described in the Joint Powers Agreements.

**SECTION 3.** This Ordinance shall be in full force and effective 30 days after its adoption, and shall be published and posted as required by law.

This Ordinance was introduced by the San Mateo County Board of Supervisors on [insert date], and was adopted on [insert date], by the following roll call vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

Dated: ____________________

COUNTY OF SAN MATEO

________________________________

ATTEST:

________________________________

APPROVED AS TO FORM:

________________________________
County Counsel

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# DRAFT PENINSULA CLEAN ENERGY CCA TECHNICAL STUDY

9/18/2015

Prepared by Pacific Energy Advisors, Inc.

This Technical Study was prepared for the County of San Mateo for purposes of understanding the potential benefits and liabilities associated with forming a Community Choice Aggregation (CCA) program, which would provide electric generation service to residential and business customers located within San Mateo County. A detailed discussion of the projected operating results related to the CCA program, which has been named Peninsula Clean Energy, are presented herein.

# DRAFT Peninsula Clean Energy CCA Technical Study

**PREPARED BY PACIFIC ENERGY ADVISORS, INC.**

## Table of Contents

# EXECUTIVE SUMMARY

This Community Choice Aggregation ("CCA") Technical Study ("Study") was prepared by Pacific Energy Advisors, Inc. ("PEA") for purposes of describing the potential benefits and liabilities associated with forming a CCA program, which would provide electric generation service to residential and business customers located within (i) the twenty (20) municipalities in the County of San Mateo ("County"), and (ii) the unincorporated areas of the County (together, the "San Mateo Communities"). The Study evaluated projected operations of such a CCA program, which has been named Peninsula Clean Energy ("PCE"), over a ten-year planning horizon, drawing from best available market intelligence and PEA's direct experience with each of California's operating CCA programs. This information was used to generate a set of anticipated base case assumptions for PCE operations as well as a variety of sensitivities, which were used to demonstrate how certain changes in the base case assumptions would influence anticipated operating results.

For purposes of the Study, PEA and County leadership identified three indicative supply scenarios, which were designed to test the viability of prospective CCA operations under a variety of energy resource compositions. In particular, the three supply scenarios were constructed with the following objectives in mind:

- **Scenario 1**: Maximize PCE rate/cost competitiveness relative to the incumbent investor-owned utility ("IOU"), Pacific Gas & Electric Company ("PG&E"), while ensuring compliance with applicable renewable energy procurement mandates.
- **Scenario 2**: Exceed renewable energy procurement mandates and promote reduced greenhouse gas emissions ("GHGs") within the electric energy sector through the predominant use of non-polluting generating resources.
- **Scenario 3**: Deliver a 100% bundled renewable energy product to all PCE customers based on prevailing market prices.

When considering the prospective supply scenarios evaluated in this Study, it should be understood that PCE would not be limited to any particular scenario assessed in this Study; the Study's supply scenarios were developed in cooperation with San Mateo County leadership for the purpose of demonstrating potential operating outcomes of a new CCA program under a broad range of resource mixes, which generally reflect key objectives of the San Mateo Communities. Prior to the procurement of any particular energy products, PCE would have an opportunity to refine its desired resource mix, which may differ from the prospective scenarios reflected herein.

When developing these supply scenarios, PEA was directed to exclude unbundled renewable energy certificates, nuclear generation, which represents a significant portion of PG&E's energy resource mix[1], and coal generation[2] from the anticipated resource mix.

Based on current market prices and various other operating assumptions, the Study indicates that PCE would be viable under a broad range of market conditions, demonstrating the potential for customer cost savings and significant GHG reductions. In particular, Scenarios 1 and 2 demonstrate the potential for customer cost savings ranging from 2% to 6%, relative to projected PG&E rates, over the ten-year study period. As expected, increased supply costs associated with the Scenario 3 supply portfolio, which specified the exclusive use of

[1] According to PG&E's 2013 Power Content Label, 22% of total electric energy supply was sourced from nuclear generating facilities; in 2014, a similar proportion of PG&E's total electric energy supply was sourced from nuclear generating facilities: 21%, as reflected in PG&E's Power Source Disclosure Report for the 2014 calendar year.

[2] According to the California Energy Commission, approximately 6% of California's total system power mix is comprised of electric energy produced by generators using coal as the primary fuel source: http://energyalmanac.ca.gov/electricity/total_system_power.html.

bundled renewable energy resources for the entirety of PCE's electric supply, resulted in marginally higher customer costs throughout the study period with premiums ranging from 1% to 2% relative to PG&E. As previously noted, none of the prospective supply scenarios include the use of unbundled RECs; renewable energy products will be exclusively limited to "bundled" deliveries produced by generators primarily located within California, the San Mateo Communities and elsewhere in the western United States.

When reviewing the pro forma financial results associated with each of the prospective supply scenarios, as reflected in Appendix A of this Study, line "X" indicates the "Total Change in Customer Electric Charges" during each year of the study period: to the extent that such values are negative, PCE would have the potential to offer comparatively lower customer rates/charges, relative to similar charges imposed by PG&E; to the extent that such values are positive, PCE would need to impose comparatively higher customer charges in order to recover expected costs. Ultimately, the disposition of any projected operating surpluses will be determined by PCE leadership during annual budgeting and ratesetting processes. For example, in the cases of Scenario 1 and Scenario 2, each year of the study period reflects the potential for operating surpluses. Such surpluses could be passed through to PCE customer in the form of comparatively lower electric rates/charges, as reflected in this Study, or PCE leadership could strike a balance between reduced rates and increased funding for complementary energy programs, such as Net Energy Metering, customer rebates (to promote local distributed renewable infrastructure buildout or energy efficiency, for example) as well as other similarly focused programs. PCE leadership would have considerable flexibility in administering the disposition of any projected operating surpluses, subject to any financial covenants that may be entered into by the program.

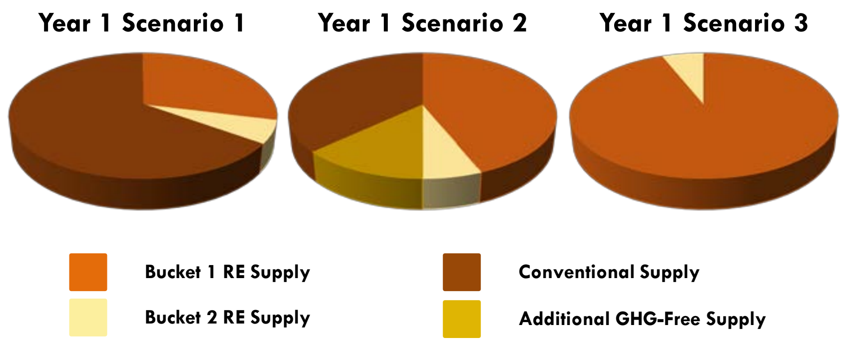
With regard to anticipated clean energy supply and resultant GHG emissions impacts, Scenario 1, which was designed with the primary purpose of minimizing customer costs, resulted in projected emissions *increases* ranging from 136,000 to 488,000 metric tons per year – the noted range of emissions impacts reflects the minimum (occurring in Year 1 of expected PCE operations) and maximum (occurring in Year 10 of expected PCE operations) impacts over the ten-year study period. Conversely, the predominantly carbon-free energy supply associated with Scenario 2 resulted in annual emissions *reductions* ranging from 75,000 (Year 1 impact) to 156,000 (Year 10 impact) metric tons. Scenario 3 yielded the most significant emissions benefits, resulting from a zero portfolio emissions rate – annual projected emissions *reductions* ranged from 130,000 (Year 1 impact) to 266,000 (Year 10 impact) metric tons. With regard to the anticipated GHG emissions impacts reflected under each scenario, it is important to note that such estimates are significantly influenced by PG&E's ongoing use of nuclear generation, which is generally recognized as GHG-free. To the extent that PG&E's use of nuclear generation is curtailed or suspended at some point in the future, PCE's projected emissions reductions would significantly increase.

The various energy supply components underlying each scenario are broadly categorized as:

- Conventional Supply (generally electric generation produced through the combustion of fossil fuels, particularly natural gas);
- "Bucket 1" Renewable Energy Supply (generally renewable generation within CA);
- "Bucket 2" Renewable Energy Supply (renewable generation imported into CA); and
- Additional GHG-Free Supply (generally power from large hydro-electric generation facilities, which are not eligible to participate in California's Renewables Portfolio Standard, or "RPS", certification program).

The following exhibit identifies the projected operating results under each supply scenario in Year 1 of anticipated CCA operation. Additional details regarding the composition of each supply scenario are addressed in Chapter 2.

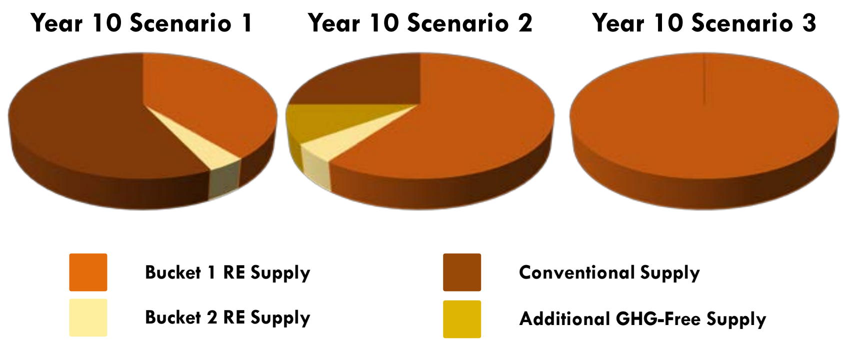
# Peninsula Clean Energy Indicative Supply Scenarios: Year 1




| Key Considerations | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| <u>General Environmental Benefits</u><br>Renewable energy and GHG content | 35% Renewable<br>35% GHG-Free | 50% Renewable<br>63% GHG-Free | 100% Renewable<br>100% GHG-Free |
| <u>Rate Competitiveness</u><br>Incremental renewable/clean energy purchases will impose upward pressure on PCE customer rates | Average 6% <u>savings</u> relative to PG&E rate projections | Average 4% <u>savings</u> relative to PG&E rate projections | Average 2% <u>increase</u> relative to PG&E rate projections |
| <u>Projected Residential Customer Cost Impacts</u>[1]<br>Resource choices will influence monthly energy costs<br>[1]Average monthly usage for PCE res. customers ≈ 450 kWh | Average $5.40 monthly cost <u>savings</u> relative to PG&E rate projections | Average $4.05 monthly cost <u>savings</u> relative to PG&E rate projections | Average $1.80 monthly cost <u>increase</u> relative to PG&E rate projections |
| <u>Assumed PCE Participation</u><br>Projected rate savings/increases are assumed to impact customer participation levels; medium and large commercial customers are assumed to be highly cost sensitive | 85% customer participation rate assumed across all customer groups | 85% customer participation rate assumed across all customer groups | 75% customer participation rate assumed for residential and small commercial customer groups; 50% participation for all other customer groups |
| <u>Comparative GHG Emissions Impacts</u><br>GHG emissions impact relative to assumed PG&E portfolio | 0.278 metric tons $CO_2$/MWh emissions rate results in <u>additional GHG emissions</u> of ≈136,000 metric tons in Year 1 | 0.115 metric tons $CO_2$/MWh emissions rate results in ≈75,000 metric ton <u>GHG emissions reduction</u> in Year 1 | Zero emissions rate results in ≈130,000 metric ton <u>GHG emissions reduction</u> in Year 1 |

The following exhibit identifies the projected operating results under each supply scenario in Year 10 of anticipated CCA operation.

## Peninsula Clean Energy Indicative Supply Scenarios: Year 10




| Key Considerations | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| General Environmental Benefits<br>Renewable energy and GHG content | 43% Renewable<br>43% GHG-Free | 65% Renewable<br>75% GHG-Free | 100% Renewable<br>100% GHG-Free |
| Rate Competitiveness<br>Incremental renewable/clean energy purchases will impose upward pressure on PCE customer rates | Average 4% savings relative to PG&E rate projections | Average 2% savings relative to PG&E rate projections | Average 1% increase relative to PG&E rate projections |
| Projected Residential Customer Cost Impacts[1]<br>Resource choices will influence monthly energy costs<br>[1]Average monthly usage for PCE res. customers ≈ 450 kWh | Average $4.95 monthly cost savings relative to PG&E rate projections | Average $1.80 monthly cost savings relative to PG&E rate projections | Average $1.35 monthly cost increase relative to PG&E rate projections |
| Assumed PCE Participation<br>Projected rate savings/increases are assumed to impact customer participation levels; medium and large commercial customers are assumed to be highly cost sensitive | 85% customer participation rate assumed across all customer groups | 85% customer participation rate assumed across all customer groups | 75% customer participation rate assumed for residential and small commercial customer groups; 50% participation for all other customer groups |
| Comparative GHG Emissions Impacts<br>GHG emissions impact relative to assumed PG&E portfolio | 0.243 metric tons CO2/MWh emissions rate results in additional GHG emissions of ≈488,000 metric tons in Year 10 | 0.066 metric tons CO2/MWh emissions rate results in ≈156,000 metric ton GHG emissions reduction in Year 10 | Zero emissions rate results in ≈266,000 metric ton GHG emissions reduction in Year 10 |

PCE's anticipated long-term power contract portfolio is also expected to generate substantial economic benefits throughout the state as a result of new renewable resource development. The prospective PCE long-term contract portfolio, which is reflected in the anticipated resource mix for each supply scenario, includes approximately 330 MW of new generating capacity (all of which is assumed to be located within California and some of which may be located within the County). Based on widely used industry models, such projects are expected to generate up to 10,000 construction jobs and as much as $1.3 billion in total economic output. Ongoing operation and maintenance ("O&M") jobs associated with such projects are expected to employ as many as 130 full time equivalent positions ("FTEs") with additional annual economic output up to $20 million. PCE would also employ a combination of staff and contractors, resulting in additional ongoing job creation (up to 30 FTEs per year) and related annual economic output ranging from $3 to $9 million.

Based on the results reflected in this Study and PEA's considerable experience with California CCAs, the PCE program has a variety of electric supply options that are projected to yield both customer rate savings and environmental benefits. To the extent that clean energy options, including renewable energy and hydroelectricity, are used in place of conventional power sources, which utilize fossil fuels to produce electric power, anticipated PCE costs and related customer rates would marginally increase. However, Scenario 3 indicates that ratepayer costs associated with a 100% bundled renewable energy supply scenario generally approach parity with the default supply option offered by PG&E over the ten-year study period.

Ultimately, PCE's ability to demonstrate rate competitiveness (while also offering environmental benefits) would hinge on prevailing market prices at the time of power supply contract negotiation and execution. Depending on inevitable changes to market prices and other assumptions, which are substantially addressed through the various sensitivity analyses reflected in this Study, PCE's electric rates may be somewhat lower or higher than similar rates charged by PG&E and would be expected to fall within a competitive range needed for program viability.

As with California's operating CCA programs, PCE's ability to secure requisite customer energy requirements, particularly under long term contracts, will depend on the program's perceived creditworthiness at the time of power procurement. Customer retention and reserve accrual, as well as a successful operating track record, will be viewed favorably by prospective energy suppliers, leading to reduced energy costs and customer rates. As previously noted, it is PEA's opinion that PCE would be operationally viable under a range of resource planning scenarios, demonstrating the potential for customer savings as well as reduced GHG emissions.

# SECTION 1: INTRODUCTION

In consideration of its response to the County of San Mateo's ("County") Request for Proposals for Services Developing a Technical Study on CCA, PEA was retained by the County to conduct a technical study focused on the prospective formation of a CCA program serving the San Mateo Communities. This Study reflects the results of a comprehensive analysis, which addresses prospective CCA operations under a range of scenarios, including the identification of anticipated rate/cost impacts, environmental benefits, resource composition and economic development among other considerations. When reviewing this Study, it is important to keep in mind that the findings and recommendations reflected herein are substantially influenced by current market conditions within the electric utility industry, which are subject to sudden and significant changes.

PEA is an independent consulting firm specializing in providing strategic advice and technical support to various organizations within the California electricity market, particularly aspiring and operating CCA programs. PEA's consultants have been assisting local governments with the evaluation and implementation of CCA programs since 2004, including each of California's operational CCA programs: Marin Clean Energy ("MCE"), Sonoma Clean Power ("SCP") and Lancaster Choice Energy ("LCE"). This Study reflects operating projections that are based on best available information, utilizing transparent, documented assumptions to provide an objective assessment regarding the prospects of CCA operation in the County. However, due to the dynamic nature of California's energy markets, particularly market prices which are subject to frequent changes, the assumptions and projections reflected in this Study should be revisited prior to taking any action(s) or making any decision(s) that may be predicated on information contained in this Study – to the extent that future market price benchmarks materially differ from any of the assumptions noted in this Study, PEA recommends updating pertinent operating projections to ensure well-informed decision making and prudent action.

This Study addresses the projected benefits and liabilities related to the formation, implementation and operation of a potential CCA program, PCE, which would provide electric generation services to residential and business customers currently served by the incumbent investor-owned utility, PG&E, within the following San Mateo Communities:

| | |
|---|---|
| Town of Atherton | City of Millbrae |
| City of Belmont | City of Pacifica |
| City of Brisbane | City of Portola Valley |
| City of Burlingame | City of Redwood City |
| Town of Colma | City of San Bruno |
| City of Daly City | City of San Carlos |
| City of East Palo Alto | City of San Mateo |
| City of Foster City | City of South San Francisco |
| City of Half Moon Bay | Town of Woodside |
| Town of Hillsborough | Unincorporated San Mateo County |
| City of Menlo Park | |

Under existing rules administered by the California Public Utilities Commission ("CPUC"), PG&E would use its transmission and distribution system to deliver the electricity supplied by PCE in a non-discriminatory manner, as it currently does for its own "bundled service" customers (i.e., customers who receive both electric generation and delivery services from a single provider) and for "direct access" customers who receive electricity provided by competitive retail suppliers. PG&E would continue to provide all metering and billing services, and customers would receive a single electric bill each month from PG&E – each customer's bill would show PCE charges for generation services as well as charges for PG&E delivery services. Money collected by PG&E on behalf of PCE would be electronically transferred each day to PCE's designated bank account. Following enrollment in the CCA program, PCE customers would continue to be eligible for programs funded through distribution rates and operated by PG&E, including rebate/subsidy programs focused on energy efficiency and distributed solar generation.

To fulfill the electric energy requirements of its customers and related compliance obligations, PCE would participate in the electricity market to purchase various energy products from generators, brokers, and/or marketers. In the future, PCE may also produce electricity generated by its own power plants, which could be independently developed or acquired by the CCA. Other programs and services may be offered by PCE as well, such as new programs to promote conservation and/or energy efficiency, locally-situated distributed renewable generation (e.g., photovoltaic solar systems that are installed by a customer "behind the meter" to reduce reliance on offsite energy sources and/or reduce overall energy costs), electric vehicle charging, and customer load shifting (also known as "demand response").

PEA's analysis quantifies the expected benefits and liabilities of the CCA program in terms of overall operating margins, ratepayer costs, reductions in emissions of greenhouse gases ("GHGs", which primarily entail carbon dioxide, or "$CO_2$") from electric generating resources used to supply customers within the San Mateo Communities, and economic development impacts arising from new job creation and local spending. The remaining sections of this report are organized by subject matter as follows:

*Section 2: Study Methodology* – describes the methodological approach used to conduct the Study.

*Section 3: PCE Technical Parameters* – describes the electric consumption patterns and electric resource requirements of prospective PCE customers (i.e., electricity customers located within the San Mateo Communities).

*Section 4: Cost of Service Elements* – explains the various costs that would be involved in providing electric service through a CCA program.

*Section 5: Cost and Benefits Analysis* – details the estimated benefits and financial liabilities associated with a variety of potential resource scenarios with regard to ratepayer costs, GHG impacts, and local economic development impacts.

*Section 6: Sensitivity Analyses* – describes the variables that are expected to have the largest impact on customer rates and shows the range of impacts associated with key variables.

*Section 7: Risk Analysis* – highlights key risks associated with the formation and operation of a CCA program, including recommended mitigation measures for such risks.

*Section 8: Fully Outsourced CCA Model Assessment* – PEA previously completed and delivered this Assessment to the County of San Mateo; the Assessment is incorporated by reference in this Study but is not attached hereto.

*Section 9: CCA Formation Activities* – summarizes the steps involved in forming a CCA program.

*Section 10: Evaluation and Recommendations* – summarizes Study results and provides recommendations based on PEA's analysis.

*Appendix A: PCE Pro Forma Analyses* – includes pro forma operating projections for each of the three PCE supply scenarios addressed in this Study.

# SECTION 2: STUDY METHODOLOGY

The analytical framework for the Study is a cost-of-service model that estimates all costs and anticipated revenues that would be incurred/received in providing CCA services. The Study examines projected economic impacts over a ten-year study period. As detailed in Section 4 (Cost of Service Elements), CCA program costs include those associated with energy procurement as well as administrative, financing and other costs that would be involved in the program's formation and ongoing operation. Total projected costs over each twelve-month period represent the amounts that must be funded through program rates, also known as the "revenue requirement." Average generation rates of the CCA program, which are calculated by dividing total program costs (dollars) by total program electricity sales (kilowatt hours, kWh; or megawatt hours, MWh), were determined for each year as well as the entirety of PCE's ten-year study period (ten-year averages were calculated on a levelized basis, as further described below) to facilitate comparisons among potential electric supply mixes and against projected PG&E rates.

The CCA program would have myriad choices with regard to the types of resources that may comprise its electric supply portfolio. Such choices typically focus on the following portfolio attributes: 1) the proportion of renewable and non-renewable, or conventional, generation sources; 2) specification of a portfolio GHG emissions rate; 3) selection of specific generating technologies (solar photovoltaic, wind, geothermal, etc.); 4) identification of resource locations (local, in-state, regional); 5) preferred power supply structure (power purchase agreement or, potentially, asset development/acquisition); 6) determination of resource scale (larger "utility-scale" projects and/or smaller distributed generating resources); and 7) duration of supply commitments (short-, mid-, long-term). Each of these choices presents economic and/or environmental tradeoffs. Specification of such preferences, which is a fundamental component of the resource planning process, typically occurs during the implementation and operation stages by those charged with leading and overseeing the CCA program. As the CCA continues to operate over time, resource planning will remain an ongoing obligation, enabling the CCA to adapt its planning principles to changing circumstances while promoting the CCA program's overarching policy objectives.

For purposes of this Study, PEA developed three representative supply portfolios that were evaluated on the basis of ratepayer cost, renewable energy content, GHG emissions, and economic development impacts. The objective of evaluating alternative supply scenarios is to obtain a robust set of analytical results that can be used to inform decision-makers of the inherent trade-offs that exist among various resource choices while also illustrating a reasonable range of outcomes that could be achieved through CCA implementation and operation. It should be understood that PCE would not be limited to any particular supply scenario assessed in this Study; the supply scenarios reflected in this Study have been developed for the sake of example, taking into consideration key objectives of the aspiring CCA program.

## Supply Scenarios

The following supply scenarios are representative of different choices that could be made by PCE with regard to overall renewable energy content, fuel sources and generator locations (of the electric resources used to supply PCE's customers). Each scenario embodies unique portfolio attributes and related ratepayer impacts. Subject to compliance with prevailing law and applicable regulations, California CCAs have a broad range of options when assembling a supply portfolio. The three scenarios discussed in this Study also reflect the inclusion of power supply from both existing generating sources, which may supply the majority of PCE's early stage energy requirements, and new renewable generation projects developed as a result of long-term power purchase agreements entered into by the CCA program, which may play an increasingly prominent role in PCE's mid- and long-term resource planning efforts. *With regard to specific sources of supply that may be incorporated by PCE, PEA was directed to exclude potential purchases from coal-fired and nuclear generating resources (utilized* *by the incumbent IOU) as well as the procurement of unbundled renewable energy certificates from all prospective supply portfolios.* In consideration of this direction, such products were omitted during PCE's portfolio analysis. It is also noteworthy that independent development and ownership of generating resources may also be an available supply alternative for the CCA program over the longer-term planning horizon, following years of successful operations, financial reserve accrual and establishment of general creditworthiness. Because the timing of any significant CCA-sponsored resource development and ownership likely falls outside the planning horizon addressed within this Study, PEA has not incorporated CCA-owned resources as a component of the indicative supply scenarios discussed herein.

With regard to the three prospective PCE supply scenarios addressed in this Study, such scenarios were designed to evaluate a broad range of portfolio characteristics for purposes of demonstrating the inherent tradeoffs that exist when deciding between available resource options. The prospective supply portfolios were also constructed in consideration of certain key objectives that were communicated to PEA on behalf of the San Mateo Communities. These objectives generally focused on the achievement of rate competitiveness, GHG emissions reductions and increased use of renewable energy resources relative to the incumbent utility. For purposes of this Study, each scenario was constructed as follows:

| **PCE Supply Scenario** | **Primary Objectives of Supply Portfolio** | **Total Renewable Energy Content[3] as % of Total Supply (Year 1; Year 10)** | **Anticipated GHG Emissions Savings[4] (Year 1; Year 10)** | **Anticipated PCE Customer Cost Impacts[5] (Year 1; Year 10)** |
|---|---|---|---|---|
| **Scenario 1** | Cost/rate competitiveness with incumbent utility | YEAR 1 = 35%<br>YEAR 10 = 43% | YEAR 1 = No<br>YEAR 10 = No | YEAR 1 = Moderate Savings<br>YEAR 10 = Moderate Savings |
| **Scenario 2** | Above-RPS renewable energy supply plus GHG emissions reductions (relative to incumbent utility) | YEAR 1 = 50%<br>YEAR 10 = 65% | YEAR 1 = Yes (Moderate)<br>YEAR 10 = Yes (Moderate) | YEAR 1 = Minimal Savings<br>YEAR 10 = Minimal Savings |
| **Scenario 3** | 100% PCC1 (bundled) renewable energy at prevailing market prices | YEAR 1 = 100%<br>YEAR 10 = 100% | YEAR 1 = Yes (Significant)<br>YEAR 10 = Yes (Significant) | YEAR 1 = Increased Costs<br>YEAR 10 = Increased Costs |

Under each of the three supply scenarios, the CCA program would cause new renewable generation projects to be developed through long-term power purchase agreements. It should be recognized that developing generation in California is a difficult and time-consuming process, and developing generation within the San

[3] All renewable energy volumes are assumed to be eligible for use in California's Renewables Portfolio Standard ("RPS") program.
[4] Anticipated GHG emissions impacts were determined in consideration of the GHG emissions factor associated with PCE's assumed resource mix as compared to the assumed emissions factor associated with PG&E's supply portfolio, which is expected to decline throughout the ten-year study period.
[5] Anticipated customer cost impacts were determined in consideration of the projected average PCE customer rate to be paid under each of the three prospective supply scenarios relative to the forecasted average PG&E rate.

Mateo Communities and surrounding areas may be even more difficult than in other parts of the state. Major development challenges include siting, permitting, financing and generator interconnection with the transmission system, all of which may take far longer than originally planned. Suitable sites must be identified and placed under control of the developer, and the required land can be quite significant, particularly for photovoltaic solar projects.[6] It is also common for proposed generating projects to draw opposition from local residents and interest groups, who may identify various objections to the project (e.g., habitat destruction/displacement, visual impacts and species mortality). Once a suitable site is secured and the necessary permits are in place, the project must be financed, and that financing will primarily depend upon the perceived creditworthiness of the CCA program, which may take several years to build. As previously noted, PEA has assumed that during the ten year study horizon, generation projects would be developed and financed by third parties under long-term power purchase agreements with PCE.

For purposes of this Study, an indicative long-term renewable energy contract portfolio, which emphasizes resource and delivery profile diversity in consideration of reasonably available project opportunities, was assembled for the PCE program. This indicative long-term contract portfolio was applied when analyzing each of the three supply scenarios for purposes of determining the resource planning and financial impacts associated with long-term power supply commitments that could be reasonably pursued by PCE. As reflected in the following table, the indicative supply portfolio phases in a variety of contracting opportunities over time, allowing the CCA program to incrementally increase long-term renewable supply commitments without unnecessarily exposing PCE to renewable energy price risk at a single point in time – this is both a prudent resource and risk management practice in consideration of recent, ongoing price reductions that have been observed by California's renewable energy buyers. The incremental ramp up in contracted renewable energy volumes will also serve the purpose of mitigating credit concerns that may impact the CCA program during early operations and limit the pace at which new long term resource commitments can be made. Based on PEA's experience, California's three operating CCAs, MCE, SCP and LCE, have been successful in pursuing small- (1 to 5 MWs in size) to mid-sized (5-40 MWs in size) renewable energy contracting opportunities during early operations – the developers/owners for such projects have been able to reconcile credit concerns in consideration of the CCA's projected operating results and/or relatively nominal collateral postings. PEA expects that PCE would have a similar experience when pursuing available renewable project options. For example, prior to commencing operations and in the 24 to 36 months thereafter, it is expected that PCE would be able to secure long-term contract commitments with both small- and mid-sized renewable project opportunities on the basis of PCE's projected operating results. California's other operating CCAs have generally been able to pursue similar opportunities with little to no collateral obligations (utilizing the respective CCA's pro forma operating projections as the basis for creditworthiness). After establishing a successful operating track record, PCE should be effective in pursuing larger-scale project opportunities, which may prove to be more cost competitive. PEA expects that larger-scale projects may be available following the accrual of three or more years of successful operating history, including the accumulation of prudent financial reserves and the demonstration of significant customer retention – in general, the opt-out structure provided for by California's CCA legislation is viewed as a risk by many prospective project developers and energy sellers; however, the successful operating track record of California's existing CCAs and the ongoing compilation of data related to customer participation/retention has provided compelling evidence that CCA customer counts and overall program operations will remain stable over time.

The indicative portfolio of long-term renewable energy contracts also reflects a significant commitment to renewable project development within the County – a total of 20 MWs of anticipated feed-in tariff ("FIT")

[6] Each MW of PV capacity requires approximately five to eight acres, depending upon the location and installation characteristics.

projects has been included in the Study in consideration of the San Mateo Communities' interest in promoting local renewable infrastructure buildout and economic development. FIT projects are typically smaller-scale renewable development opportunities, ranging from 50 kW to 1.5 MW in size, so PEA has assumed that numerous projects will comprise the 20 MW allocation reflected in the indicative resource mix.

For purposes of the Study, PEA has assumed a uniform portfolio of long-term renewable energy contracts for each of the three indicative supply scenarios. In practical terms, this means that each of the prospective supply scenarios reflects the resource mix described below as well as varying amounts of shorter-term renewable energy purchases to fulfill each scenario's specified renewable resource mix. Assumed prices for such long-term transactions as well as associated capacity factors, which reflect the amount of energy produced by each resource relative to its total, potential generating capacity, were also assembled by PEA in consideration of recent renewable energy transactions and typical operating characteristics associated with the noted renewable resource types. It is also noteworthy that PEA's pricing assumptions reflect significant planned reductions in the federal investment tax credit ("ITC"), which is expected to decrease from 30% to 10% for projects with initial delivery dates occurring after December 31, 2016, as well as growing demand for new renewable energy projects resulting from California's RPS procurement mandate increasing to 50% by 2030[7] – both of these considerations may impose upward pressure on renewable energy pricing. PEA has addressed this possibility through relatively conservative price assumptions when compared to the current market for renewable energy products. It is possible, of course, that Congress could extend the ITC at its current level, which would mean prices for solar power would be lower than the assumptions used in this study. It is also possible that increased demand, while applying upward pricing pressure in the near term, may promote expanded supply capabilities, which would have the effect of mitigating such price pressures over time. The specific contracting opportunities, which have been incorporated in PCE's indicative long-term renewable energy supply portfolio, are identified in the following table.

| Resource Type | Year of First Delivery | Capacity (MW) | Capacity Factor | Assumed Price ($/MWh)* | Annual Capacity Degradation |
|---|---|---|---|---|---|
| **Solar PV, utility scale** | 2019 | 100 | 30% | $65 | 1% |
| **Solar PV, utility scale** | 2025 | 100 | 30% | $65 | 1% |
| **Wind** | 2020 | 100 | 35% | $70 | 0% |
| **Landfill Gas to Energy** | 2020 | 10 | 90% | $80 | 1% |
| **Geothermal** | 2018 | 45 | 100% | $80 | 0% |
| **Solar PV, multiple FIT (local) projects** | 2018 | 5 | 22% | $100 | 1% |

[7] On September 11, 2015, the California legislature concurred with proposed amendments to Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015, and recommended this bill for enrolling. If signed, SB 350 would increase California's RPS to 50% by 2030 amongst other clean-energy initiatives. To enact the provisions of SB 350, Governor Brown must sign the bill by October 11, 2015. If signed, many details regarding implementation of SB 350 will be developed over time with oversight by applicable regulatory agencies.

| Resource Type | Year of First Delivery | Capacity (MW) | Capacity Factor | Assumed Price ($/MWh)* | Annual Capacity Degradation |
|---|---|---|---|---|---|
| **Solar PV, multiple FIT (local) projects** | 2020 | 5 | 24% | $90 | 1% |
| **Solar PV, multiple FIT (local) projects** | 2021 | 5 | 24% | $90 | 1% |
| **Solar PV, multiple FIT (local) projects** | 2022 | 5 | 24% | $90 | 1% |

*Certain pricing assumptions reflect planned reductions to currently applicable incentives, which may result in increased renewable energy prices during the ten-year planning period. To the extent that such incentives are continued at current levels and/or supply significantly increases, actual prices could be lower than reflected herein. It is important to note that a broad range of considerations, including the assumed increase in California's RPS to 50% by 2030, may influence renewable energy pricing and product availability in future years.

When considering the portfolio composition associated with PCE's prospective supply scenarios, it is important to note that several resource types, including clean (e.g., renewable and GHG-free) and conventional (e.g., fossil-fueled, which typically entails the use of natural gas within California) energy sources, would be available to PCE. With regard to renewable energy product options, California's currently effective RPS program allows for the use of three distinct renewable energy products, which are primarily differentiated by uniquely defined delivery attributes. In particular, certain RPS-eligible renewable energy products are referred to as "bundled renewable energy," meaning that the physical electricity and renewable attributes associated with specified quantities of renewable generation are both sold/delivered to the buyer, whereas other RPS-eligible products are referred to as "unbundled," meaning that the renewable attributes are sold separately from the electric commodity. Under the nomenclature of California's RPS, bundled renewable energy products are categorized as Portfolio Content Category 1 ("PCC1" or "Bucket 1") or Portfolio Content Category 2 ("PCC2" or "Bucket 2"). In general terms, PCC1 products are the most costly, least objectionable and offer the most flexibility when complying with California's RPS procurement mandates. Unbundled renewable energy, or Portfolio Content Category 3 ("PCC3" or "Bucket 3"), has usage limitations under the RPS program and is also the subject of ongoing philosophical debate regarding environmental impacts. For purposes of this Study, PEA was advised to exclude unbundled renewable energy products from PCE's prospective supply portfolios. For purposes of this Study, it was assumed that all additional GHG-free energy (i.e., GHG-free energy obtained from sources that are not RPS-eligible due to size limitations) would be produced/delivered by hydroelectric generators. In consideration of these product options, PCE's three prospective supply scenarios were constructed with the following resource preferences.

| PCE Supply Scenario | Primary Objectives of Supply Portfolio | Total Renewable Energy Content[8] as % of Total Supply (Year 1; Year 10) | Total PCC1-Eligible[9] Renewable Energy Content as % of Total Supply (Year 1; year 10) | Total PCC3-Eligible[10] Renewable Energy Content as % of Total Supply (Year 1; year 10) | Total GHG-Free Energy Content[11] as % of Total Supply (Year 1; Year 10) |
|---|---|---|---|---|---|
| **Scenario 1** | Cost/rate competitiveness with incumbent utility | YEAR 1 = 35%<br>YEAR 10 = 43% | YEAR 1 = 29%<br>YEAR 10 = 39% | YEAR 1 = None<br>YEAR 10 = None | YEAR 1 = 35%<br>YEAR 10 = 43% |
| **Scenario 2** | Above-RPS renewable energy supply plus GHG emissions reductions (relative to incumbent utility) | YEAR 1 = 50%<br>YEAR 10 = 65% | YEAR 1 = 44%<br>YEAR 10 = 60% | YEAR 1 = None<br>YEAR 10 = None | YEAR 1 = 63%<br>YEAR 10 = 75% |
| **Scenario 3** | 100% PCC1 (bundled) renewable energy at prevailing market prices | YEAR 1 = 100%<br>YEAR 10 = 100% | YEAR 1 = 94%<br>YEAR 10 = 100% | YEAR 1 = None<br>YEAR 10 = None | YEAR 1 = 100%<br>YEAR 10 = 100% |

[8] All renewable energy volumes are assumed to be RPS-eligible for purposes of this Study.

[9] Portfolio Content Category 1, or "Bucket 1" eligible renewable energy resources, are typically located within California but may also be located outside California, delivering power to California delivery points via specified energy scheduling protocols.

[10] Portfolio Content Category 3, or "Bucket 3" eligible renewable energy resources, are typically referred to as "unbundled renewable energy certificates" or "unbundled RECs". Bucket 3 products are produced when metered renewable energy is delivered to the grid and represent the environmental and/or "green attributes" associated with such renewable energy production. However, Bucket 3 products are sold separately from the physical energy commodity without any associated energy delivery obligations for the seller(s) of such products.

[11] Total GHG-free content equals the proportion of total supply produced by renewable energy resources plus the proportion of total supply produced by non-GHG emitting generating resources, namely non-RPS qualifying hydroelectric generators.

### Scenario 1: Maximize Rate Competitiveness while Minimally Exceeding RPS Mandates

Scenario 1 was structured for the primary purpose of promoting rate competitiveness with PG&E. With regard to renewable energy procurement, resource preferences within Scenario 1 were generally selected to promote compliance with the legal requirements of California's RPS in advance of applicable deadlines.[12] In particular, Scenario 1 incorporates a 35% RPS-eligible renewable energy supply from day one of CCA program operations, incrementally increasing after the 2020 calendar year in consideration of California's transition to a 50% RPS mandate. For purposes of Scenario 1, PCC3 and nuclear volumes were excluded from the renewable energy supply portfolio, replacing such volumes with additional PCC1 and PCC2 products. This substitution has the effect of increasing total renewable energy supply costs but will likely minimize philosophical objections related to the use of unbundled renewable energy products, which have become more prominent in recent years. Additional clean energy purchases, which would have the effect of reducing overall portfolio GHG emissions, were not considered in an effort to hold down costs, and related customer rates, to the lowest possible levels. A supply portfolio reflecting such a resource mix would be expected to offer among the lowest ratepayer costs during the study period but also the lowest level of environmental benefits. The expected clean energy content associated with Scenario 1 is identified in the following tables, which reflect the proportionate share of purchases relative to PCE's expected energy requirements.

**Scenario 1: Proportionate Share of Planned Energy Purchases Relative to PCE's Projected Retail Sales**

| | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6 | Yr 7 | Yr 8 | Yr 9 | Yr 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **PCC 1 Supply** | 26% | 26% | 26% | 33% | 32% | 32% | 31% | 31% | 38% | 38% |
| **PCC 2 Supply** | 9% | 9% | 9% | 2% | 3% | 5% | 7% | 9% | 3% | 5% |
| **PCC 3 Supply** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **Total Renewable Energy Supply** | **35%** | **35%** | **35%** | **35%** | **35%** | **36%** | **38%** | **40%** | **42%** | **43%** |
| **Additional GHG-Free Energy Supply** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **Total Clean Energy Supply** | **35%** | **35%** | **35%** | **35%** | **35%** | **36%** | **38%** | **40%** | **42%** | **43%** |

[12] State law requires PG&E to increase its renewable energy content to 33% by 2020. Based on PG&E's recent Power Source Disclosure Report, which addressed power purchases and sales completed by the utility during the 2014 calendar year, its current renewable energy content is approximately 27%. An equivalent renewable supply percentage should be reflected in PG&E's 2014 Power Content Label, which will be provided to customers of the utility later this year.

| | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6 | Yr 7 | Yr 8 | Yr 9 | Yr 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Conventional Energy Supply (including CAISO* market purchases)** | **65%** | **65%** | **65%** | **65%** | **65%** | **64%** | **62%** | **60%** | **59%** | **57%** |

*"CAISO" refers to the California Independent System Operator, the organization responsible for overseeing operation of California's wholesale electric transmission system and related energy markets.

As previously noted, each indicative supply scenario reflects a uniform portfolio of long-term renewable energy supply contracts, which incorporates a variety of generating technologies and related energy delivery profiles. In consideration of the expected delivery start dates and energy quantities associated with each prospective contract, PCE's portfolio composition will somewhat change over time, reflecting increased resource diversity.

Snapshots of the Scenario 1, Year 1 resource mix as well as the related Year 10 resource mix are shown in the following figures.

**Figure 1: Scenario 1 Resource Mix, Year 1**

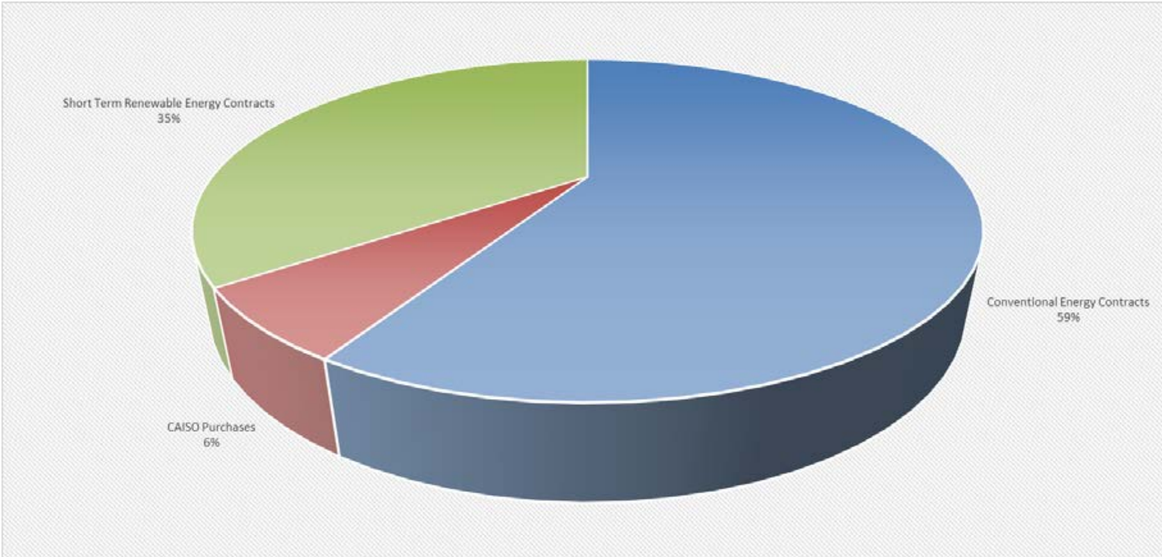



**Figure 2: Scenario 1 Resource Mix, Year 10**

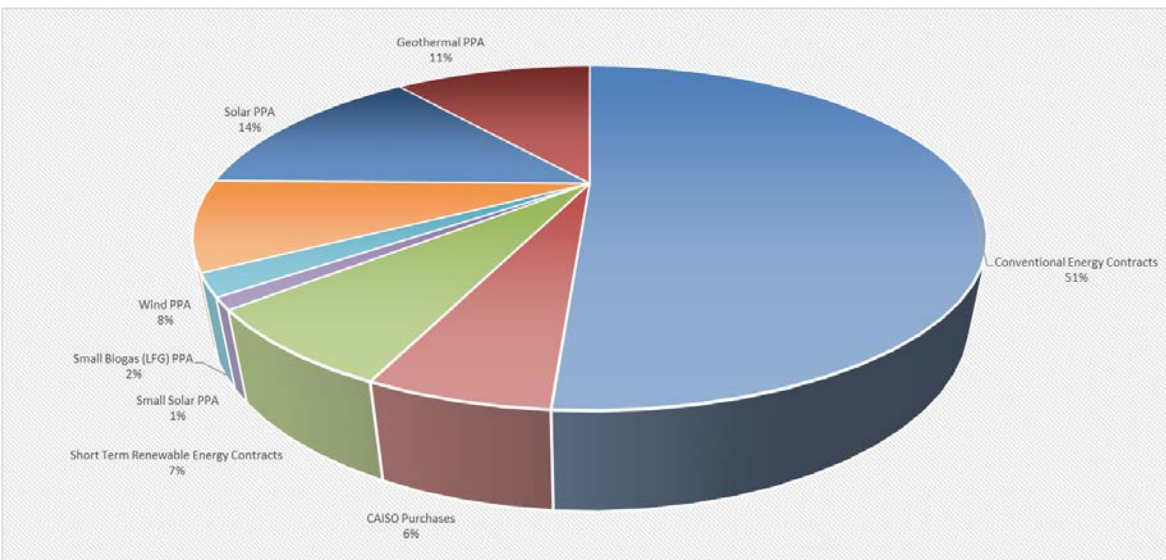
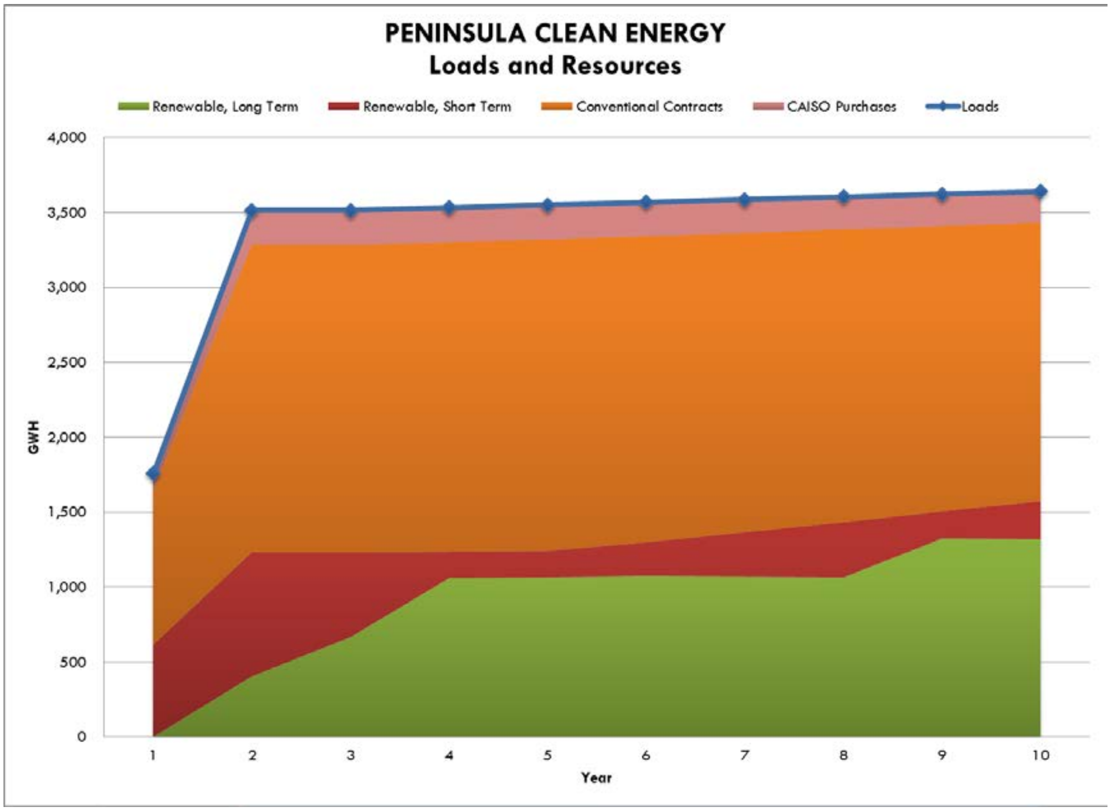



Figure 3 shows how composition of the Scenario 1 supply portfolio changes throughout the study period, reflecting planned diversification of PCE's renewable energy supply portfolio through long-term contracting efforts and local infrastructure build out.

**Figure 3: Scenario 1 Load and Resource Projections**




### Scenario 2: Minimum 50% Renewable Energy Content plus Net GHG Reductions

Scenario 2 reflects more aggressive procurement of renewable energy resources, starting out at a 50% RPS-eligible renewable energy content, increasing to 65% by Year 10 of program operations. This renewable energy procurement strategy ensures that PCE will continually exceed California's RPS mandate, even following recent adoption of the 50% renewable energy procurement requirement. In addition to the noted renewable energy volumes, Scenario 2 assumes that PCE will procure additional GHG-free energy supply to promote the delivery of a resource mix that demonstrates a projected emissions factor that is below PG&E's projected metrics. As with Scenario 1, the Scenario 2 supply portfolio excludes the use of PCC3 products and nuclear power.

**Scenario 2: Proportionate Share of Planned Energy Purchases Relative to PCE's Projected Retail Sales**

| | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6 | Yr 7 | Yr 8 | Yr 9 | Yr 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **PCC 1 Supply** | 38% | 38% | 38% | 44% | 45% | 46% | 46% | 46% | 54% | 54% |
| **PCC 2 Supply** | 13% | 13% | 13% | 6% | 8% | 9% | 11% | 14% | 8% | 11% |
| **PCC 3 Supply** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **Total Renewable Energy Supply** | **50%** | **50%** | **50%** | **50%** | **53%** | **55%** | **58%** | **60%** | **63%** | **65%** |

| | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6 | Yr 7 | Yr 8 | Yr 9 | Yr 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Additional GHG-Free Energy Supply** | 23% | 25% | 28% | 29% | 28% | 26% | 25% | 23% | 21% | 20% |
| **Total Clean Energy Supply** | **73%** | **75%** | **78%** | **79%** | **80%** | **81%** | **82%** | **83%** | **84%** | **85%** |
| **Conventional Energy Supply (including CAISO market purchases)** | **27%** | **25%** | **22%** | **21%** | **20%** | **19%** | **18%** | **17%** | **16%** | **15%** |

**Figure 4: Scenario 2 Resource Mix, Year 1**

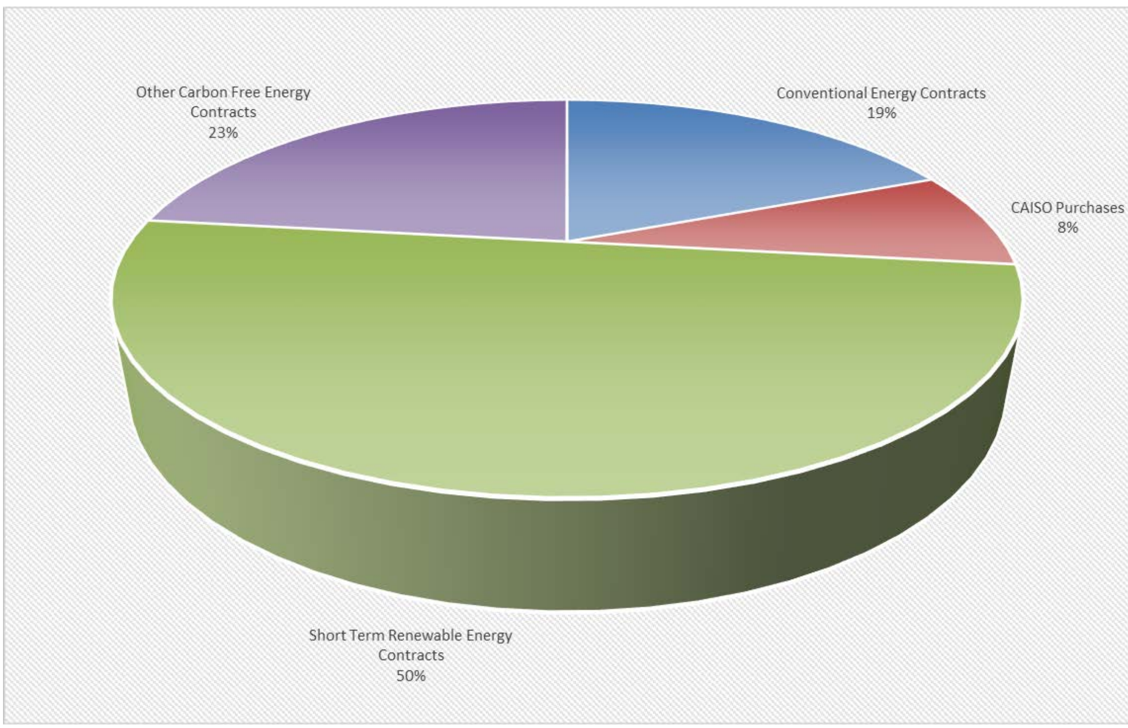


**Figure 5: Scenario 2 Resource Mix, Year 10**

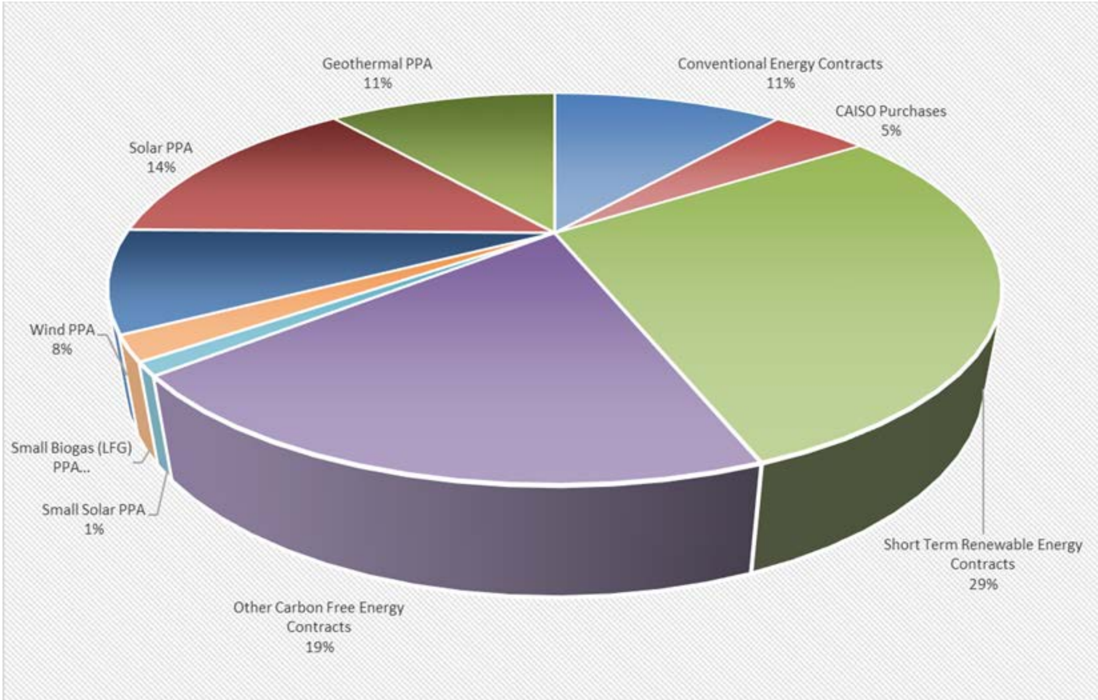
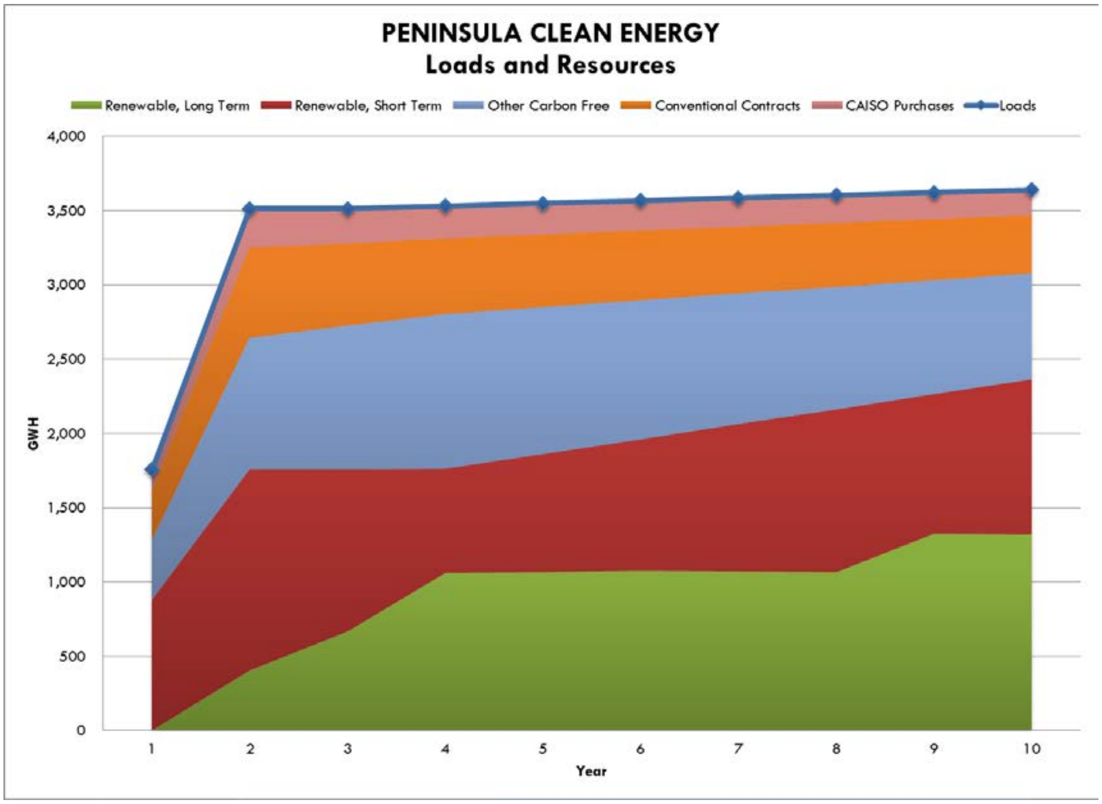



Figure 6 shows how composition of the Scenario 2 supply portfolio changes throughout the study period.

**Figure 6: Scenario 2 Load and Resource Projections**




### Scenario 3: 100% Renewable Energy Content

Scenario 3 represents a supply portfolio that relies entirely on renewable energy throughout the study period, relying on a mix of shorter- and longer-term supply agreements to achieve this objective. PCC3 and nuclear power products are not incorporated in this supply scenario, resulting in the exclusive use of bundled renewable energy products (e.g., PCC1 and PCC2). As a result of this planning strategy, the GHG emissions associated with Scenario 3 are assumed to be zero. It is also noteworthy that the exclusive use of bundled renewable energy products results in comparatively higher costs relative to PG&E, which is expected to reduce customer participation below the assumed levels reflected in Scenario 1 and Scenario 2. As a result of this assumption, annual electric energy requirements of the PCE program fall below similar levels reflected in Scenario 1 and Scenario 2 – in particular, Year 1 energy requirements under Scenario 3 are expected to be approximately 1,000 GWh lower relative to Scenarios 1 and 2; annual energy requirements are also expected to decline over time as customer attrition, following ongoing bill/cost reviews and increased awareness regarding the PCE program, occurs throughout the study period. With regard to Scenario 3, it is also assumed that CARE customers within the San Mateo Communities will continue to receive applicable discounts, as provided through the incumbent utility's distribution rates. However, the basic generation rate under Scenario 3, which will be subject to the aforementioned CARE discount, will be somewhat higher than PG&E's projected generation rate, as described below. Based on this observation, PCE may choose to reset applicable CARE rates under Scenario 3 to avoid the imposition of higher costs on this customer group. To the extent that applicable CARE rates are more heavily discounted under Scenario 3, it is assumed that other, non-CARE rates would marginally increase (above projections reflected in this subsection). This expected outcome is illustrated in the following figures.

**Scenario 3: Proportionate Share of Planned Energy Purchases Relative to PCE's Projected Retail Sales**

| | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6 | Yr 7 | Yr 8 | Yr 9 | Yr 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **PCC 1 Supply** | 75% | 75% | 79% | 86% | 86% | 86% | 86% | 86% | 89% | 89% |
| **PCC 2 Supply** | 25% | 25% | 21% | 14% | 14% | 14% | 14% | 14% | 11% | 11% |
| **PCC 3 Supply** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **Total Renewable Energy Supply** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** |
| **Additional GHG-Free Energy Supply** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| **Total Clean Energy Supply** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** |
| **Conventional Energy Supply (including CAISO market purchases)** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** |

**Figure 7: Scenario 3 Resource Mix, Year 1**

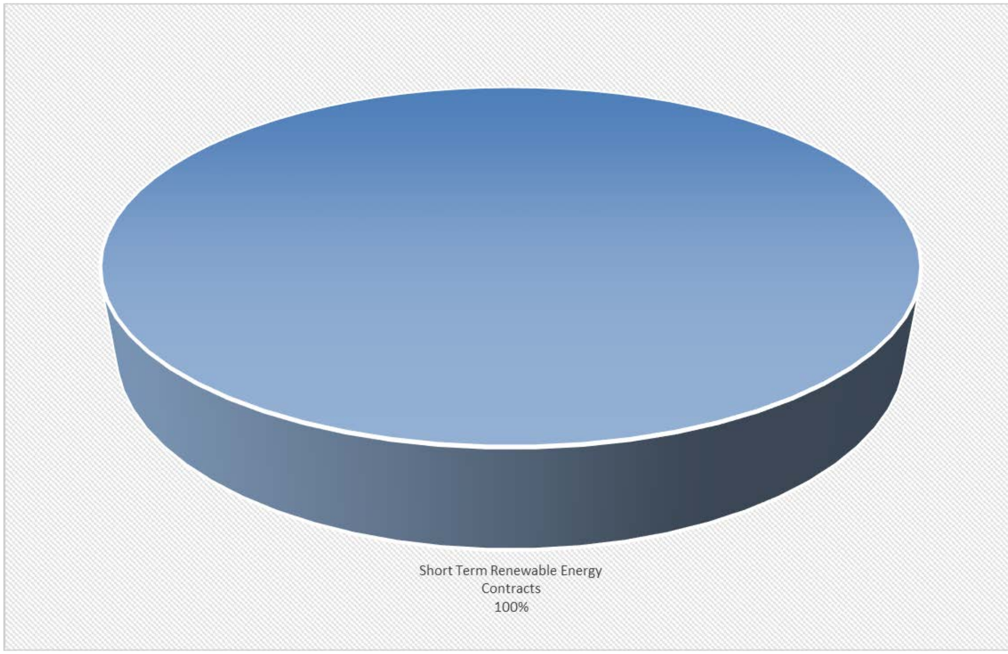



**Figure 8: Scenario 3 Resource Mix, Year 10**

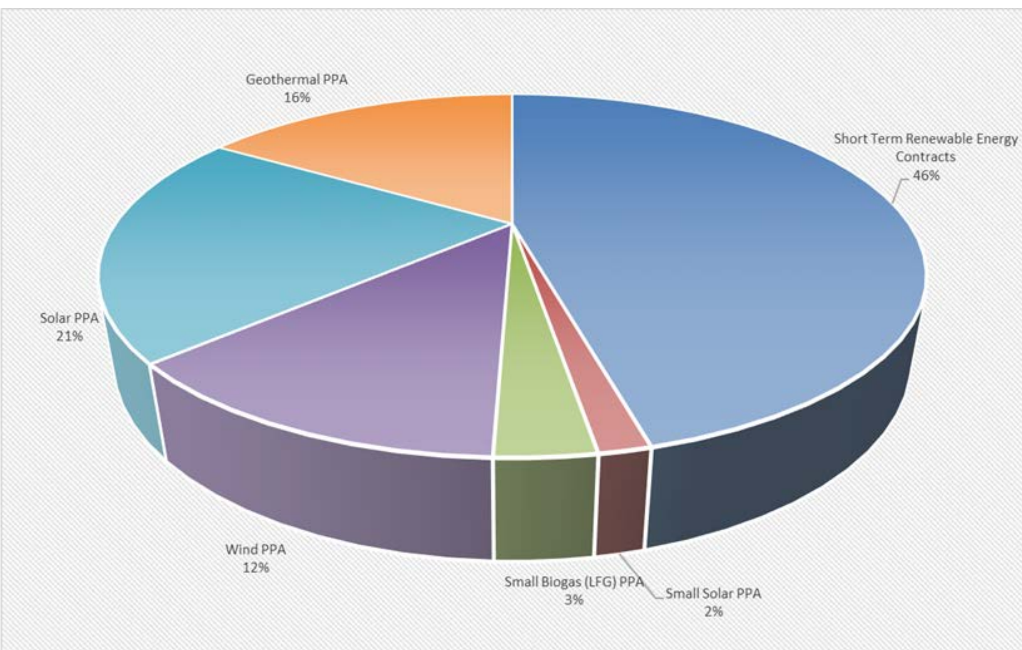
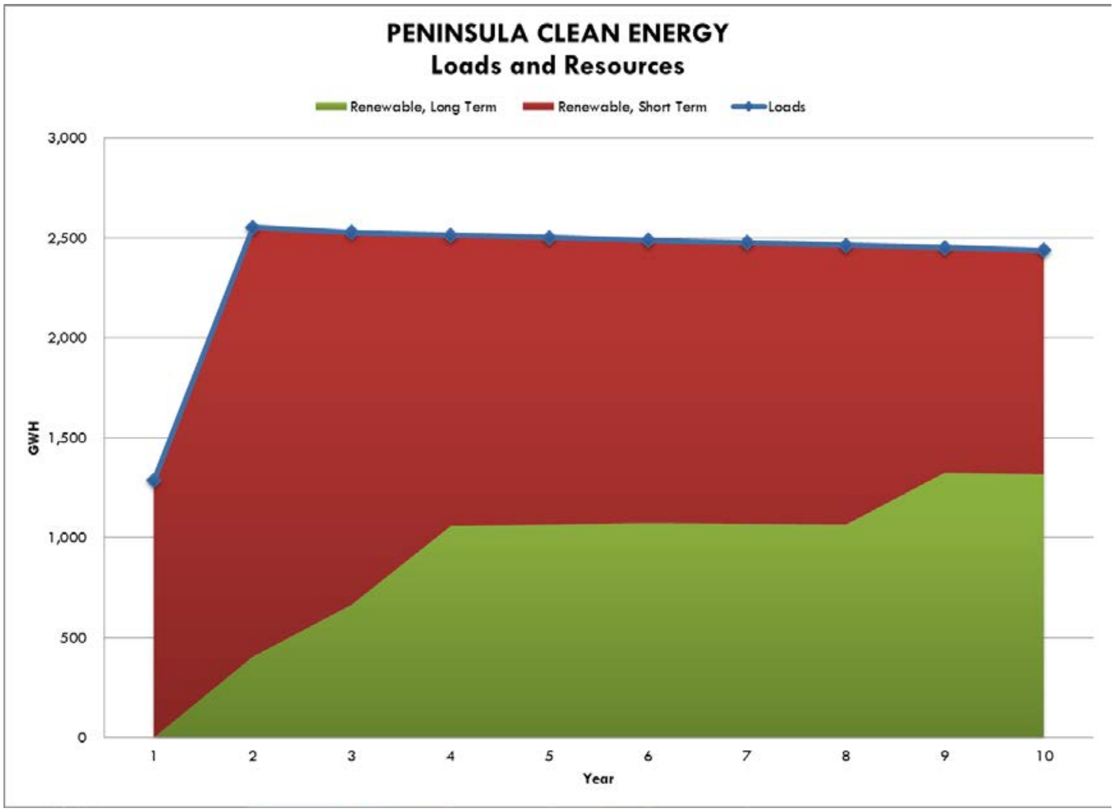



Figure 9 shows how composition of the Scenario 3 supply portfolio changes throughout the study period.

**Figure 9: Scenario 3 Load and Resource Projections**




## Costs and Rates

For each supply scenario, detailed cost estimates were made for the electric power supply costs and all other program costs. Net ratepayer costs or benefits were calculated for each scenario as the difference between the costs ratepayers would pay while taking service under the CCA program and the costs ratepayers would pay under bundled service, as currently provided by PG&E. Competitive rates are a key metric for program feasibility as PCE must offer competitive rates in order to retain customers that are automatically enrolled in the program. Customer retention may also be affected by PCE offering customized rate choices such as voluntary green pricing programs or market based rate options for large end users.[13] Certain communities may be interested in defaulting customers to a 100% renewable energy supply option with the ability to opt down to the prevailing PCE resource mix. As previously discussed, the anticipated higher costs of a 100% renewable service option may affect customer participation rates. In addition, PCE's administrative costs and communication obligations would likely increase as result of administering two default service offerings.

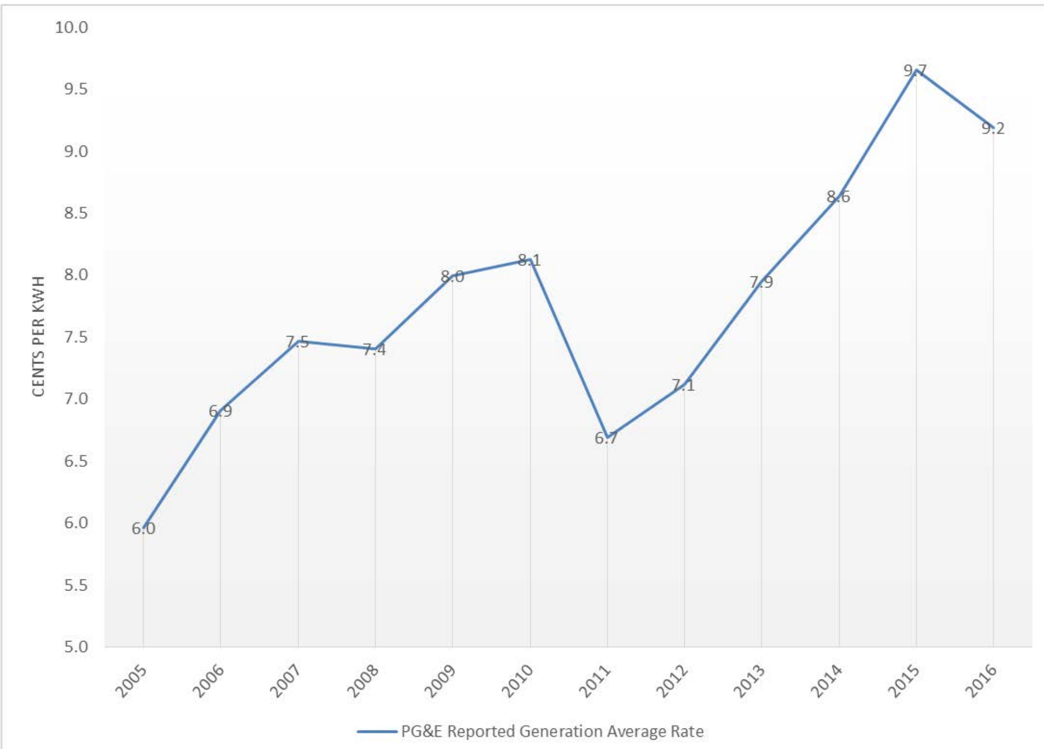
Rate competiveness is particularly important during the first year, when opt out notices are being provided to eligible customers and initial impressions are being formed in the community. Generally speaking, if the net cost to the customer of PCE service is below what the customer would pay for PG&E bundled service, the PCE program can be considered to offer competitive rates and would be feasible. Rates that provide for a modest

[13] Such customized rate options would require PCE design and administration, working collaboratively with customers and interested stakeholders. Green pricing participation may also improve PCE's environmental benefits and overall renewable energy content.

cost increase may also be considered competitive, if the attributes of the electric service being offered are perceived as superior to the electric service offered by PG&E. For instance, a materially higher renewable energy content and/or lower carbon intensity for the electricity sold by PCE may justify a higher price, and PCE rates may be competitive if they are within a defined range of PG&E's.

Historically, PG&E generation rates have trended upwards as shown in Figure 10, but the recent decline in wholesale energy costs are expected to result in lower generation rates beginning in 2016. When reviewing the following figure, it is important to note that myriad factors can influence power prices over time, including weather patterns and natural disasters, infrastructure outages, natural gas storage levels and other considerations. All of these factors contribute to the volatile nature of electric power prices.

**Figure 10: PG&E System Average Generation Rates**




The primary measure of ratepayer costs calculated for this study is the difference in total electric rates between the CCA program and PG&E. This measure examines the change in customers' total electric bills, including PG&E delivery charges and PG&E surcharges (namely, "exit fees" associated with PG&E's uneconomic generation commitments). In order to compare ratepayer costs over the ten-year study period, during which electric rates change from year-to-year, PEA calculated levelized electric rates on a per kWh basis for each PCE supply scenario and for PG&E bundled service. In simple terms, a levelized rate allows for the comparative evaluation of a multi-year period through the use of a single value or metric, which reflects the year-over-year changes that may occur over such period of time. The development of a levelized electric rate utilizes net present value analysis to consolidate rate-related impacts, which occur over time, in a single number. For purposes of this Study, a levelized rate represent the constant electric rate that would yield equivalent revenues (in present value terms) if charged to customers in place of the projected series of annual rates occurring throughout the ten-year study period. Levelized costs are commonly used in the electric utility industry to provide an apples-to-apples comparative basis for projects that have cash flows occurring at different points in time. Comparing levelized total electric rates for the CCA program against levelized total electric rates for PG&E service provides a simple measure of ratepayer impacts over the entire ten-year study period. Annual impacts are also provided for each scenario and provide a more detailed picture of ratepayer impacts from year to year of program operations.

## Greenhouse Gas Emissions

Each supply scenario was evaluated based on the emissions of greenhouse gases associated with electricity production as compared to similar projections prepared by PG&E (for its own supply portfolio). Based on PEA's review of PG&E's projected annual GHG emissions factors, which have been prepared through calendar year 2020, consideration appears to have been given to the impacts of California's increasing RPS procurement mandates. PG&E's projected emissions factor steadily declines through the 2020 calendar year as additional renewable energy purchases and other prospective clean-energy purchases increase with time. PG&E's GHG emissions factor projections for the five-year period beginning in 2016 through 2020 is identified in the following table[14]:

| Year | Emission Factor (lbs $CO_2$/MWh) | Emission Factor (Metric Tons $CO_2$/MWh) |
|---|---|---|
| **2016** | 370 | 0.168 |
| **2017** | 349 | 0.158 |
| **2018** | 328 | 0.149 |
| **2019** | 307 | 0.139 |
| **2020** | 290 | 0.131 |

For the balance of the ten-year study period, PEA assumed incremental emission reductions for the PG&E supply portfolio in consideration of increases to California's RPS procurement mandate and other factors, such as the launch of other California-based CCA programs, which may have the effect of reducing PG&E GHG emissions factor (via reductions in short term conventional energy purchases due to declining retail sales).[15] PEA's assumed annual GHG emissions factors for the PG&E supply portfolio, over the balance of the ten-year study period, are reflected in the following table:

[14] PG&E, Greenhouse Gas Emission Factors: Guidance for PG&E Customers, April 2013.

[15] In practical terms, it is not likely that PG&E would materially adjust renewable energy purchases or reduce carbon-free generation (from its hydroelectric and/or nuclear generators) as a result of customer departure following PCE formation. These carbon-free resources would generally remain in the PG&E supply portfolio without near-term adjustments for departing load. Instead, it is more likely that PG&E would reduce the amount of conventional market purchases with comparatively high emissions intensities, which would have the effect of marginally reducing its portfolio emissions factor following customer departures as the relative proportion of clean energy sources in the PG&E supply portfolio would incrementally increase.

| Year | Emission Factor (lbs $CO_2$/MWh) | Emission Factor (Metric Tons $CO_2$/MWh) |
|---|---|---|
| **2021** | 280 | 0.127 |
| **2022** | 272 | 0.123 |
| **2023** | 264 | 0.120 |
| **2024** | 256 | 0.116 |
| **2025** | 248 | 0.112 |

The PG&E emission profile was selected as the benchmark for comparison to promote a conservative assessment of direct emissions impacts related to CCA operations (on a head-to-head basis with PG&E's anticipated supply portfolio). The GHG impacts associated with PCE's supply portfolio will likely be evaluated (by members of the public and, potentially, through new emissions reporting requirements that may be incorporated in annual Power Content Label, or "PCL", reporting) relative to the PG&E benchmark, which suggests that the aforementioned comparative methodology is appropriate.

For each supply scenario, the difference in GHG emissions produced by the scenario's assumed resource mix and the otherwise applicable PG&E supply portfolio were quantified during each year as well as the entirety of the ten-year study period. The GHG impacts were quantified in terms of total tons of $CO_2$ emissions.

## Economic Development Impacts

A key potential benefit of a CCA program is its ability to promote economic development through investment in and contracts with locally constructed renewable generating infrastructure. Such projects have the potential to stimulate a significant level of new economic activity within California by creating new jobs and spending activities during generator construction, ongoing operation and maintenance. Economic development impacts may also be significant factors when comparing expected operating costs, including generation costs, of the CCA program to electric generation costs under PG&E service, particularly when initial "head-to-head" cost comparisons are comparable. When performing such comparisons, it is important to acknowledge the difficulty in accurately quantifying actual economic benefits related to local project investment, particularly induced economic impacts resulting from the effects of economic multipliers.

In qualitative terms, it is reasonable to assume that new development projects would stimulate new economic activity. However, as with any capital project, quantifying the specific location in which such economic benefits may occur, including job creation, is challenging due to numerous uncertainties affecting the proportion of expenditures and employment that would occur within discretely defined geographic boundaries. Certain tools, which rely on the application of industry-specific economic multipliers, have been developed to assist in completing these projections, but decision makers should be aware of the broad range of outcomes that may actually apply when interpreting analytical results.

To quantify the economic impacts associated with new renewable generation projects that were incorporated in the indicative long-term renewable energy supply portfolio that was applied in each of the three energy supply scenarios, PEA utilized the National Renewable Energy Laboratory's ("NREL") Jobs & Economic Development Impact ("JEDI") models. NREL is the principal research laboratory for the United States Department of Energy ("DOE") Office of Energy Efficiency and Renewable Energy and also provides research expertise for the Office of Science, and the Office of Electricity Delivery and Energy Reliability. NREL is operated for DOE by the Alliance for Sustainable Energy, LLC.[16]

NREL JEDI models are publicly available, spreadsheet-based tools that were specifically designed to "estimate the economic impacts of constructing and operating power plants, fuel production facilities, and other projects at the local (usually state) level. JEDI results are intended to be estimates, not precise predictions. Based on user-entered project-specific data or default inputs (derived from industry norms), JEDI estimates the number of jobs and economic impacts to a local area that can reasonably be supported by a power plant, fuel production facility, or other project."[17] Unique JEDI models have been developed for a variety of resource types, including wind, solar, geothermal, biogas and various other generating technologies. Each version of the model may be downloaded free of charge from NREL's website: http://www.nrel.gov/analysis/jedi/download.html.

According to NREL, the JEDI models are peer reviewed and are intended to project gross job estimates. NREL also notes that it "performed extensive interviews with power generation project developers, state tax representatives, and others in the appropriate industries to determine appropriate default values contained within the models." In PEA's opinion, NREL's JEDI models are the appropriate tools to forecast "order of magnitude" local economic development impacts associated with a CCA program serving the San Mateo Communities.

Based on the aforementioned indicative long-term renewable energy contract portfolio that was assumed to exist under each of the three supply scenarios, PEA downloaded, populated and ran the appropriate JEDI models to derive estimates of the anticipated jobs and economic development impacts that could be created in relation to the indicative long-term contract portfolio. PEA utilized each set of economic development projections to assemble an aggregate economic impact analysis for the complete long-term contract portfolio. However, all economic development estimates within this report are presented with the understanding that subtle changes in certain expenditures (and jobs) may result in significant changes to actual economic development impacts.

Key output from the JEDI models is presented within three specific categories: jobs, earnings and economic output. Within each of these broadly defined categories, JEDI models approximate the impacts of economic multipliers by quantifying the "ripple effect" that occurs as a result of new local economic activity. JEDI models initially estimate direct economic impacts at the project site and apply economic multipliers, derived from the U.S. Bureau of Economic Analysis, the U.S. Census Bureau and other sources, to approximate impacts within the supply chain (manufacturing job creation, as an example) as well as induced economic impacts (spending that occurs as a result of activity within the first two categories) related to the project. JEDI models also address job creation and economic impacts on a temporal basis, quantifying related impacts during two specific phases of the project lifecycle: 1) construction; and 2) ongoing operation and maintenance.

Forecasted economic impacts associated with the indicative long-term contract portfolio are presented in aggregate form, inclusive of all anticipated development/contract opportunities, by summing the project-specific impacts calculated by the JEDI models. This approach facilitates a high-level understanding of the prospective economic impacts that could be created through such contracts but does not address temporal nuance related to the timing and receipt of economic benefits associated with specific projects. For example, the unique economic impacts of projects that will begin operation/delivery during the period extending from 2018 through 2025 have been aggregated and presented within a single scenario-specific summary table.

When reviewing economic development projections within this Study, it is important to distinguish between economic impacts related to the construction period and the ongoing operation and maintenance period. All

[16] National Renewable Energy Laboratory website, http://www.nrel.gov/about/, September 2, 2015.
[17] National Renewable Energy Laboratory website: http://www.nrel.gov/analysis/jedi/about_jedi.html, September 2, 2015.

job creation estimates are presented as full time equivalent positions ("FTEs"). Projections related to the construction period are intended to capture annual economic benefits received during the defined construction term (24 months, for example). Economic impacts during the ongoing operation and maintenance period are presented on an annual basis and are projected to persist throughout the project lifecycle. Aggregate jobs and economic development impacts associated with the indicative long-term contract portfolio, which would result in the assumed development and construction of approximately 330 MW of new renewable generating capacity within the state are reflected in the following table.

**Economic Development Impacts Summary: Indicative Supply Portfolio (Secured via Long-Term Contract)**

| | Jobs | Earnings | Output |
|---|---|---|---|
| **During Construction Period** | | ($ - Millions) | ($ - Millions) |
| Project Development and Onsite Labor Impacts | 3,250 - 4,250 | 210 - 265 | 375 - 450 |
| Construction and Installation Labor | 1,250 - 1,750 | 85 - 115 | |
| Construction Related Services | 2,000 - 2,500 | 125 - 150 | |
| Power Generation and Supply Chain Impacts | 3,250 - 3,750 | 175 - 225 | 550 - 600 |
| Induced Impacts | 1,500 - 2,000 | 75 - 100 | 225 - 275 |
| **Total Construction Period Impacts** | 8,000 - 10,000 | 460 - 590 | 1,150 - 1,325 |
| **During operating years (Annual)** | | | |
| Onsite Labor Impacts | 50 - 80 | 3 - 6 | 3 - 6 |
| Local Revenue and Supply Chain Impacts | 20 - 30 | 1 - 2 | 5 - 10 |
| Induced Impacts | 10 - 20 | 0 - 1 | 2 - 4 |
| **Total Operating Impacts (Annual)** | 80 - 130 | 5 - 10 | 10 - 20 |
| **Peninsula Clean Energy - Internal Staff** | 10 - 30 | 1 - 3 | 3 - 9 |

**Notes: Earnings and Output values are expressed in million dollar increments (2015). Construction period jobs reflect full-time equivalent (FTE) positions during the duration of the construction period (1 FTE = 2,080 hours). For example, if 10,000 construction jobs are expected over a 24-month construction period, an annual equivalent of 5,000 construction jobs would be created through anticipated development activities. Such jobs will not exist following completion of construction activities. Economic impacts "During operating years" represent annual, ongoing impacts that occur as a result of generator operation and related expenditures. With respect to operating jobs, such statistics represent annual, ongoing FTEs during the entire project lifecycle, which may extend up to thirty (30) years in duration. Totals may not add up due to independent rounding.**

As reflected in the previous table, the indicative long-term contract supply portfolio, which is assumed to exist in each of the CCA program's three planning scenarios, would result in significant economic benefits throughout the state and, potentially, within the San Mateo Communities.

With respect to the prospective generating facilities that have been incorporated in PCE's indicative long-term contract portfolio, PEA assumed that the significant majority of such facilities would be developed in optimal renewable resource areas throughout California. PEA assumed the development of 20 MW of locally situated renewable generating projects during the study period – such projects are discussed below. With regard to anticipated development projects occurring outside of the San Mateo Communities, PEA assumed that virtually all plant equipment, including turbines and other materials, would be procured outside of the San Mateo Communities. This equipment typically represents the largest single line item expenditure in generator construction. Requisite labor, including general site preparation and ancillary facility construction activities (concrete footings and structures not directly involved in the generation process) would also draw from California's broader regional workforce.

In total, PCE's indicative long-term contract portfolio is projected to result in the creation of approximately 8,000-10,000 new jobs during the aggregate construction period required to complete the assumed 330 MW of new generating projects. During the construction period, individuals working directly on the projects, including electricians, engineers, construction workers and heavy equipment operators, attorneys and permitting specialists, would be responsible for as much as $450 million in new economic output of which as much as $265 million would be collected in the form of salaries and wages. Workers involved with supply chain activities, such as turbine manufacturing and assembly, cement producers and heavy equipment rental companies would be responsible for up to $600 million in new economic activity of which approximately $225 million would be collected in the form of salaries and wages. Furthermore, spending by the aforementioned individuals (as a result of salary and wage collection) would "induce" other local economic impacts at local businesses, including restaurants, grocery stores, gas stations and other providers of goods and services, totaling as much as $275 million of which approximately $100 million would be collected as salaries and wages. In total, the locally developed generation projects identified under PCE's indicative long-term contract portfolio would result in $1.1 to $1.3 billion in new economic output throughout the state and local economy during the construction process.

During ongoing operation of the renewable generators, it is projected that as many as 130 new jobs would be created with a total annual economic impact ranging from $10 to $20 million. It is anticipated that these jobs would remain effective as long as the generating facilities remain operational, resulting in significant, lasting impacts to San Mateo County's local economy.

### Local Economic Development Impact Potential

The primary source of local jobs and economic development impacts would be derived through projects developed under PCE's anticipated Feed-In Tariff ("FIT") program, which would promote the construction of locally situated, smaller-scale (i.e., up to 1 MW of total generating capacity, per project) renewable generating projects over time. For purposes of this Study and in consideration of a similar FIT program offered by MCE, PEA assumed that PCE would eventually (by year five of program operation) support the development of approximately 20 MW of locally situated renewable generating capacity, which will likely utilize the photovoltaic solar generating technology.

Based on applicable JEDI modeling results, the prospective PCE FIT program would result in the creation of approximately 370 local jobs during generator construction with an additional 500 jobs induced (during the construction period) through associated economic activity. As previously noted, these construction jobs are temporary, but there is also a nominal level of ongoing job growth associated with generator maintenance and operation, which is projected to be approximately six full-time equivalent employees during each year of facility operation (which may continue for 25-30 years).

Project development would also generate approximately $22 million in earnings for those working on the FIT projects, which is expected to create a total economic stimulus approximating nearly $39 million (in consideration of economic multiplier effects created by the spending of earnings/wages). Supply chain and induced impacts would also be significant totaling approximately $26 million and $71 million, respectively.

It is also anticipated that PCE would employ 10 to 30 internal staff, depending on decisions related to outsourcing/insourcing of requisite activities, during program implementation and ongoing operation. These estimates were derived by PEA in consideration of direct experience working with California's operating CCA programs. Depending on staffing levels, aggregate direct salaries for such staff are estimated to range from $1 to $3 million per year with a total of $3 to $9 million in total annual local economic activity generated by PCE staff.

These local economic development impacts are subsumed in the aggregate economic development impact totals reflected in the previous table.

# SECTION 3: PCE TECHNICAL PARAMETERS (ELECTRICITY CONSUMPTION)

## Historical and Projected Electricity Consumption

Total electric consumption for eligible customers within the San Mateo Communities was provided by PG&E for the 2013 and 2014 calendar years. The PG&E historical data was used as the basis for the study's customer and electric load forecast. Based on PEA's review of the PG&E data set, there were 298,435 electric customers within the potential CCA service territory. These customers consumed approximately 4,318 million kilowatt-hours of electricity during the 2014 calendar year. It is noteworthy that the aforementioned customer account and usage statistics include approximately 550 accounts, which are currently served through direct access service arrangements with third party suppliers. These customers account for approximately 10% of the aforementioned energy consumption, or approximately 400 million kWh annually, within the San Mateo Communities. Such usage has been excluded from the projections reflected in this Study – under direct access service arrangements, which are no longer available to California consumers[18], individual customers engage in shorter-term contract arrangements for the provision of electric generation service. By enrolling direct access accounts in the PCE program, such customers would be potentially exposed to duplicate generation charges or may be in violation of existing supply agreements. In consideration of these potential issues, direct access accounts have been excluded from PCE's prospective customer base.

Figure 11 shows how potential electric customers are distributed throughout the San Mateo Communities: the largest customer populations within the potential CCA jurisdiction include the City of San Mateo, Daly City, Redwood City, South San Francisco and the unincorporated areas of the County.

[18] Consideration of Senate Bill 286 (Hertberg), which would have expanded eligibility of direct access service within California, subject to the provision of increased levels of renewable energy supply, was recently suspended by the California legislature and is now a two-year bill. In consideration of this suspension, the participatory cap on direct access service remains capped/fixed at current levels, precluding new customer accounts from enrolling in such service options.

**Figure 11: Geographic Distribution of Customers**

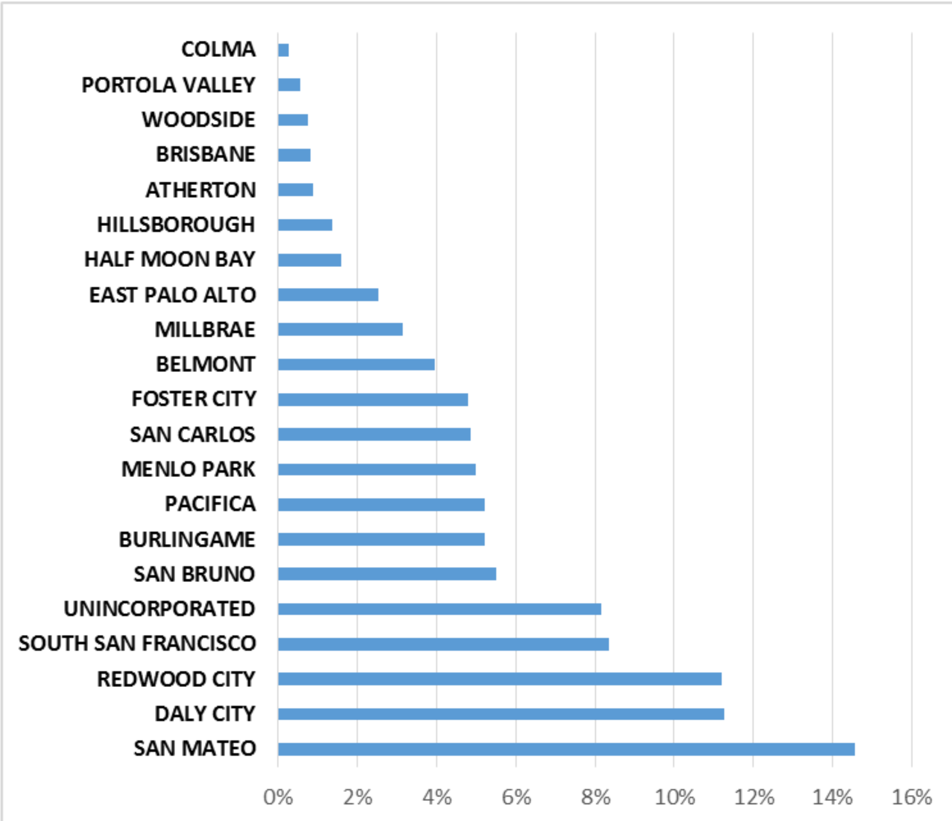
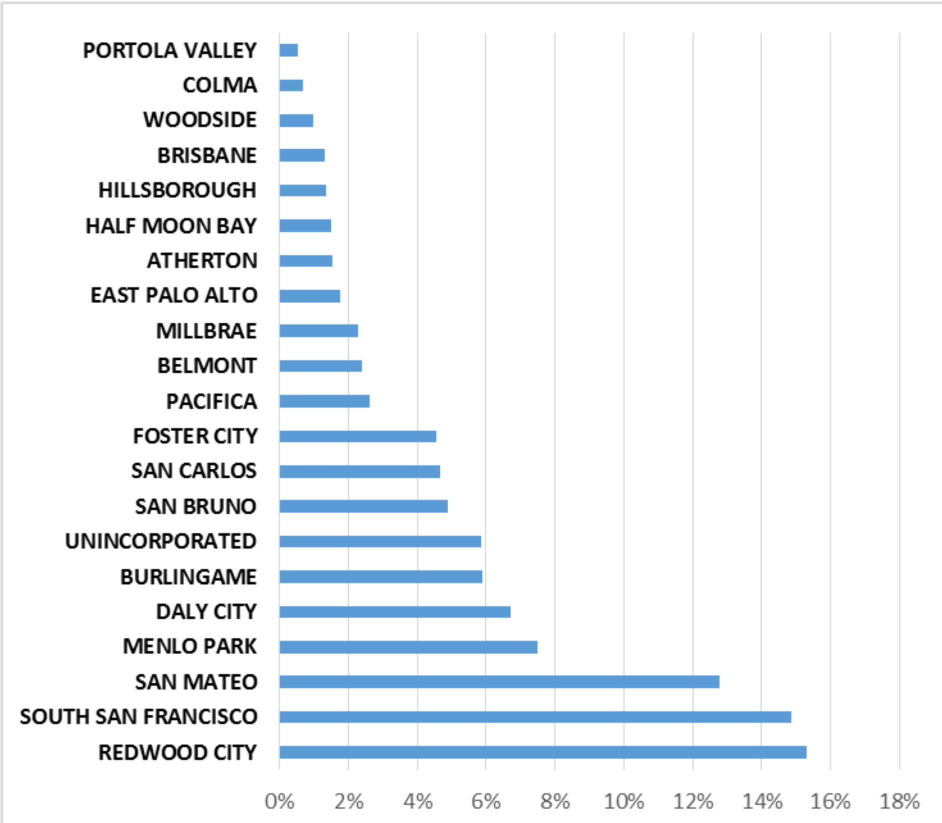



Figure 12 shows the distribution of electric consumption by municipality. The geographic distribution of energy consumption is somewhat different when compared to the service account data in Figure 11 above, indicating disproportionately higher use in certain San Mateo Communities (as a result of differentiated account composition, particularly higher concentrations of larger commercial and/or industrial account types, within such jurisdictions).

**Figure 12: Geographic Distribution of Electric Consumption**




In deriving the load projections used for the Study, adjustments to the base forecast were made to remove customers identified as taking service under direct access[19] as it was assumed that direct access customers would remain with their current electric service provider. Further adjustments were made to estimate customer opt-out rates during the statutory customer notification period when eligible customers would be offered CCA service and provided with information enabling them to opt out of the program. PEA assumed a 15% customer opt-out rate, which is generally consistent with the reported opt-out rates observed during recent expansions of the Marin Clean Energy program, when evaluating supply Scenario 1 and supply Scenario 2. For supply Scenario 3, which relies exclusively on bundled renewable energy products to serve the electric energy requirements of PCE customers, expected rate increases (when compared to PG&E) are assumed to drive participation levels down relative to Scenarios 1 and 2. For Scenario 3, PEA assumed more conservative participation levels, incorporating a 25% opt-out assumption for all residential and small commercial customers and a 50% opt-out assumption for all other customers groups, including medium commercial, large commercial, industrial and agricultural customers. Additionally, annual customer attrition for Scenario 3 was assumed at 1%. Sensitivities using different opt-out rates are presented in Section 6.

Going forward, potential customers and energy consumption were projected to increase by 0.5% annually, consistent with statewide projections and reflecting impacts from the significant emphasis being placed on energy efficiency in the state.

[19] Direct access allows customers to choose to receive generation service from competitive electricity providers. Currently, direct access service is not available to new customers within California. Proposed legislation may lead to the reopening of this service option at some point in the future.

## Projected Customer Mix and Energy Consumption

The projections for enrolled customers (excluding direct access customers) and annual electricity consumption for the major customer classifications are shown in the following table. Hourly electricity consumption and peak demand were estimated using hourly load profiles published by PG&E for each customer classification.

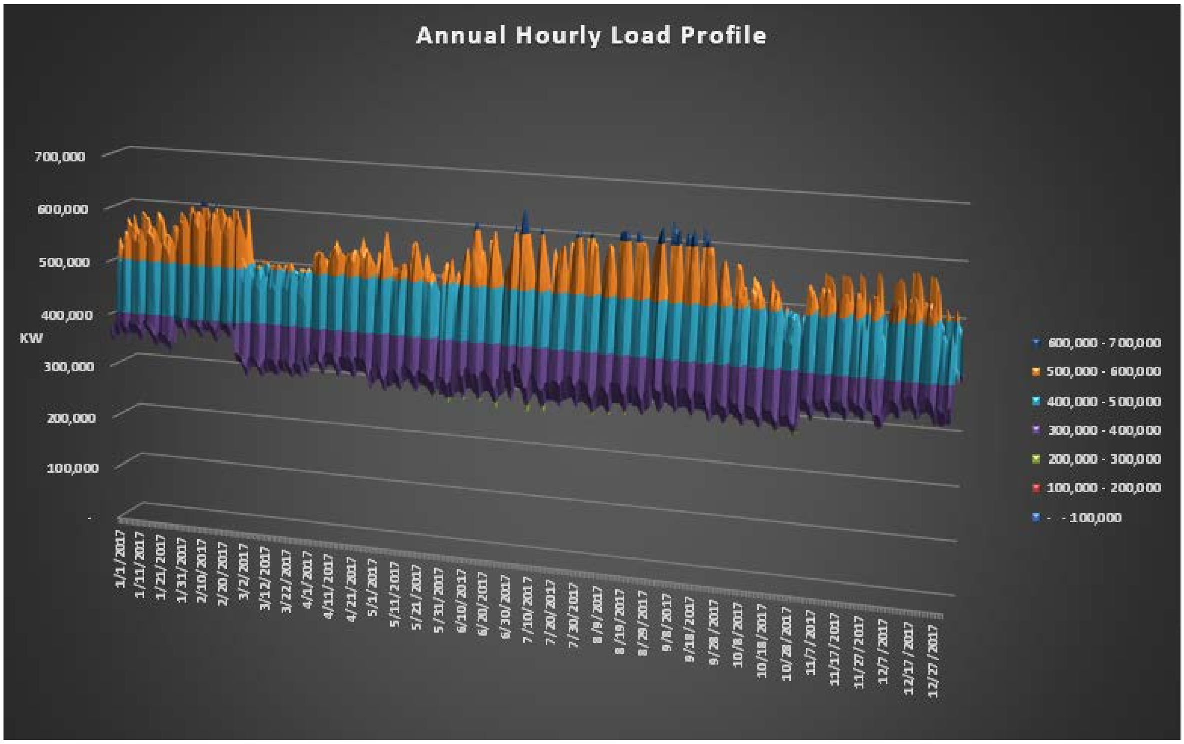
| Customer Classification | Customer Accounts | Energy Consumption (MWh) | Share of Energy Consumption (%) |
|---|---|---|---|
| **Residential** | 269,061 | 1,457,637 | 37% |
| **Small Commercial** | 23,072 | 469,021 | 12% |
| **Medium Commercial** | 2,665 | 613,398 | 16% |
| **Large Commercial** | 1,333 | 933,305 | 24% |
| **Industrial** | 43 | 378,422 | 10% |
| **Ag and Pumping** | 275 | 25,095 | 1% |
| **Street Lighting** | 1,432 | 24,052 | 1% |
| **TOTAL** | 297,881* | 3,900,930* | 100% |

*These totals exclude accounts that currently receive generation service under direct access arrangements. As a result, the account totals and annual energy consumption statistics reflected in the "Total" line item are slightly less than the overall account totals and energy usage reported at the beginning of Section 3.

The hourly load forecast indicates a peak demand of approximately 682 MW and a minimum demand of approximately 300 MW. The minimum demand establishes the requirement for baseload energy (constant production level), while the difference between the peak demand and the minimum demand would be met by peaking and dispatchable, load following resources.

Figure 13 shows the hourly load projections for the CCA program in Year 1 of program operations.

**Figure 13: Hourly Electric Load Profile for San Mateo County**




## Renewable Energy Portfolio Requirements

Current law requires that specified percentages of annual retail electricity sales be supplied from qualified renewable energy resources. Senate Bill X1 2 (April, 2011) established a 33% Renewables Portfolio Standard by 2020 with certain interim procurement targets applying in each of three "Compliance Periods": Compliance Period 1 began on January 1, 2011 and concluded on December 31, 2013 (a three-year period); Compliance Period 2 began on January 1, 2014 and will continue through December 31, 2016 (a three-year period; the current compliance period); and Compliance Period 3 (a four-year period), which will commence on January 1, 2017 and conclude on December 31, 2020.

SBX1 2 also specified additional requirements for the types of renewable energy products that may be used to demonstrate compliance with California's RPS. According to the currently effective RPS program, there are three Portfolio Content Categories ("PCCs" or "Buckets") that have been defined in consideration of the unique product attributes associated with typical renewable energy products.

- PCC1, or Bucket 1, renewable products are produced by RPS-certified renewable energy generators located within the state or by out-of-state generators that can meet strict scheduling requirements, ensuring deliverability to California. For purposes of demonstrating RPS compliance, there are no limitations with regard to the use of PCC1 products.

- PCC2, or Bucket 2, renewable products are generally "firmed/shaped" transactions through which the energy produced by an RPS-certified renewable energy generator is not necessarily delivered to California, but an equivalent quantity of energy from a different, non-renewable generating resource is delivered to California and "bundled" (or associated via an electronic transaction tracking system) with the renewable attribute produced by the aforementioned RPS-certified renewable generator. As noted, PCC2 products rely on electronic transaction tracking systems to substantiate the delivery of specified quantities of RPS-eligible renewable energy.
- PCC3, or Bucket 3, renewable products refer to unbundled renewable energy certificates, which are sold separately from the associated electric energy (with no physical energy delivery obligations imposed on the seller of such products).

Under RPS rules, limitations apply with regard to the use of PCC2 and PCC3 products. A more detailed description of the renewable product procurement specifications applicable under the currently effective RPS program are described in the following table.

| **Compliance Period** | **Calendar Year** | **Overall Procurement Target (% of Total Retail Sales)** | **PCC1 Procurement (% of Total RPS Procurement)** | **PCC2 Procurement (% of Total RPS Procurement)*** | **PCC3 Procurement (% of Total RPS Procurement)** |
|---|---|---|---|---|---|
| **CP 1** | 2011 | 20.0% | ≥50.0% | ≤50.0% | ≤25.0% |
| **CP 1** | 2012 | 20.0% | ≥50.0% | ≤50.0% | ≤25.0% |
| **CP 1** | 2013 | 20.0% | ≥50.0% | ≤50.0% | ≤25.0% |
| **CP 2** | 2014 | 21.7% | ≥65.0% | ≤35.0% | ≤15.0% |
| **CP 2** | 2015 | 23.3% | ≥65.0% | ≤35.0% | ≤15.0% |
| **CP 2** | 2016 | 25.0% | ≥65.0% | ≤35.0% | ≤15.0% |
| **CP 3** | 2017 | 27.0% | ≥75.0% | ≤25.0% | ≤10.0% |
| **CP 3** | 2018 | 29.0% | ≥75.0% | ≤25.0% | ≤10.0% |
| **CP 3** | 2019 | 31.0% | ≥75.0% | ≤25.0% | ≤10.0% |
| **CP 3** | 2020 | 33.0% | ≥75.0% | ≤25.0% | ≤10.0% |

*Note that PCC2 products may be used in place of PCC3 products.

Beyond the 2020 calendar year, California's RPS procurement will likely increase to 50% by 2030, subject to Governor Brown signing SB 350, which is expected to occur no later than October 11, 2015. On September 11, 2015, the California legislature concurred with proposed amendments to Senate Bill 350 (De Leon and Leno), the Clean Energy and Pollution Reduction Act of 2015, and recommended this bill for enrolling. Once signed, there are many details related to SB 350 implementation that will be developed over time with oversight by designated regulatory agencies. However, it is reasonable to assume that interim annual renewable energy procurement targets will be imposed on CCAs and other retail electricity sellers to facilitate progress towards the 50% RPS; PEA also expects that additional detail regarding renewable energy product eligibility, including any restrictions and/or requirements regarding the use of such products, will also become clearer during upcoming implementation efforts.

For purposes of this Study, PEA assumed straight-line progress when moving from the 33% RPS mandate in 2020 to the 50% RPS mandate in 2030, or 1.7% annual increases in California's renewable energy procurement target during the ten-year transition period. With respect to the applicability of various renewable energy products that may be eligible under the prospective 50% RPS, PEA assumed a similar product mix to that which will be allowed under the current RPS program in calendar year 2020: minimum 75% PCC1 content;

maximum 10% PCC3 content. Again, final details related to the implementation of SB 350 will not be certain until implementation of this legislation commences in coordination with assigned regulatory agencies. With regard to any voluntary (above-RPS) renewable energy procurement activities, PEA has assumed that the CCA program would have discretion in how it meets such voluntary, internally imposed targets reflected in the prospective planning scenarios. The following table illustrates PEA's assumed RPS procurement rules as California transitions to a 50% RPS by 2030.

| Compliance Period | Calendar Year | Overall Procurement Target (% of Total Retail Sales) | PCC1 Procurement (% of Total RPS Procurement) | PCC2 Procurement (% of Total RPS Procurement)* | PCC3 Procurement (% of Total RPS Procurement) |
|---|---|---|---|---|---|
| **TBD** | 2021 | 34.7% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2022 | 36.4% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2023 | 38.1% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2024 | 39.8% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2025 | 41.5% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2026 | 43.2% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2027 | 44.9% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2028 | 46.6% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2029 | 48.3% | ≥75.0% | ≤25.0% | ≤10.0% |
| **TBD** | 2030 | 50.0% | ≥75.0% | ≤25.0% | ≤10.0% |

## Capacity Requirements

The CCA program would be required to demonstrate it has sufficient physical generating capacity to meet its projected peak demand (682 MW) plus a 15% planning reserve margin, in accordance with resource adequacy regulations administered by the CPUC and the CEC. A specified portion of generating capacity must be located within certain local reliability areas and the remaining capacity requirement can be met with generating plants anywhere within the CAISO system. Presently, there are two local reliability areas that would apply to the CCA program: the "Greater Bay Area" and the "Other PG&E Areas". Additionally, the CPUC and CAISO have flexible capacity requirement, which must be satisfied by all California load serving entities, including CCAs, to ensure that certain quantities of reserve capacity are capable of increasing generation levels within specified time periods (to promote system reliability when the production from certain grid-connected generators quickly changes as is becoming increasingly common as a result of California's buildout of intermittent renewable energy resources).

Using the most recent data from the 2015 compliance year, the following resource adequacy capacity requirements were assumed to apply to PCE's CCA program to meet the requirements identified above:

| Capacity Type | Percentage of Peak Demand |
|---|---|
| System | 75% |
| Greater Bay Area | 14% |
| Other PG&E Areas | 26% |
| Total | 115% |

Accordingly, the total resource adequacy requirement for PCE's first year of operations would be approximately 784 MW, with approximately 95 MW of the total procured from the Greater Bay Area region, 177 MW procured from any other local reliability area in the PG&E service area, and 512 MW procured from anywhere within the CAISO footprint. PCE would also have a flexible resource adequacy requirement, which ensures that adequate generation resources connected to the grid can ramp-up and produce power in a short amount of time in response to the intermittency of California renewable resources. Requisite resource adequacy products are typically procured/secured through one or more of the following arrangements: 1) short- to medium-term contract arrangements with the owners or controllers of qualifying generating capacity; 2) capacity attributes conferred through long-term power purchase arrangements with specified generators – such contracts typically provide the buyer with both energy and capacity products from one or more specific generating resources identified in the purchase agreement; or 3) direct ownership of generating facilities, which may be eligible to provide requisite resource adequacy capacity.

# SECTION 4: COST OF SERVICE ELEMENTS

This section summarizes the different types of costs that would be incurred by the CCA program in providing electric service to its customers. For each supply scenario, a detailed pro forma was developed that delineates the applicable cost of service elements. These pro forma are shown in Appendix A.

## Electricity Purchases

The CCA program would be financially responsible for supplying the net electric demand of all enrolled customers, and it would be able to source that supply from a variety of markets and/or through the program's own generation resources. Energy requirements are ultimately financially settled by the CAISO. The CAISO plays a critical role in balancing supply and demand on a significant portion of California's electric grid and operates short-term markets for energy as well as real-time balancing services to cover inevitable moment-to-moment fluctuations in electricity consumption (resulting from circumstances including but not limited to weather, unexpected changes in customer energy use, unexpected variances in generator operation, infrastructure outages and other situations). The CCA program would interact with the CAISO through an intermediary known as a "Scheduling Coordinator", periodically reporting usage data for its customers and settling with the CAISO for any imbalances (i.e., instances in which the load forecast and/or the planned generator operation differs from expectations, requiring the CAISO to balance any variances through the operation of other system resources) or transactions in the CAISO markets.

Bilateral markets exist for longer term purchases, which allow hedging (i.e., contractual protection via specified/fixed product pricing over a mutually agreed upon delivery term) against the fluctuations in CAISO market prices. Longer term purchases can span many years, with the most active trading being for contracts with terms of less than three years in duration. Contracts for new generation resources typically have contract term lengths of twenty (20) years or more, allowing the project developer/owner to utilize the contract's expected revenue stream to support project financing.

Electric purchase costs were estimated using the projected energy demand during the industry-defined peak and off-peak time periods. Assumed renewable energy contracts of the CCA, as reflected in the previously described indicative long-term contract portfolio, were subtracted from PCE's expected peak and off-peak energy demands, resulting in a residual energy requirements, or "net short", which was assumed to be met with short and mid-term contract purchases of system energy (produced by conventional generating technologies; within California, the majority of system energy is produced by generators using natural gas as a primary fuel source).

## Renewable Energy Purchases

Renewable energy purchases may take two forms: 1) physical electric energy bundled with associated renewable/environmental attributes; or 2) unbundled renewable/environmental attributes, which are sold separately from the physical energy commodity. As described in Section 2, unbundled RECs were not incorporated in any of the supply scenarios addressed in this Study; only bundled renewable energy resources, which were assumed to meet the product delivery specifications associated with the PCC1 and PCC2 product designations were incorporated in the indicative PCE supply portfolios.

Purchases of renewable energy from new resources are typically made under bundled, long-term contract arrangements of 20 years or more. Shorter term purchases are common for existing renewable resources and for unbundled renewable energy certificates.

Renewable energy currently sells for a premium relative to the cost of conventional power. However, when compared to the cost of new, natural gas-fueled generation, renewable resources tend to have lower levelized costs.[20]

Renewable energy purchase costs were estimated using predominantly long-term contracts for new renewable energy projects as specified in the indicative long-term contract portfolio. Short term market purchases of bundled renewable energy were assumed to fulfill PCE's remaining renewable energy needs.

With regard to the term renewable energy certificates, or "RECs", it is important to understand that a REC is the only mechanism by which ownership of renewable energy can be demonstrated/substantiated. One REC is created for every whole MWh of metered electricity produced by a registered renewable generating facility. Within the Western United States, a tracking system known as the Western Renewable Energy Generation Information System ("WREGIS") has been developed to facilitate the management of RECs, providing a platform through which RECs can be transferred between buyers and sellers of renewable energy products and also "retired" (meaning, removed from the marketplace) for purposes of demonstrating legal/regulatory compliance or achievement of certain voluntary procurement objectives. <u>All</u> renewable energy production is substantiated via the creation of a REC, which occurs following WREGIS' verification of metered energy production by a registered renewable generating resources. Use of the WREGIS system for purposes of REC accounting serves to minimize concerns regarding double-counting during compliance demonstration and public reporting – in the event that a renewable energy buyer does not possess a REC, it cannot make claims with regard to the associated environmental benefits.

Again, some RECs are bundled with the associated electric energy; other RECs are sold apart from the electric commodity – such RECs are appropriately referred to as "unbundled RECs". The transaction documentation associated with each renewable energy purchase should outline applicable product specifications, including whether or not RECs are being sold with or apart from the electric commodity. In selecting its renewable energy product mix, the CCA program should be aware that California law permits the use of a limited quantity of unbundled RECs, or PCC3 product volumes, for purposes of demonstrating RPS compliance – applicable limitations were previously described in Section 3. Such products currently represent lower-cost options when compared to PCC1 and PCC2 products due to the administrative simplicity associated with such transactions.

In recent years, there has been robust philosophical debate regarding the advantages and pitfalls of unbundled REC use, particularly the environmental benefits associated with such products. Significant research and documentation has been prepared regarding this topic, and PCE is encouraged to review such information prior to engaging in unbundled REC transactions. Organizations including the Center for Resources Solutions (the program administrator for the Green-e Energy program), the United States Environmental Protection Agency, the United States Federal Trade Commission and The Climate Registry, amongst others, have all completed research and/or issued positions regarding the use of unbundled RECs. Furthermore, Assembly Bill 1110 (Ting), which was introduced to the California legislature on February 27, 2015 but is now a two-year bill, was intended to promote the inclusion of GHG emissions intensity reporting by retail electricity suppliers (in annual Power Content Label communications). If AB 1110 moves forward next year, it could impose a retail-level emissions calculation methodology that may eliminate all GHG emissions benefits associated with unbundled RECs. This is also an important consideration as PCE assembles its renewable energy supply portfolio, due to the fact that any GHG benefits conferred through unbundled REC transactions would be excluded from customer reporting, resulting in the reporting of higher than anticipated portfolio emission levels for entities that procured such products. In light of the perceived risks and general controversy associated with the use of unbundled

[20] See for example, Table 62, Estimated Cost of New Renewable and Fossil Generation in California, California Energy Commission, March 2015.

RECs, leadership within the San Mateo Communities advised PEA to exclude Bucket 3 products from each of the prospective supply scenarios.

## Electric Generation

Generation projects developed or acquired by the CCA program could also supplement energy purchases. Generation costs would include development costs, capital costs for land, plant and equipment, operations and maintenance costs, and, if applicable, fuel costs. Capital costs for publicly owned utilities such as a CCA are typically financed with long-term debt, and the annual debt service would be an element of annual CCA program costs. For purposes of this Study, PEA's analysis did not contemplate the utilization of CCA-owned/developed generating resources during the ten-year study period for reasons previously described.

## Transmission and Grid Services

The CAISO charges market participants, including CCA (via the CCA's selected scheduling coordinator) for a number of transmission and grid management services that it performs. These include costs of managing transmission congestion, acquiring operating reserves and other "ancillary services", and conducting CAISO markets and other grid operations. The CAISO charges are both directly related to PCE's operations, but there are other grid charges that are shared across all load serving entities on a pro rata basis. These costs would be assessed to the Scheduling Coordinator for the CCA program, and are assumed to be directly passed through to the CCA program with no markup.

## Financing Costs

The CCA program would need capital to cover start-up costs, working capital, and any generation or other project financing. The analysis assumes short term financing with the exception of generation projects which would be financed with long term debt.

Start-up costs are estimated at $2.7 million, which would fund the program for approximately six months prior to commencement of service to customers. Start-up activities include costs for staffing and professional services, security deposits, the CCA bond/financial security requirement, communications and customer notices, data management, and other activities that must occur before the program begins providing electricity to customers. These costs would be recovered from program revenues after service commences. A breakdown of estimated start-up costs is shown in the following table.

**Estimated CCA Program Start-Up Costs**

| Cost Item | Amount |
|---|---|
| Staff | $734,000 |
| Consulting and Legal Services | $600,000 |
| Feasibility Study | $150,000 |
| JPA Formation/Development | $50,000 |
| Implementation Plan | $75,000 |
| Power Procurement Solicitation and Contract | $75,000 |
| Marketing and Communications | $337,000 |
| Customer Noticing and Mailers | $335,00 |
| PG&E Service Fees | $37,500 |
| Miscellaneous Administrative and General | $193,000 |
| Financial Security/Bond Carrying Cost | $115,000 |
| Total | $2,700,000 |

Working capital requirements are estimated at $20 million, which would cover the timing lag between when invoices for power purchases must be paid and other operating expenses incurred prior to when cash is received from customers. Typical invoicing timelines for wholesale power purchase contracts require payment for the prior month's purchases by the 20th of the current month. Customer payments are typically received within sixty to ninety days following electricity delivery. The timing difference between cash outflows and inflows represents the working capital requirement. The possibility exists to negotiate payment timelines with power suppliers in order to reduce the initial working capital requirement. For example, both SCP and LCE have negotiated an additional 30 days in the supplier payment timeline, which would significantly reduce the working capital figure described above.

## Billing, Metering and Data Management

PG&E provides billing and metering services for all CCA programs and charges the CCA for such services in accordance with applicable tariffs, which are regulated by the CPUC. PG&E posts the meter data to a data server that the CCA program would be able to access for its power accounting and settlements. PG&E uses systems to exchange billing, payment, and other customer data electronically with competitive retail electric providers such as CCAs. While PG&E issues customer bills and processes customer payments, the CCA program will have a large amount of data to manage and must be able to exchange data with PG&E using automated processes. PEA included costs for third party data management as well as PG&E charges for billing and metering in this cost of service category.

## Uncollectible Accounts

CCA rates must account for the small fraction of customers who do not pay their electric bill. PG&E attempts to collect the CCA's charges, but some accounts must be written off as uncollectible. An allowance for uncollectible accounts has been included as a program cost element.

## Program Reserves

A reasonable revenue surplus was factored in to estimated CCA program rates to fund a reserve account that would be used for contingencies or as a rate stabilization tool. Financing also requires generation of revenue surpluses that accumulate as reserves, as lenders typically require maintenance of debt service coverage ratios that would necessitate setting rates to yield revenues in excess of program costs.

## Bonding and Security Requirements

The CCA program would be required to provide a security deposit to PG&E and post a bond or other form of financial security with the CPUC as part of its registration process. The security deposit covers approximately one month of PG&E charges for billing and metering services. The CCA bond or financial security requirement, which is posted with the CPUC, is intended to cover the potential reentry costs if customers were to be involuntarily returned to PG&E.

The currently effective financial security requirement is $100,000, but PG&E and other investor owned utilities have advocated changes to the methodology that could, under certain market conditions, result in extremely large financial security requirements. PEA's estimate of the CCA Bond amount reflects the currently applicable specification ($100,000). However, the CCA program should actively monitor applicable regulatory proceedings, which may result in changes to this bond amount. Risks associated with such changes are discussed in additional detail within Section 7 of this Study.

## PG&E Surcharges

CCA customers will pay the CCA's rates for generation services, PG&E's rates for non-generation services (transmission, distribution, public purpose, etc.), and two surcharges that are currently included in PG&E's generation rates: the Franchise Fee Surcharge and the Power Charge Indifference Adjustment ("PCIA"). These surcharges are not program costs per se, but they do impact how a customer's bill will compare between PG&E bundled service and CCA service.

The franchise fee surcharge is a minor charge that ensures PG&E collects the same amount of franchise fee revenues whether a customer takes generation service from a CCA or from PG&E. The PCIA is a substantial charge that is intended to ensure that generation costs incurred by PG&E before a customer transitions to CCA service are not shifted to remaining PG&E bundled service customers (following a customer's departure from PG&E to CCA service). For purposes of this Study, PEA's assumed surcharges reflect the most recent advice provided by PG&E and assumed changes to the PG&E supply portfolio over time.

# SECTION 5: COST AND BENEFITS ANALYSIS

This section contains a quantitative description of the estimated costs and benefits for each representative supply scenario. Each scenario was evaluated using the three criteria described in Section II. Ratepayer costs and benefits are evaluated on the basis of the total electric rates customers would pay under CCA service as compared to PG&E bundled service. Total electric rates include the rates charged by the CCA program plus PG&E's delivery charges and other surcharges. Environmental benefits are evaluated on the basis of reductions in GHG ($CO_2$) emissions relative to the reference case. Local economic benefits are evaluated on the basis of jobs and economic activity created by the CCA program's investments in local generation resources.

When assessing the comparative environmental impacts associated with each of PCE's prospective supply scenarios, it is important to consider the potential changes that could result from PG&E's reduced or discontinued use of nuclear electricity produced by the Diablo Canyon Power Plant ("DCPP"). DCPP currently produces approximately 18,000 GWh, or more than 20% of PG&E's total power content, per year, but licenses for the facility's two reactor units expire in 2024 and 2025, respectively. At this point in time, there is uncertainty regarding PG&E's ability to successfully relicense these units under the current configuration, which utilizes once-through cooling as part of facility operations. Environmental concerns regarding the use of once-through cooling may present relicensing challenges for PG&E, which could result in temporary or permanent discontinued operation of DCPP. Under this scenario, which falls towards the outer years of the study period, PCE's actual GHG emissions impact would dramatically improve under each of the prospective supply scenarios. It is also noteworthy, that discontinued DCPP operation (without the addition of equivalent generating capacity within the region) may also impose upward pressure on market energy prices and resource adequacy products. PEA recommends that the San Mateo Communities continue to monitor the relicensing status of DCPP as expiration of the existing licenses approaches.

When reviewing PCE's scenario results, it is important to keep in mind the planned phase-in strategy for the prospective CCA customer base, which is expected to occur over a two-year period. Such a strategy will allow the CCA program to "walk before its runs," gaining operational experience while the initial customer base remains relatively small (when compared to the total prospective customer population). This approach will also create an opportunity for the CCA program to debug" potential customer service and billing issues that may arise during initial operations and will also reduce credit/collateral concerns during initial power contracting efforts.

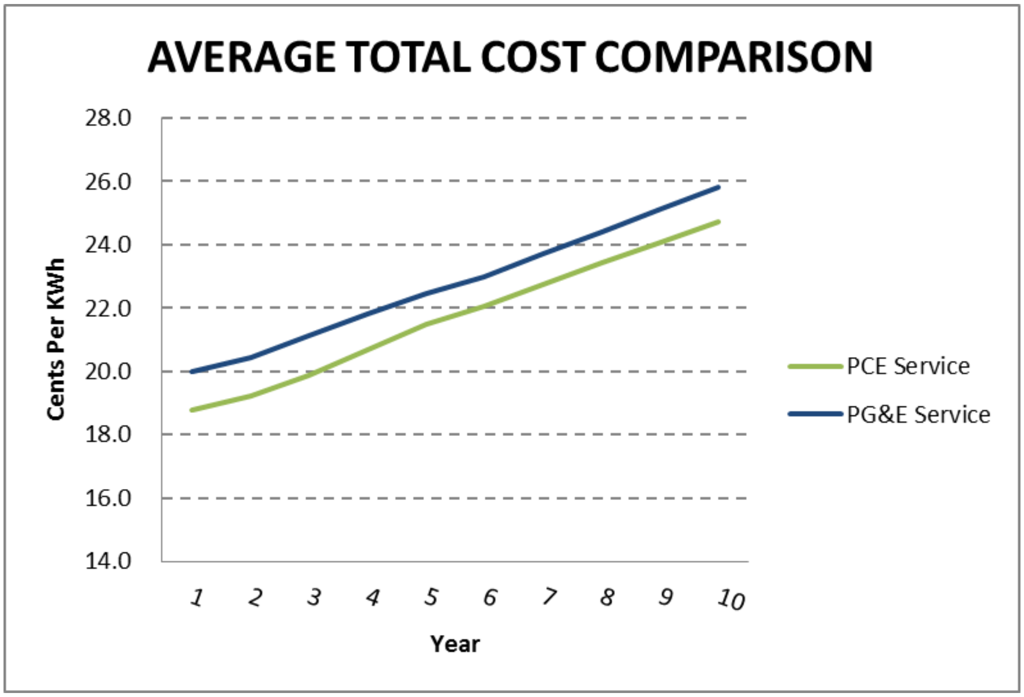
## Scenario 1 Study Results

### Ratepayer Costs

The primary objective of Scenario 1 is to promote maximum CCA customer savings, if possible, while offering such customers an RPS-compliant resource mix that does not include the use of unbundled RECs. As expected, projected CCA customer rates in Scenario 1 are lower than similar rate projections for PG&E throughout the ten-year study period, with annual comparative benefits ranging from 4% to 6%. Levelized rates over the study period are projected to be 5% lower than projected PG&E rates. For a typical household using 450 kWh per month, a 5% rate difference would result in a cost reduction of approximately $6.18 per month.

Projected average rates for the PCE customer base are shown in the following figure and table, comparing total ratepayer impacts under the PG&E bundled service and CCA service options.

**Figure 14: Scenario 1 Annual Ratepayer Costs**



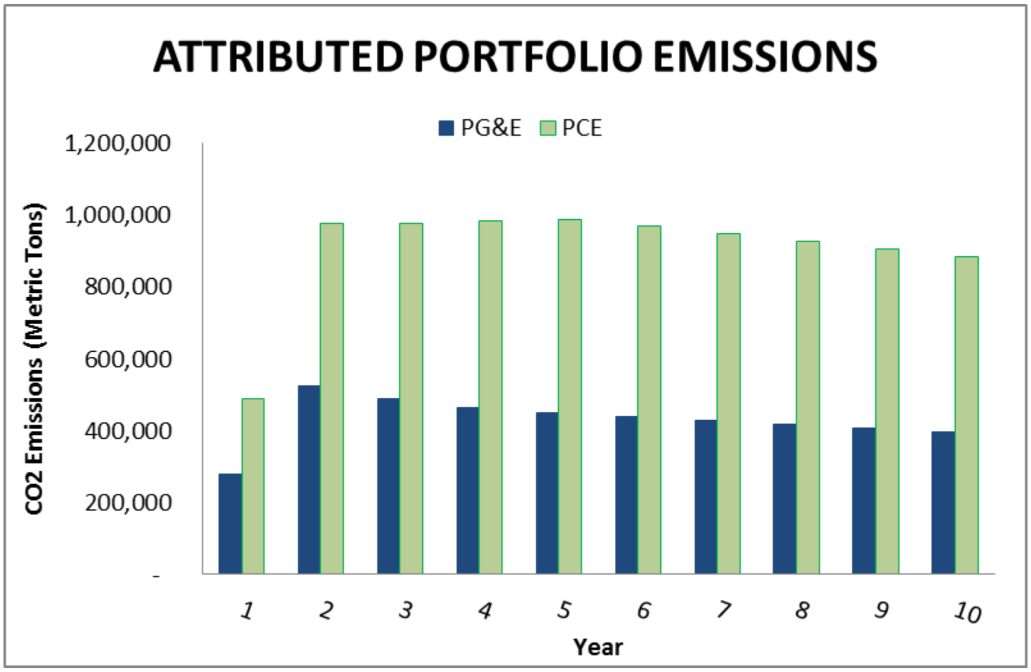

**Scenario 1: Annual Total Delivered Rate Comparison**

| Year | PG&E Total (₵/kWh) | PCE Total (₵/kWh) | Percent Difference |
|---|---|---|---|
| Levelized | 22.7 | 21.6 | -5% |
| 1 | 20.0 | 18.8 | -6% |
| 2 | 20.4 | 19.2 | -6% |
| 3 | 21.1 | 19.9 | -6% |
| 4 | 21.8 | 20.7 | -5% |
| 5 | 22.5 | 21.5 | -4% |
| 6 | 23.0 | 22.0 | -4% |
| 7 | 23.7 | 22.8 | -4% |
| 8 | 24.4 | 23.4 | -4% |
| 9 | 25.1 | 24.1 | -4% |
| 10 | 25.8 | 24.7 | -4% |

## GHG Impacts

The anticipated GHG impacts associated with Scenario 1 result in relatively significant increases when compared to PG&E's projected emissions profile. Because the assumed Scenario 1 resource mix includes renewable energy purchases that generally track with RPS procurement mandates but no additional GHG-free purchases (i.e., all non-renewable energy purchases would be sourced from the California market with an attributed emissions profile generally equivalent to a typical natural gas generator). The following figure and table provide additional detail regarding the respective GHG emissions profile associated with the assumed PCE and PG&E supply portfolios.

**Figure 15: Scenario 1 – Annual GHG Emissions Comparison**

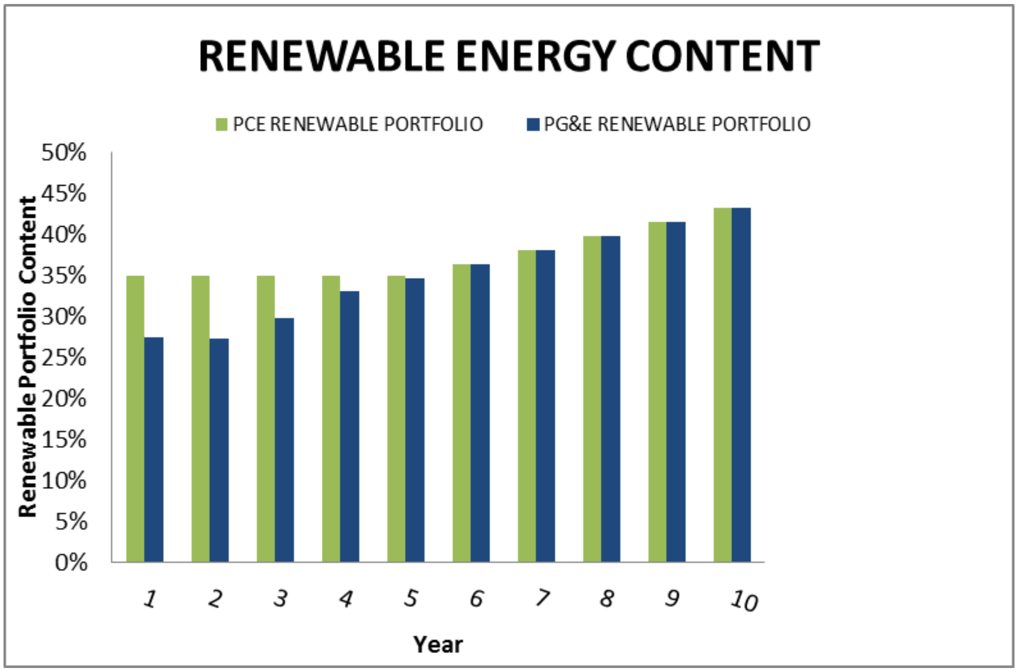



**Scenario 1: Annual GHG Emissions Factor Comparison (Metric Tons $CO_2$/MWh)**

| Year | PG&E | PCE |
|---|---|---|
| 1 | 0.158 | 0.278 |
| 2 | 0.149 | 0.278 |
| 3 | 0.139 | 0.278 |
| 4 | 0.131 | 0.278 |
| 5 | 0.127 | 0.278 |
| 6 | 0.123 | 0.272 |
| 7 | 0.120 | 0.265 |
| 8 | 0.116 | 0.258 |

| Year | PG&E | PCE |
|---|---|---|
| 9 | 0.112 | 0.250 |
| 10 | 0.109 | 0.243 |

**Figure 16: Scenario 1 – Annual Renewable Energy Content Comparison**




**Scenario 1: Annual Renewable Energy Portfolio Content**

| Year | PG&E | PCE |
|---|---|---|
| 1 | 27% | 35% |
| 2 | 27% | 35% |
| 3 | 30% | 35% |
| 4 | 33% | 35% |
| 5 | 35% | 35% |
| 6 | 36% | 36% |
| 7 | 38% | 38% |
| 8 | 40% | 40% |
| 9 | 42% | 42% |

| Year | PG&E | PCE |
|---|---|---|
| 10 | 43% | 43% |

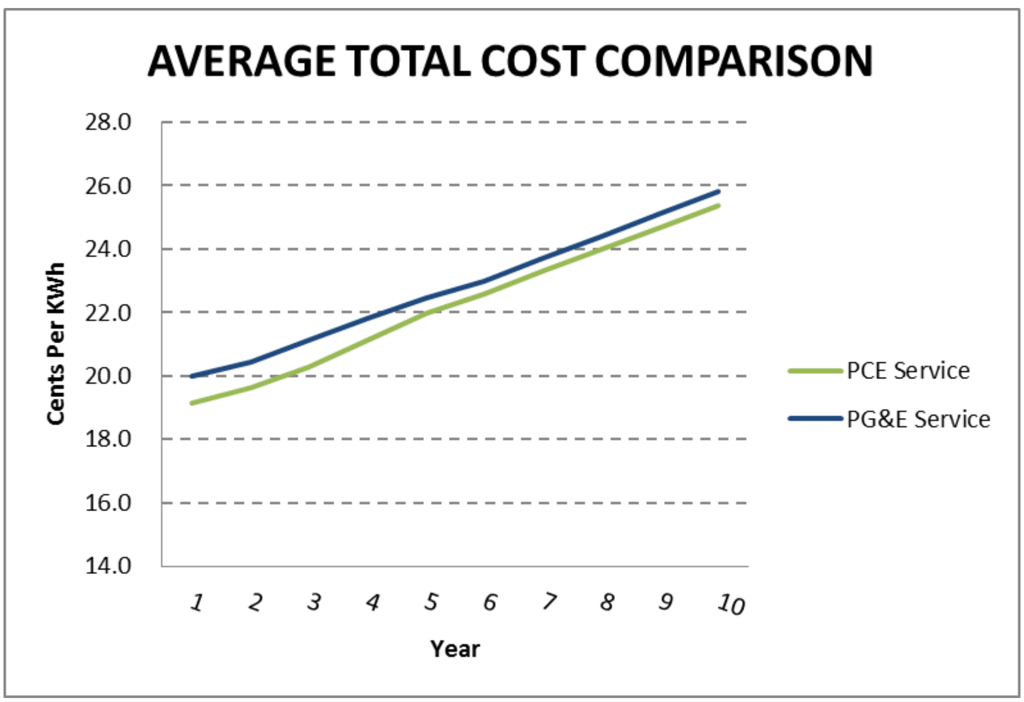
## Scenario 2 Study Results

### Ratepayer Costs

The primary objective of Scenario 2 is twofold: promote rate competitiveness with PG&E while reducing GHG emissions associated with the CCA program's supply portfolio. For purposes of the Study, this objective is achieved through the inclusion of renewable energy purchases that significantly exceed applicable compliance mandates (doing so without the use of unbundled RECs) as well as additional GHG-free energy purchases, which would be produced by non-RPS-eligible hydroelectric generators located within California and/or the Pacific Northwest. Under Scenario 2, projected CCA customer rates are initially lower than similar rate projections for PG&E and maintain that general relationship throughout the study period – the relationship between PCE and PG&E rates demonstrates marginal customer savings ranging from 2% to 4%. Levelized rates over the study period are projected to be 3% lower than projected PG&E rates. However, in consideration of typical market volatility within the electric power sector and eminent PG&E rate volatility, these results should be reasonably interpreted as reflecting the outcome of general rate parity throughout the study period. For a typical household using 450 kWh per month, a 3% rate difference would result in a cost reduction of approximately $4.36 per month.

Projected average rates for the PCE customer base are shown in the following figure and table, comparing total ratepayer impacts under the PG&E bundled service and CCA service options.

**Figure 17: Scenario 2 Annual Ratepayer Costs**



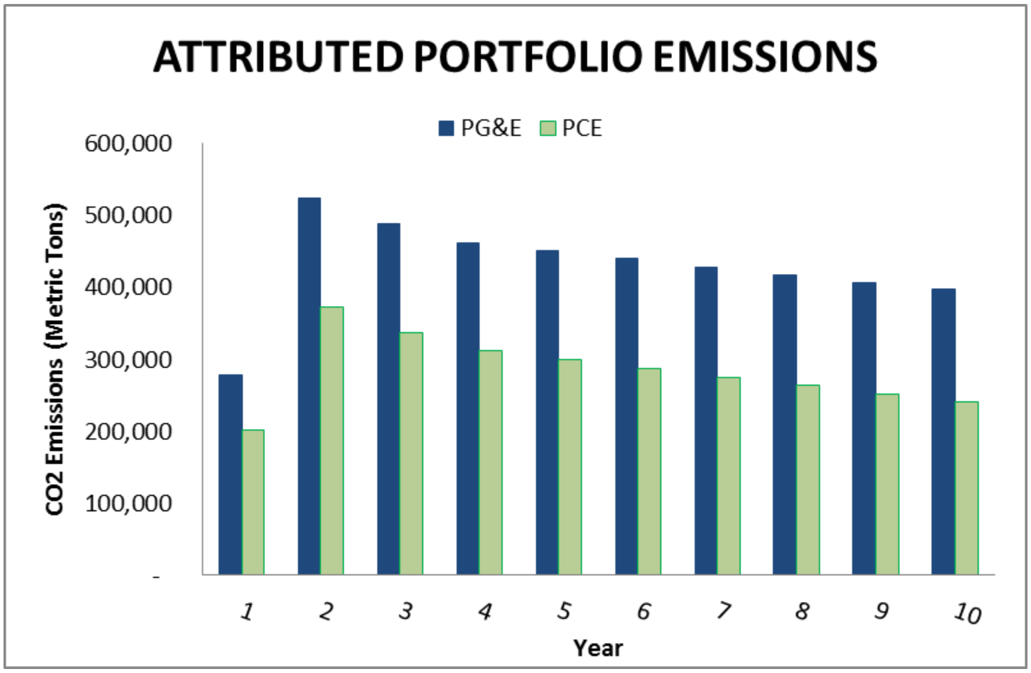
**Scenario 2: Annual Total Delivered Rate Comparison**

| Year | PG&E Total (₵/kWh) | PCE Total (₵/kWh) | Percent Difference |
|---|---|---|---|
| Levelized | 22.7 | 22.1 | -3% |
| 1 | 20.0 | 19.1 | -4% |
| 2 | 20.4 | 19.6 | -4% |
| 3 | 21.1 | 20.3 | -4% |
| 4 | 21.8 | 21.1 | -3% |
| 5 | 22.5 | 22.0 | -2% |
| 6 | 23.0 | 22.6 | -2% |
| 7 | 23.7 | 23.3 | -2% |
| 8 | 24.4 | 24.0 | -2% |
| 9 | 25.1 | 24.7 | -2% |
| 10 | 25.8 | 25.4 | -2% |

### GHG Impacts

As a result of the significant proportion of GHG-free resources that were incorporated in Scenario 2, the CCA program is able to demonstrate meaningful GHG emissions reductions when compared to PG&E's projected emissions profile. The following figure and table provide additional detail regarding the respective GHG emissions profile associated with the assumed PCE and PG&E supply portfolios.

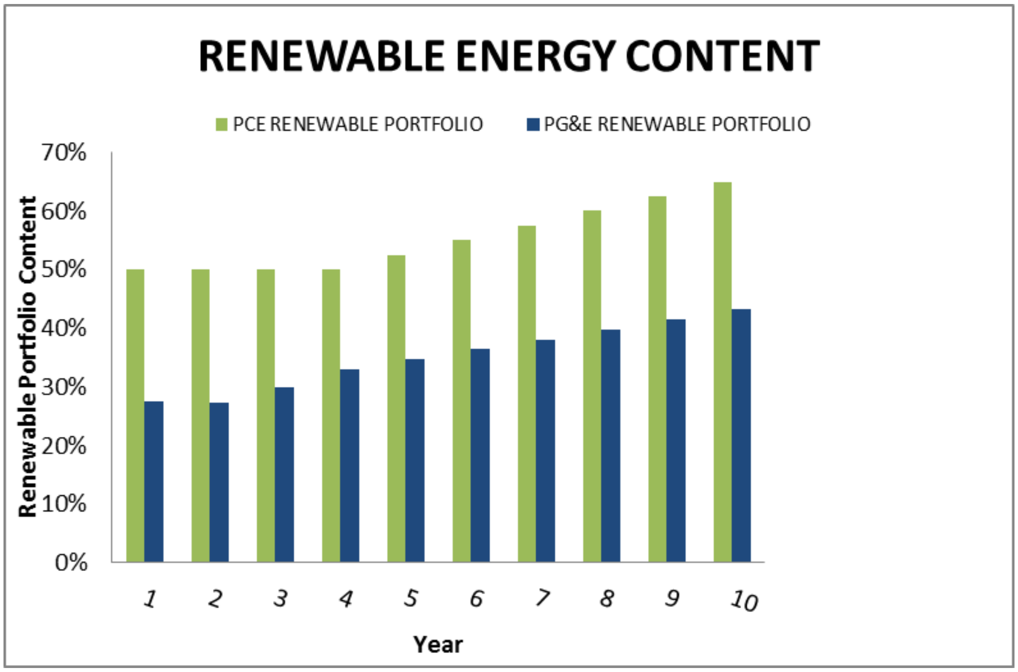
**Figure 18: Scenario 2 – Annual GHG Emissions Comparison**




**Scenario 2: Annual GHG Emissions Factor Comparison (Metric Tons $CO_2$/MWh)**

| Year | PG&E | PCE |
|---|---|---|
| 1 | 0.158 | 0.115 |
| 2 | 0.149 | 0.106 |
| 3 | 0.139 | 0.096 |
| 4 | 0.131 | 0.088 |
| 5 | 0.127 | 0.084 |
| 6 | 0.123 | 0.080 |
| 7 | 0.120 | 0.077 |
| 8 | 0.116 | 0.073 |
| 9 | 0.112 | 0.070 |
| 10 | 0.109 | 0.066 |

**Figure 19: Scenario 2 – Annual Renewable Energy Content Comparison**




**Scenario 2: Annual Renewable Energy Portfolio Content**

| Year | PG&E | PCE |
|---|---|---|
| 1 | 27% | 50% |
| 2 | 27% | 50% |
| 3 | 30% | 50% |
| 4 | 33% | 50% |
| 5 | 35% | 53% |
| 6 | 36% | 55% |
| 7 | 38% | 58% |
| 8 | 40% | 60% |
| 9 | 42% | 63% |
| 10 | 43% | 65% |

## Scenario 3 Study Results

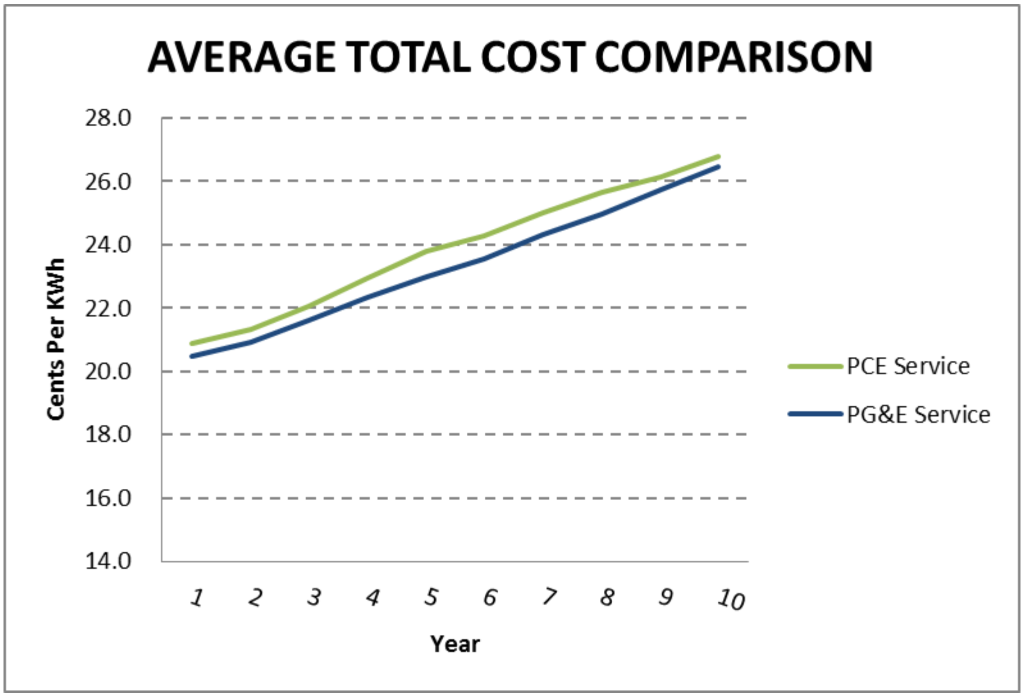
### Ratepayer Costs

Scenario 3 is aptly characterized as an aspirational supply scenario under which the entirety of PCE's energy requirements would be sourced from bundled renewable energy resources. As reasonably expected, the relatively high supply costs of bundled renewable energy products would impose incremental rate increases for PCE customers relative to the incumbent utility. Under Scenario 3, projected CCA customer rates remain above similar rate projections for PG&E throughout the study period – the relationship between PCE and PG&E rates demonstrates rate increases ranging from 1% to 3%. Levelized rates over the study period are projected to be 2% higher than projected PG&E rates. For a typical household using 450 kWh per month, a 2% rate difference would result in a cost increase of approximately $1.86 per month. This customer impact is particularly insightful when considering the voluntary, 100% renewable energy option that PCE may offer to its customers. Scenario 3 is also useful when comparing PG&E's anticipated voluntary green option, which has been named Community Solar Choice, to a similar option that may be offered by PCE.

Under PG&E's proposed Community Solar Choice program, bundled customers would have the option to voluntarily purchase up to 100% of their respective electric energy requirements from new and existing solar generating facilities located throughout the PG&E service footprint – PG&E has generically defined the location of such facilities as "local", however there does not appear to be a direct association between individual customers and nearby solar generators. According to PG&E, program launch is anticipated in early 2016 with two available supply variations: 50% solar energy content; and 100% solar energy content. At this point, specific details related to Community Solar Choice pricing have not been posted on PG&E's website, but the utility has generally characterized the cost impact in terms of a "modest monthly premium." PEA recommends that the San Mateo Communities continue to monitor the following PG&E website, http://www.pge.com/en/about/environment/pge/solarchoice/index.page?WT.mc_id=Vanity_greenoption, which indicates that more details will be available soon.

Projected average rates for the PCE customer base are shown in the following figure and table, comparing total ratepayer impacts under the PG&E bundled service and CCA service options.

**Figure 20: Scenario 3 Annual Ratepayer Costs**



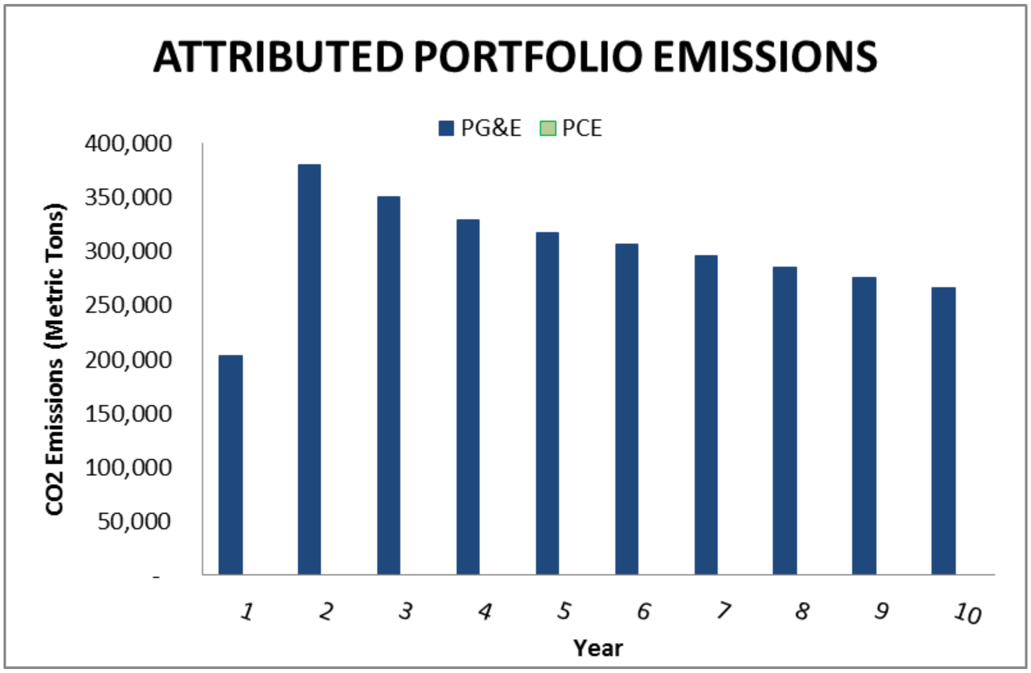

**Scenario 3: Annual Total Delivered Rate Comparison**

| Year | PG&E Total (₵/kWh) | CCA Total (₵/kWh) | Percent Difference |
|---|---|---|---|
| Levelized | 23.2 | 23.7 | 2% |
| 1 | 20.5 | 20.9 | 2% |
| 2 | 20.9 | 21.3 | 2% |
| 3 | 21.6 | 22.0 | 2% |
| 4 | 22.3 | 22.9 | 3% |
| 5 | 23.0 | 23.8 | 3% |
| 6 | 23.5 | 24.3 | 3% |
| 7 | 24.3 | 25.0 | 3% |
| 8 | 25.0 | 25.7 | 3% |
| 9 | 25.7 | 26.2 | 2% |
| 10 | 26.5 | 26.8 | 1% |

## GHG Impacts

Through the exclusive use of bundled renewable energy resources, Scenario 3 suggests that the CCA program could achieve substantial GHG emissions reductions when compared to PG&E's projected emissions profile. The following figure and table provide additional detail regarding the respective GHG emissions profile associated with the assumed PCE and PG&E supply portfolios.

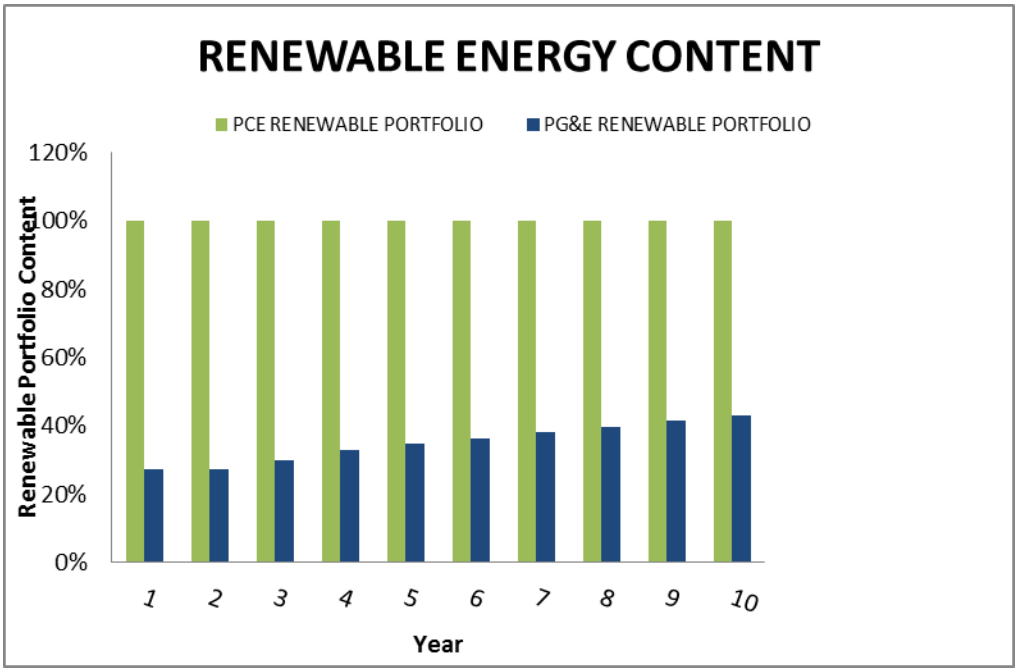
**Figure 21: Scenario 3 – Annual GHG Emissions Comparison**




**Scenario 3: Annual GHG Emissions Factor Comparison (Metric Tons $CO_2$/MWh)**

| Year | PG&E | PCE |
|---|---|---|
| 1 | 0.158 | 0.000 |
| 2 | 0.149 | 0.000 |
| 3 | 0.139 | 0.000 |
| 4 | 0.131 | 0.000 |
| 5 | 0.127 | 0.000 |
| 6 | 0.123 | 0.000 |
| 7 | 0.120 | 0.000 |
| 8 | 0.116 | 0.000 |
| 9 | 0.112 | 0.000 |
| 10 | 0.109 | 0.000 |

**Figure 22: Scenario 3 – Annual Renewable Energy Content Comparison**




**Scenario 3: Annual Renewable Energy Portfolio Content**

| Year | PG&E | PCE |
|---|---|---|
| 1 | 27% | 100% |
| 2 | 27% | 100% |
| 3 | 30% | 100% |
| 4 | 33% | 100% |
| 5 | 35% | 100% |
| 6 | 36% | 100% |
| 7 | 38% | 100% |
| 8 | 40% | 100% |
| 9 | 42% | 100% |
| 10 | 43% | 100% |

# SECTION 6: SENSITIVITY ANALYSES

The economic analysis uses base case input assumptions for many variable factors that influence relative costs of the CCA program. Sensitivity analyses were performed to examine the range of impacts that could result from changes in the most significant variables (relative to base case values). The key variables examined are: 1) power and natural gas prices; 2) renewable energy prices; 3) low carbon energy prices; 4) PG&E rates; 5) PG&E surcharges; and 6) customer participation/opt-out rates.

## Power and Natural Gas Prices

Electric power prices in California are substantially influenced by natural gas prices, as natural gas-fired generation is predominantly used as the marginal resource within the state's system dispatch order. Changes in natural gas prices will also tend to change the power purchase costs of the CCA program. To the extent that PCE's selected supply portfolio excludes the use of conventional energy supply, the potential impact related to price volatility within the natural gas market will be minimized. Such changes also influence PG&E's rates, but the relative cost impacts will differ depending upon the proportionate use of conventional resources utilized by the CCA program relative to PG&E.

For the CCA program, the non-renewable portion of the supply portfolio will be influenced by changes in natural gas and wholesale power prices. The PG&E resource mix includes resources that are influenced by natural gas prices such as utility-owned natural gas fueled power plants, so-called "tolling" agreements with independent generators, and certain other contracts that are priced based on an avoided cost formula. The PG&E resource mix also includes energy sources that are not affected by natural gas prices, including renewable resources as well as PG&E's hydro-electric and nuclear assets.

Sensitivity to changes in natural gas and power prices were tested by varying the base case assumptions to create high and low cases. The high case reflects a 50% increase in this input relative to the base case and the low case reflects a 25% decrease relative to the base case.

## Renewable Energy Costs

There can be wide variation in renewable energy costs due to locational factors (wind regime, solar insulation, availability of feedstock for biomass and biogas facilities, etc.), transmission costs, technological changes, federal tax policy, and other factors. In fact, the federal investment tax credit, or "ITC", is expected to decrease significantly for projects commencing operations on or after January 1, 2017 – the ITC is expected to drop from 30% to 10%, based on PEA's understanding, which could impose generally proportionate increases to renewable energy pricing following such a change.

Sensitivity to renewable energy cost assumptions was tested by varying the base case costs for renewable power purchase contracts and for the installed costs for renewable generation projects by 25% for the high case and -25% for the low case. The variances were only applied to the CCA's cost structure and not PG&E's in order to test the impact of potential variation in site-specific renewable projects used by the CCA program.

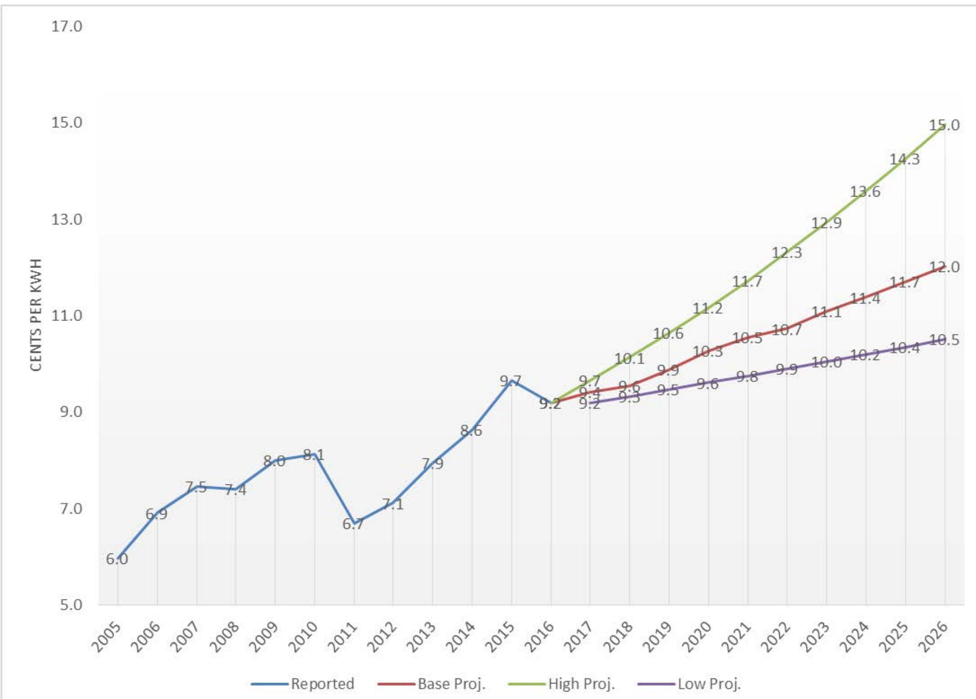
## Carbon Free Energy Costs

Specified purchases from carbon free resources or low carbon emissions portfolios generally yields a premium relative to system energy purchases. In consideration of the potential for increased CCA demand for low carbon content energy and the generally fixed supply of the large hydro-electric generation resource base available to California consumers, only a high case was evaluated for this factor. The high carbon free energy cost premium scenario was evaluated at a 300% increase relative to the base case assumption.

## PG&E Rates

The base case forecast for PG&E's generation rates yields a projected average annual increase of approximately 2.5%. The forecast relies on resource mix data provided by PG&E in its most recent long-term procurement plan, and incorporates many of the same core market cost assumptions (natural gas prices, power prices, GHG allowance prices, etc.) as used in the forecast of CCA program rates. Numerous factors can cause variances in PG&E's rates, and low and high cases were developed for this variable. One factor that could have a significant increase on PG&E's rates is the potential closure or rebuilding of DCPP, resulting from regulations prohibiting the use of once-through cooling at the plant. A high case was created that reflects an average annual generation rate increase of 5%. The low case assumes 1.5% annual rate increases for PG&E. Figure 23 illustrates the base, high and low case forecasts of PG&E generation rates and how these projections compare with historical trends.

**Figure 23: PG&E System Average Generation Rates**




## PG&E Surcharges

The PCIA and Franchise Fee surcharges directly impact PCE rate competitiveness, and the PCIA has been volatile. In an August, 2015 filing to the CPUC, PG&E projected PCIA levels for 2016 that are approximately 70% higher than current levels.[21] Figure 24 shows the projected Franchise Fee Surcharge and PCIA applicable to residential customers as well as historical data illustrating the volatility of these surcharges.

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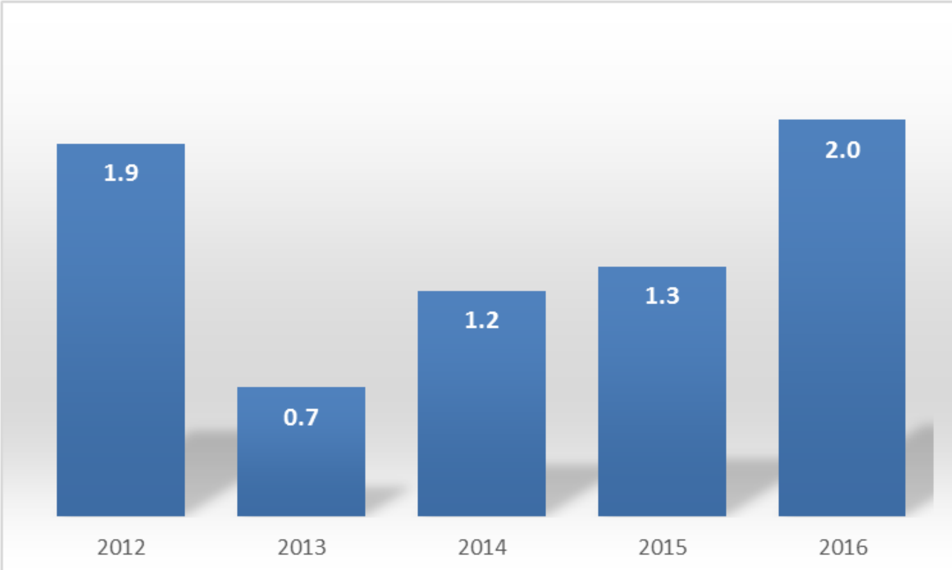
[21] PG&E Advice Letter AL-4696-E.

**Figure 24: PG&E CCA Surcharges for Residential Customers (Cents Per KWh)**




The base case PCIA projections begin with the higher 2016 PCIA charges reported by PG&E and remain relatively flat over the forecast period. High and low cases were run at plus or minus 50% off of the base case.

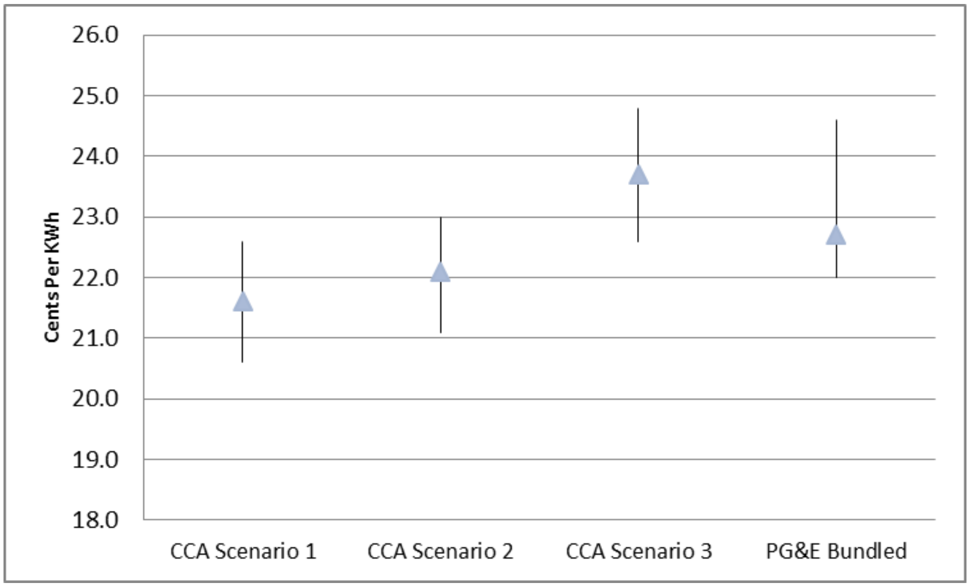
## Opt-Out Rates

Sensitivity of ratepayer costs to customer participation in the CCA program was tested by varying the opt-out rate from 25% in the high case to 5% in the low case. For Scenario 3, the high case was set to 35% for residential and small commercial customers and 60% for all other customer groups, while the low case was set to 15% for residential and small commercial and 40% for the other customer groups. A higher opt-out rate would reduce sales volumes relative to base case assumptions, and increase the share of fixed costs paid by each customer, while a lower opt-out rate would have the opposite effect.

## Sensitivity Results

The sensitivity analysis produced a range of levelized electric rates for the CCA program and PG&E as shown in the following figure. It should be noted that there is considerable overlap in the range of estimated rates, and while base case estimates show higher rates for the CCA program, any of the CCA Scenarios could potentially result in lower ratepayer costs than under the status quo.

**Figure 25: Sensitivity Analysis Range of Levelized Electric Rates**




The sensitivity to each tested variable is shown in the following table. Natural Gas/Power prices had the greatest impact on CCA rates in Scenarios 1 and 2, while renewable energy costs were the most significant driver of CCA rates in Scenarios 3.

**Sensitivity Analysis: Levelized Ratepayer Costs (Cents Per KWh)**

| Rate Scenario | Base Case | High Gas/ Power | Low Gas/ Power | High R.E. Costs | Low R.E. Costs | High PG&E Rates | Low PG&E Rates | High PCIA | Low PCIA | High Opt Out | Low Opt Out | High Carbon Free Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CCA Scenario 1 | 21.6 | 22.5 | 21.1 | 22.1 | 21.1 | 21.6 | 21.6 | 22.6 | 20.6 | 21.7 | 21.5 | 21.6 |
| CCA Scenario 2 | 22.1 | 23.0 | 21.6 | 22.7 | 21.4 | 22.1 | 22.1 | 23.0 | 21.1 | 22.1 | 22.0 | 22.3 |
| CCA Scenario 3 | 23.7 | 24.4 | 23.4 | 24.8 | 22.6 | 23.7 | 23.7 | 24.7 | 22.7 | 24.0 | 23.6 | 23.7 |
| PG&E Bundled (S1,2) | 22.7 | 23.3 | 22.3 | 22.7 | 22.7 | 24.1 | 22.0 | 22.7 | 22.7 | 22.7 | 22.7 | 22.7 |
| PG&E Bundled (S3) | 23.2 | 23.8 | 22.8 | 23.2 | 23.2 | 24.6 | 22.5 | 23.2 | 23.2 | 23.3 | 23.1 | 23.2 |

The sensitivity results for each PCE supply scenario are depicted graphically in the following figures.

**Figure 26: Scenario 1 Sensitivity Impacts on Levelized Electric Rates**

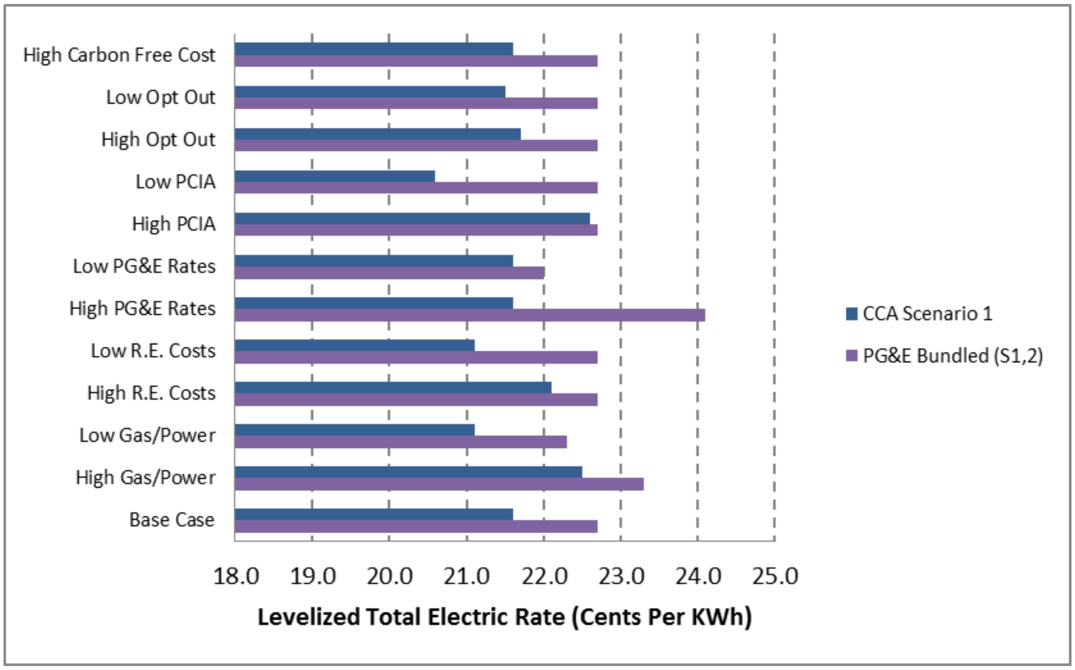



**Figure 27: Scenario 2 Sensitivity Impacts on Levelized Electric Rates**

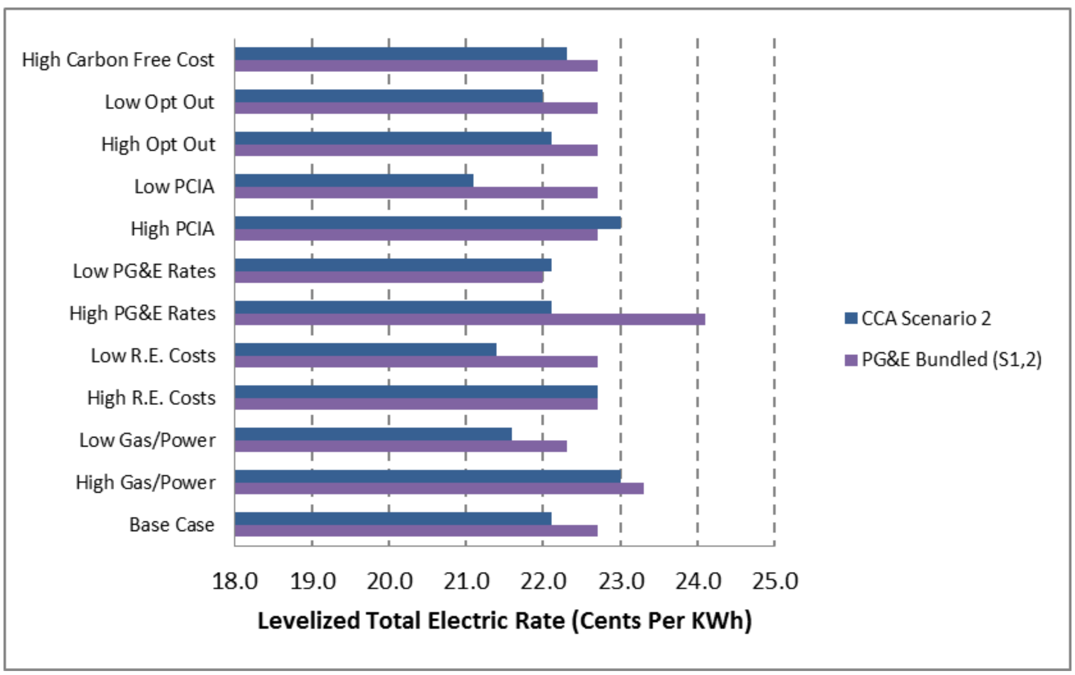
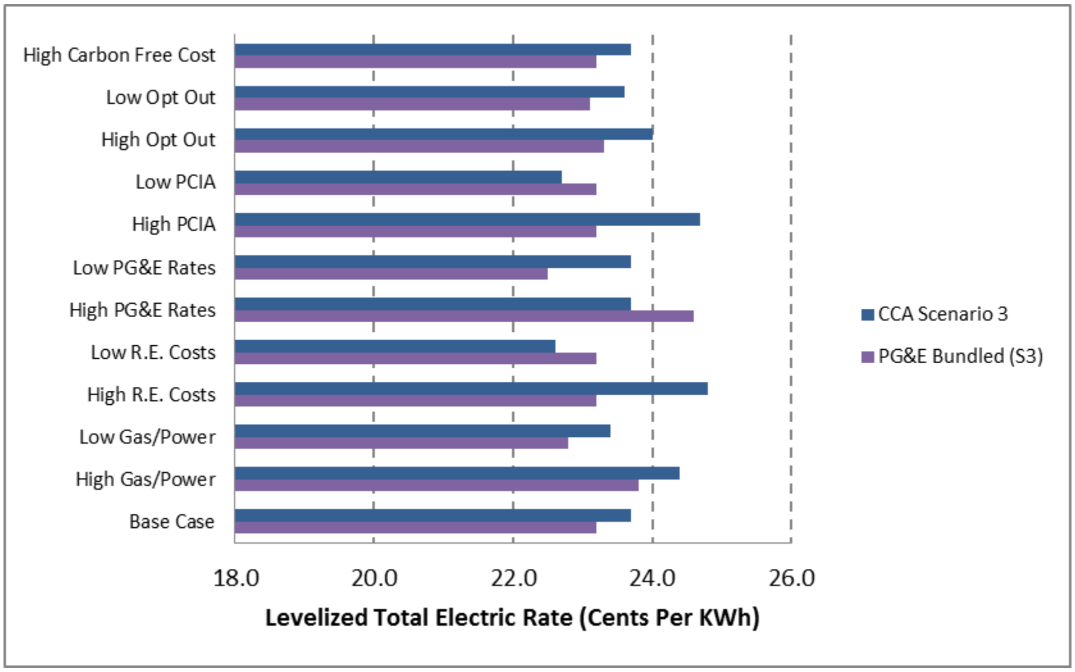


**Figure 28: Scenario 3 Sensitivity Impacts on Levelized Electric Rates**



# SECTION 7: RISK ANALYSIS

CCA formation is not without risk, and a key element of this Study is highlighting key risks that may face the CCA program as well as related risk-mitigation measures. Much of the quantitative impacts associated with key risks has been addressed in Section 6, Sensitivity Analyses, while other risk elements were highlighted in PEA's Alternative CCA Business Model Assessment (the "Assessment"), which was previously provided to San Mateo County. However, there are additional risk elements of which any aspiring CCA program should be aware as well as associated mitigation measures for such risks. In particular, these additional risks include, but are not limited to, the following:

- Financial risks to PCE's member municipalities in the unlikely event of CCA failure;
- Financial risks that may exist in the event that procured energy volumes fall short of or exceed actual customer energy use;
- Reasonably foreseen legislative and regulatory changes, which may limit a CCA's ability to remain competitive with the incumbent utility;
- Availability of renewable and carbon-free energy supplies required to meet compliance mandates, PCE program goals, and customer commitments; and
- General market volatility and price risk.

## Financial Risks to PCE Members

In general terms, the prospective financial risks to PCE members will be limited to the extent that the JPA agreement creates separation, also referred to as a "firewall", between the financial assets and obligations of the JPA and those of its individual members. This approach has been effectively employed by both MCE and SCP at the time that each JPA was created, insulating the respective members of each organization from the financial liabilities independently incurred by the JPA (e.g., power purchase agreements, debt, letters of credit and other operating expenditures). For example, if the JPA were to default on a contract obligation, any termination payments would be owed by the JPA and not the individual members, as individual JPA members would not be responsible for the financial commitments of the JPA. From a practical perspective, each member of the JPA would have a relatively small financial exposure, which would be limited to any early-stage contributions and/or expenditures related to the CCA initiative before joining the JPA. After joining the JPA, each participating municipality would be financially insulated via the JPA agreement, and it is anticipated that the JPA would be financially independent during ongoing CCA operations, meaning that the JPA would be responsible for independently demonstrating creditworthiness when entering into power purchase agreements and financial covenants. Based on PEA's understanding, qualified legal counsel was engaged during the formation of each operating, multi-jurisdiction CCA to ensure that the associated JPA agreement created the desired financial protections for its members.

Other than relatively small upfront costs/contributions that may be incurred by the JPA members during CCA evaluation and JPA formation, financial obligations of the participating communities would be limited to individual customer impacts in the event of outright CCA failure. In such a scenario, the $100,000 CCA bond is intended to cover the costs of returning customers to PG&E service. However, following an involuntary return to bundled service, CCA customers would be individually required to pay the transitional bundled commodity cost, as described in PG&E's Electric Schedule TBCC, which imposes a market-based rate on customers who fail to provide PG&E with six-month advance notice prior to reestablishing PG&E electric service.[22] In recent years, the TBCC rate has likely benefited participating customers due to historically low market prices (and the favorable relationship of such prices to PG&E's generation rates). However, inherent price volatility within the

[22] http://www.pge.com/tariffs/tm2/pdf/ELEC_SCHEDS_TBCC.pdf

electric power sector could result in relatively high customer costs in the short-term, following an involuntary return to bundled service at a time when market prices are higher than PG&E's prevailing generation rates. In practical terms, the likelihood of this risk materially impacting a PCE customer appears to be quite low.

## Deviations between Actual Energy Use and Contracted Purchases

Deviations between actual customer energy use and contracted energy purchases are inevitable. For example, weather variation may impose meaningful day-to-day variances in expected customer energy use, which results in the potential for ongoing imbalances between procured energy volumes and actual electric energy consumption by PCE's customer base. To the extent that such imbalances exist, the CCA may be required to make market purchases during unexpected price spikes and/or sell off excess energy volumes at times when prices are relatively low (when compared to the price paid for such energy), which could impose adverse financial impacts on the CCA program. Again, this is an inevitable risk that is assumed by all energy market participants, but prudent planning and procurement practices can be utilized by the CCA to manage such risk to acceptable levels. In particular, "laddered" procurement strategies can be highly effective in mitigating such risks – this procurement strategy is designed to promote increased cost/rate certainty during the upcoming 12-month operating period by securing 90-100% of the CCA's projected energy requirements during this period of time. Beyond the 12-month operating horizon, an increasing proportion of the CCA's anticipated energy requirements are left "open" (i.e., are not addressed via contractual commitments) to avoid financial commitments based on reduced planning certainty. For example, the CCA program may decide that it is acceptable to take on market price risk associated with 5% of its expected energy requirements over the upcoming 12-month operating period – this strategy would create cost certainty for a significant portion of the CCA's expected energy requirements, allowing the CCA to set rates in consideration of such costs with minimal financial/budgetary risk. For months 13-24, the CCA would reduce forward supply commitments to a level approximating 80-90% of expectations; for months 25-36, the CCA would further reduce forward supply commitments to a level approximating 70-80% of expectations. Forward procurement commitments would continue to "fall down the ladder" in subsequent months, but such open positions are ultimately filled with time. It is also noteworthy that such percentages could always be adjusted in consideration of prevailing market prices and the CCA's overall risk tolerance.

This procurement strategy avoids the prospect of over-procurement and minimizes the prospect of surplus energy sales while also allowing the CCA program to take advantage of favorable procurement opportunities that may come about with time. During early-stage CCA operations, this strategy is particularly useful since the CCA is unlikely to know exact customer participation levels. Over time, as the CCA's customer base becomes more stable/predictable, it will become less challenging to predict customer usage patterns.

## Legislative and Regulatory Risk

California's operating CCAs can attest to the challenges presented by anti-CCA legislation – a range of tactics have been employed over time, pre-dating MCE's launch in May, 2010 and resurfacing thereafter in various forms. Ongoing issues continue to arise with regard to proposed legislation designed to assign/shift costs for purposes of competitively disadvantaging CCA programs and/or limit the autonomy of CCA programs, so that such programs appear more similar to their investor-owned counterparts. Recently, SB 350 and AB 1110 have proposed provisions that would be detrimental to existing and aspiring CCA programs.

On September 11, 2015, the California legislature concurred with proposed amendments to Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015, and recommended this bill for enrolling. If signed, SB 350 would increase California's RPS to 50% by 2030 amongst other clean-energy initiatives. To enact the provisions of SB 350, Governor Brown must sign the bill by October 11, 2015. Many details regarding implementation of SB 350 will be developed over time with oversight by applicable regulatory agencies. With regard to other relevant changes that will be created by SB 350, CCAs should be aware of the following:

- Costs associated with the integration of new renewable infrastructure may be off-set by a CCA if it can demonstrate to the CPUC that it has already provided equivalent resources [Sections 454.51(d) and 454.52(c)];
- CCAs will be required to submit Integrated Resource Plans to the CPUC for certification while retaining the governing authority and procurement autonomy administered by their respective governing boards [Section 454.52(b)(3)];
- The CPUC is now responsible for ensuring that: (1) IOU bundled customers do not incur any cost increases as a result of customers participating in CCA service options, and (2) CCA customers do not experience any cost increases as a result of IOU cost allocation that is not directly related to such CCA customers (Sections 365.2 and 366.3);
- Beginning in 2021, CCAs must have at least 65% of their RPS procurement under long-term contracts of 10 years or more [Section 399.13(b)]; and
- CCA energy efficiency programs will be able to count towards statewide energy efficiency targets [Sections 25310(d)(6) and 25310(d)(8)].

In aggregate, the CCA-specific changes reflected in SB 350 are generally positive, providing for ongoing autonomy with regard to resource planning and procurement. CCAs must be aware, however, of the long-term contracting requirement associated with renewable energy procurement. This is not expected to present issues for PCE, but planning and procurement efforts will need to consider this requirement during ongoing operation of the CCA program.

AB 1110, which is now a two-year bill, was primarily focused on the addition of GHG emission disclosures within the Power Content Label. During discussion in the recent legislative session, CCA interests were generally concerned that the emissions methodology reflected in the bill was designed in a manner that was not necessarily consistent with retail-level emissions reporting conventions used throughout the electric utility industry and also appeared to diminish the environmental value of certain clean energy products. On September 8, 2015, AB 1110 was ordered to the inactive file at the request of Senator Wolk.[23] With this direction in mind, AB 1110 is no longer an issue in the current legislative session. However, PEA recommends that the San Mateo Communities should continue to monitor the legislature's interest in promoting certain reporting changes reflected in AB 1110, as such changes could narrow the potential field of cost-effective supply options that could be pursued by PCE at some point in the future. The AB 1110 GHG emissions reporting methodology may also present methodological conflicts with other programs, such as The Climate Registry, which may be of interest to PCE at some point in the future.

Regulatory risks include the potential for utility generation costs to be shifted to non-bypassable and delivery charges. Examples include: 1) the Cost Allocation Mechanism, under which the costs of certain generation commitments made by the investor owned utilities deemed necessary for grid reliability or to support other state policy, are allocated to non-bundled (CCA and direct access) customers; and 2) the PCIA as previously discussed. Another significant regulatory risk relates to changes that may occur with regard to the CCA Bond amount. Currently, the $100,000 bond amount is quite manageable for aspiring CCA initiatives, but this could change dramatically in the event that a larger bond amount, based on market conditions at the time of an involuntary return of customers to bundled service, is established at some point in the future. PEA recommends that the San

[23] AB 1110 bill history: http://leginfo.legislature.ca.gov/faces/billHistoryClient.xhtml?bill_id=201520160AB1110.

Mateo Communities actively monitor and participate in, as necessary, related regulatory proceedings to ensure that this item does not become a barrier for CCA formation or ongoing operation.

## Availability of Requisite Renewable and Carbon-Free Energy Supplies

The prospect of a 50% RPS in California has prompted various questions regarding the sufficiency of renewable generating capacity that may be available to support compliance with such mandates. In particular, both new and existing CCAs, which will be subject to prevailing RPS procurement mandates, represent a growing pool of renewable energy buyers that will be "competing" for requisite in-state resources. While this is certainly a legitimate concern, particularly when considering that the potential for CCA expansion throughout California seems quite significant, it strikes PEA as highly unlikely that any CCA buyer would be unable to meet applicable procurement mandates during the ten-year planning horizon. To date, renewable energy contracting opportunities within California have been abundant, providing interested buyers with cost-competitive procurement opportunities well in excess of compliance mandates and voluntary renewable energy procurement targets that have been established by certain CCAs. Furthermore, to the extent that additional CCA programs continue to form, California's largest buyers of renewable energy, represented by the three investor-owned utilities, will have diminished renewable energy procurement obligations as a result of decreasing retail sales. Certainly, the potential exists for increased supply costs as additional CCA buyers compete for available renewable projects, but the general availability of such projects does not seem to be a significant issue that will face PCE over the ten-year planning horizon.

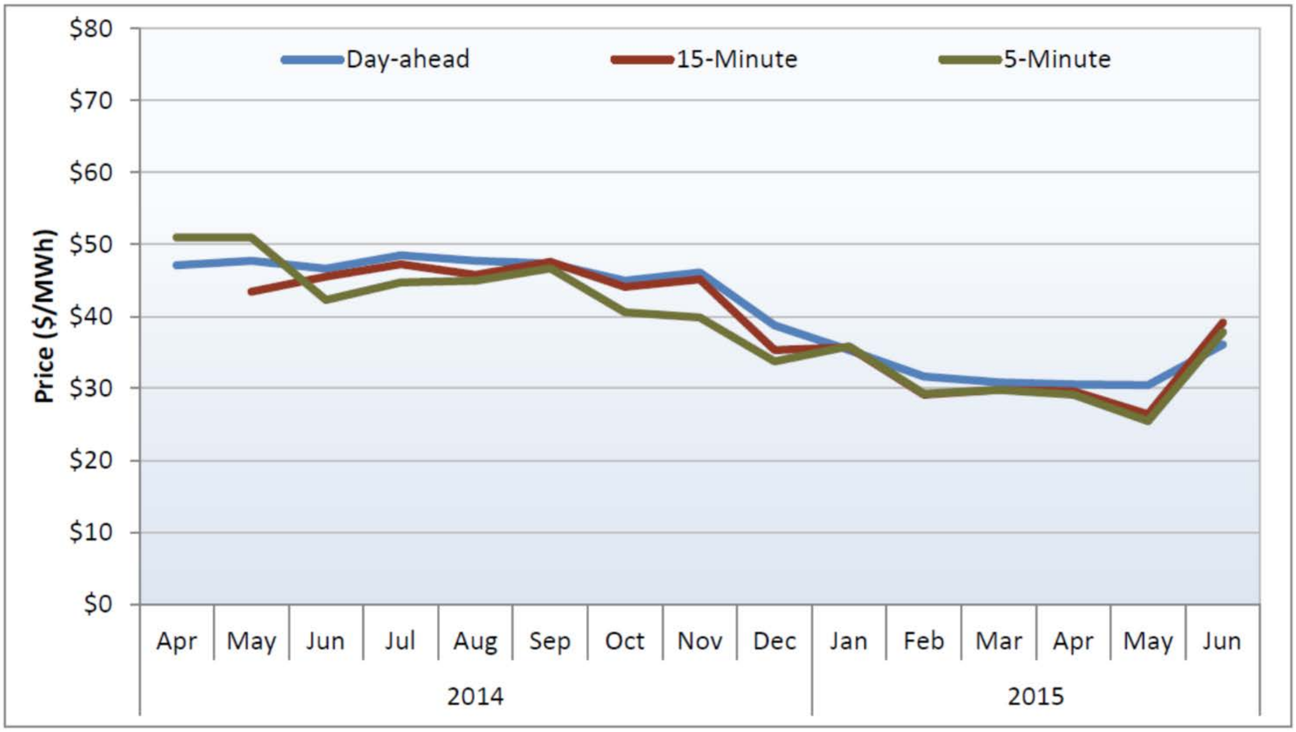
Additionally, as the operational and future CCA's strive to meet high carbon-free energy targets, there is some uncertainty around the availability of hydroelectric generation resources within California and throughout the Pacific Northwest to meet such goals. Outside of renewable energy resources, hydroelectric generation is the lowest cost means of meeting carbon-free objectives (with it in mind that nuclear generation will be excluded from PCE's supply portfolio) but also comes with certain variability in supply. Given the variability of such resources (i.e., wet versus dry year) and unpredictability of the day-to-day energy deliveries, there is risk in achieving carbon content goals. There is also a cost risk associated with the transmission of out-of-state hydroelectric generation into California during certain times of the year when California energy buyers are seeking to import peak hydro season production – this congestion risk could add significant costs to contracted hydroelectric power.

## Market Volatility and Price Risk

Wholesale energy markets are subject to sudden and significant volatility, resulting from myriad factors, including but not limited to the following: weather, natural disasters, infrastructure outages, legislation and implementing regulations, and natural gas storage levels. Over the past 24 months (or longer), wholesale energy prices have fallen to near-historic lows, providing a favorable environment for buyers of electric energy. An abundance of domestic natural gas supply, particularly shale gas, and strong storage levels have also suppressed electric energy pricing, which will likely promote the continued trend of relatively low prices for the foreseeable future. However, unexpected circumstances can impose abrupt changes to available pricing, which necessitates a thoughtful, disciplined approach to managing such risk. The following figure, provided by the CAISO, illustrates historic volatility in the wholesale electricity market, including a nearly 40% reduction in such prices over the past 24 months.[24]

[24] California ISO Q2 2015 Report on Market Issues and Performance, August 17, 2015.

**Figure 29: Historical Wholesale Electricity Price Curve**




As previously described, a laddered procurement strategy will serve to mitigate wholesale pricing impacts at any single point in time. Much like dollar cost averaging in the financial sector, laddered procurement strategies serve to mask the impacts of periodic price spikes and troughs by blending the financial impacts associated with such changes through a temporally diversified supply portfolio. This procurement strategy should also create a certain level of symmetry with market impacts that would also affect incremental procurement completed by the incumbent utility. Ultimately, there is no mitigation tactic that could completely insulate the CCA from market price risk, but a diversified supply portfolio, in terms of transaction timing, fuel sources and contract term lengths, will minimize such risks over time.

# SECTION 8: ALTERNATIVE CCA BUSINESS MODEL ASSESSMENT: THIRD-PARTY ADMINISTRATION

In June 2015, PEA prepared and delivered an assessment of the fully outsourced CCA service model at the request of San Mateo County. In general terms, the "fully outsourced model" purported to minimize risks and guarantee benefits typically associated with CCA implementation and operation. This approach differs from the approach taken by California's operating CCAs, which have established internal organizations with the intent of providing CCA as a locally focused/locally situated public service organization for the long term. The existing CCAs have opted for more traditional supplier/service arrangements with longer-standing, highly experienced organizations and/or through the development of internal staff, who have been assigned responsibility for certain operational functions. Based on PEA's research and evaluation, there are certain benefits and risks associated with this approach, which are further articulated in the Assessment, which is incorporated by reference in this Study but not attached hereto.

# SECTION 9: CCA FORMATION ACTIVITIES

This section provides a high level summary of the main steps involved in forming a CCA program that culminates in the provision of service to enrolled customers. Key implementation activities include those related to 1) CCA entity formation; 2) regulatory requirements; 3) procurement; 4) financing; 5) organization; and 6) customer noticing. Completion of these activities is reflected in the Study's startup cost estimates.

## CCA Entity Formation

Unless the municipal organization that will legally register as the CCA entity already exists, it must be legally established. Municipalities electing to offer or allow others to offer CCA service within their jurisdiction must do so by ordinance. As anticipated for PCE, a joint power authority ("JPA"), the members of which will include certain or all municipal jurisdictions within the San Mateo Communities intending to offer CCA service, will be formed via a related agreement amongst the participating municipalities. Specific examples of applicable JPA agreements are available for currently operating CCA programs, including MCE and SCP, which were formed under this joint structure. Based on PEA's understanding, specific details related to PCE's JPA agreement are currently under development.

## Regulatory Requirements

Before aggregating customers, the CCA program must meet certain requirements set forth by the CPUC. In the case of PCE, an Implementation Plan must be adopted by the joint powers authority, and that Implementation Plan must be submitted to the CPUC. The Implementation Plan must include the following:

- An organizational structure of the program, its operations, and its funding;
- Ratesetting and other costs to participants;
- Provisions for disclosure and due process in setting rates and allocating costs among participants;
- The methods for entering and terminating agreements with other entities;
- The rights and responsibilities of program participants, including, but not limited to, consumer protection procedures, credit issues, and shutoff procedures;
- Termination of the program; and
- A description of the third parties that will be supplying electricity under the program, including, but not limited to, information about financial, technical, and operational capabilities.

A Statement of Intent must be included with the Implementation Plan that provides for:

- Universal access
- Reliability
- Equitable treatment of all classes of customers
- Any requirements established by law or the CPUC concerning aggregated service.

The CPUC has ninety days to complete a review and certify the Implementation Plan though previous Implementation Plan reviews completed on behalf of other California CCA programs have required far less time. Following certification of the Implementation Plan, the CCA entity must submit a registration packet to the CPUC, which includes:

- An executed service agreement with PG&E, which may require a security deposit; and

- A bond or evidence of sufficient insurance to cover any reentry fees that may be imposed against it by the CPUC for involuntarily returning customers to PG&E service. As previously noted, the current CCA bond amount is $100,000.

The CCA program would be required to participate in the CPUC's resource adequacy program before commencing service to customers by providing load forecasts and advance demonstration of resource adequacy compliance.

## Procurement

Power supplies must be secured several months in advance of commencing service. Power purchase agreements with one or more power suppliers would be negotiated, typically following a competitive selection process. Services that are required include provision of energy, capacity, renewable energy and scheduling coordination.

## Financing

Funding must be obtained to cover start-up activities and working capital needs. Start-up funding would be secured early in the implementation process as these funds would be needed to conduct the critical activities leading up to service commencement. Working capital lender commitments should be secured well in advance, but actual funding need not occur until near the time that service begins.

## Organization

Initial staff positions would be filled several months in advance of service commencement to conduct the implementation process. Initially, internal staff of the CCA program may be relatively small but this would likely change in the event that the CCA determines to insource various administrative and operational responsibilities and/or develops and administers new programs for its customers. Contracts with other service providers, such as for data management services, would be negotiated and put into effect well in advance of service commencement.

## Customer Notices

Customers must be provided notices regarding their pending enrollment in the CCA program. Such notices must contain program terms and conditions as well as opt-out instructions and must be sent to prospective customers at least twice within the sixty-day period immediately preceding automatic enrollment. These notices are referred to as "pre-enrollment" notices. Two additional "post-enrollment" notices must be provided within the sixty-day period following customer enrollment during the statutory opt-out period.

## Ratesetting and Preliminary Program Development

As a California CCA, PCE would have independent ratesetting authority with regard to the electric generation charges imposed on its customers. Prior to service commencement, PCE would need to establish initial customer generation rates for each of the customer groups represented in its first operating phase or for all prospective customers within the CCA's prospective service territory. PCE may decide to create a schedule of customer generation rates that generally resembles the current rate options offered by PG&E. This practice would facilitate customer rate comparisons and should avoid confusion that may occur if customers were to be transitioned to dissimilar tariff options. PCE would need to establish a schedule for ongoing rate updates/changes for future customer phases and ongoing operations.

PCE may also choose to offer certain customer-focused programs, such as Net Energy Metering ("NEM"), voluntary green pricing and/or FIT programs, at the time of service commencement. To the extent that PCE intends to offer such programs, specific terms and conditions of service would need to be developed in advance of service commencement.

# SECTION 10: EVALUATION AND RECOMMENDATIONS

This section provides an overall assessment of the feasibility for forming a CCA program serving the San Mateo Communities and provides PEA's recommendations in the event a decision is made to proceed with development of the PCE program.

PEA's analysis suggests that PCE could provide significant benefits – both economic and environmental – which could be accomplished under certain prospective operating scenarios with customer rates that are competitive, if not lower than, current rate projections for PG&E. Under a reasonable range of sensitivity assumptions, the analysis shows that customer rates are projected to range from approximately 21 to 25 cents per kWh, on a ten-year levelized cost basis, while PG&E rates are projected to range from 22 to 24 cents per kWh on a levelized basis over this same period of time.

Under base case assumptions, CCA program rates are projected to range from 21.6 cents per kWh to 23.7 cents per kWh, depending upon the ultimate CCA program resource mix. PG&E's generation rate is projected to be 22.7 cents per kWh, creating the potential for customer savings under two of the three supply scenarios. The following table shows projected levelized electric rates and typical residential monthly electric bills under the base case assumptions.

**Summary of Ratepayer Impacts**

| Ratepayer Impact | Scenario 1 | Scenario 2 | Scenario 3 | PG&E |
|---|---|---|---|---|
| **Levelized Electric Rate (Cents/KWh)** | 21.6 | 22.1 | 23.7 | 22.7 |
| **Typical Residential Bill ($/Month)[25]** | $97 | $99 | $107 | $102 |

It should be noted that there is considerable overlap in the range of estimated rates under the various sensitivity scenarios described in this Study, and while base case estimates generally show highly competitive rates for the CCA program, it is anticipated that Scenarios 1 and 2 are most likely to generate customer rate savings while Scenario 3 is most likely to result in increased customer costs relative to the status quo.

With regard to GHG emissions impacts, the ultimate resource mix identified by the CCA program will dictate overall GHG emissions impacts created by PCE operation. Depending upon resource choices made by the CCA program, potential GHG emissions may vary widely relative to PG&E. For example, under Scenario 1, PCE should assume a significant increase in comparative GHG emissions within the San Mateo Communities' electric power sector. Scenarios 2 and 3 are both expected to create significant GHG emissions reductions through the procurement of significant quantities of carbon-free energy. The following table summarizes projected GHG emissions impacts for each of the modeled supply scenarios.

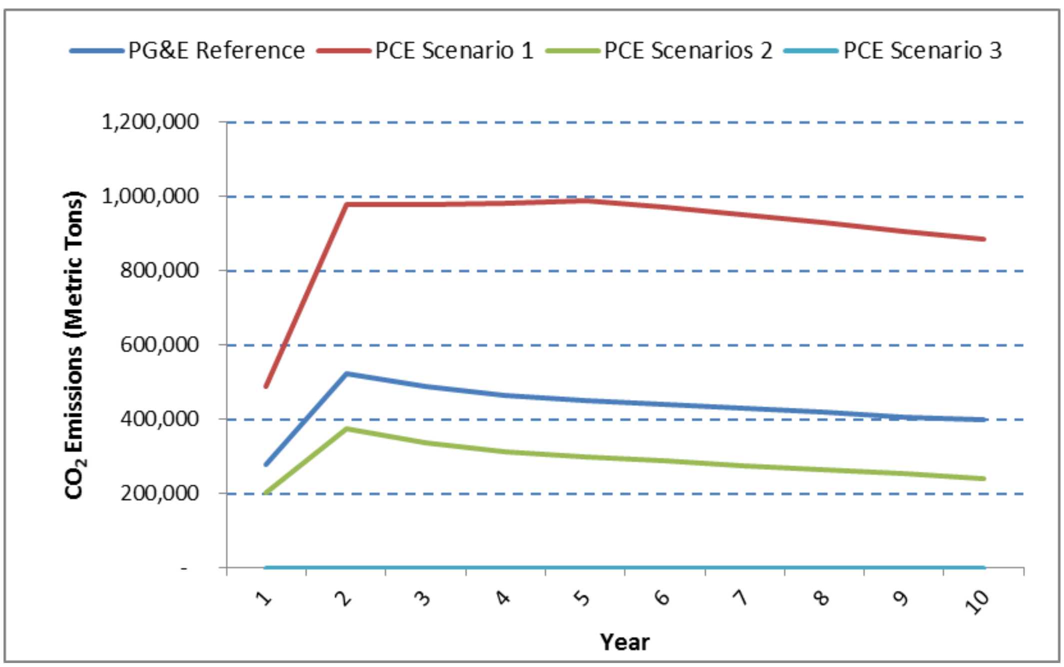
[25] Typical residential monthly consumption in the San Mateo Communities is approximately 450 kWh.

**GHG Emissions Impacts (Ten Year Average)**

| GHG Impact | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| **Annual Change in GHG Emissions (Tons $CO_2$/Year)** | 476,125 | -145,036 | -301,269 |
| **Change in Electric Sector $CO_2$ Emissions in San Mateo County (%)** | +111% | -34% | -100% |
| **Projected PCE Portfolio Emissions Factor (metric tons/MWh)** | 0.268 | 0.086 | 0 |
| **Projected PG&E Portfolio Emissions Factor (metric tons/MWh)** | 0.128 | 0.128 | 0.128 |

The following figures illustrate projected GHG emissions under the status quo as well as each of the prospective PCE supply scenarios. Note that the projected GHG emissions trend associated with Scenario 3 coincides with the figure's horizontal access, as there are zero assumed GHG emissions under this planning scenario (resulting from the exclusive use of bundled renewable energy resources).

**Figure 30: Projected GHG Emissions**




The potential for local generation investment arising from the CCA program appears to offer significant benefits to the local economy. Again, resource decisions will impact the degree to which generation investments yield local benefits as indicated through the analysis of local economic impact associated with the representative supply scenarios. Compared to some other areas in the state, San Mateo County is not the best resource area for solar and wind production, and local projects of this type will tend to have higher costs than projects sited in prime resource areas. Tradeoffs also exist between minimizing ratepayer costs in the short run and expanding use of renewable energy due to the cost premiums that currently exist for renewable energy. Decisions made during the implementation process and during the life of the CCA program will determine how these considerations are balanced. PEA recommends that considerable thought be given upfront to the ultimate goals of the CCA program so that clear objectives are established, giving those responsible for administering the CCA program the opportunity to develop and execute resource management and procurement plans that meet objectives of the San Mateo Communities.

In summary, it is PEA's opinion that, based on currently observed wholesale market conditions, anticipated PG&E electric rates and certain of the supply scenarios evaluated in this Study, amongst various other considerations, a CCA program serving customers within the San Mateo Communities could offer both economic (i.e., positive local economic development impacts and overall cost savings for customers of the CCA program) and environmental benefits during initial program operations and, potentially, throughout the ten-year study period. As previously noted, inherent power market volatility suggests that the San Mateo Communities should affirm the appropriateness of assumptions and projections reflected in this Study before taking any action related to CCA program formation.

# APPENDIX A: PCE PRO FORMA ANALYSES

PENINSULA CLEAN ENERGY
FINANCIAL PRO FORMA ANALYSIS
COMMUNITY CHOICE AGGREGATION
SCENARIO 1

| CATEGORY | YEAR 1 | YEAR 2 | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | YEAR 7 | YEAR 8 | YEAR 9 | YEAR 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| I, CUSTOMER ACCOUNTS: | | | | | | | | | | |
| RESIDENTIAL (E-1) | 114,351 | 228,702 | 228,702 | 229,845 | 230,995 | 232,150 | 233,310 | 234,477 | 235,649 | 236,827 |
| SMALL COMMERCIAL (A-1) | 9,080 | 18,159 | 18,159 | 18,250 | 18,341 | 18,433 | 18,525 | 18,618 | 18,711 | 18,805 |
| SMALL COMMERCIAL (A-6) | 726 | 1,452 | 1,452 | 1,459 | 1,466 | 1,474 | 1,481 | 1,488 | 1,496 | 1,503 |
| MEDIUM COMMERCIAL (A-10) | 1,133 | 2,265 | 2,265 | 2,277 | 2,288 | 2,299 | 2,311 | 2,322 | 2,334 | 2,346 |
| LARGE COMMERCIAL (E-19) | 567 | 1,133 | 1,133 | 1,139 | 1,144 | 1,150 | 1,156 | 1,162 | 1,167 | 1,173 |
| INDUSTRIAL (E-20) | 18 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 38 | 38 |
| STREET LIGHTING AND TRAFFIC CONTROL (LS-3) | 609 | 1,217 | 1,217 | 1,223 | 1,229 | 1,236 | 1,242 | 1,248 | 1,254 | 1,260 |
| AGRICULTURAL (AG-1B, AG-4A, AG-4B, AG-5A, AG-5B, AG-5C) | 117 | 234 | 234 | 235 | 236 | 237 | 238 | 240 | 241 | 242 |
| SUBTOTAL - CUSTOMER ACCOUNTS | 126,599 | 253,199 | 253,199 | 254,465 | 255,737 | 257,016 | 258,301 | 259,592 | 260,890 | 262,195 |
| II. LOAD REQUIREMENTS (KWH): | | | | | | | | | | |
| RESIDENTIAL (E-1) | 619,470,827 | 1,238,966,523 | 1,238,991,392 | 1,245,186,349 | 1,251,412,281 | 1,257,669,342 | 1,263,957,689 | 1,270,277,477 | 1,276,628,865 | 1,283,012,009 |
| SMALL COMMERCIAL (A-1) | 163,302,073 | 326,609,557 | 326,614,968 | 328,248,043 | 329,889,283 | 331,538,730 | 333,196,424 | 334,862,406 | 336,536,718 | 338,219,401 |
| SMALL COMMERCIAL (A-6) | 36,025,089 | 72,051,506 | 72,052,834 | 72,413,098 | 72,775,164 | 73,139,039 | 73,504,735 | 73,872,258 | 74,241,620 | 74,612,828 |
| MEDIUM COMMERCIAL (A-10) | 260,685,684 | 521,379,715 | 521,388,062 | 523,995,002 | 526,614,977 | 529,248,052 | 531,894,292 | 534,553,764 | 537,226,533 | 539,912,665 |
| LARGE COMMERCIAL (E-19) | 396,641,238 | 793,295,726 | 793,308,975 | 797,275,519 | 801,261,897 | 805,268,207 | 809,294,548 | 813,341,020 | 817,407,725 | 821,494,764 |
| INDUSTRIAL (E-20) | 160,824,374 | 321,653,919 | 321,659,091 | 323,267,386 | 324,883,723 | 326,508,142 | 328,140,683 | 329,781,386 | 331,430,293 | 333,087,445 |
| STREET LIGHTING AND TRAFFIC CONTROL (LS-3) | 10,221,691 | 20,443,736 | 20,444,090 | 20,546,311 | 20,649,042 | 20,752,288 | 20,856,049 | 20,960,329 | 21,065,131 | 21,170,457 |
| AGRICULTURAL (AG-1B, AG-4A, AG-4B, AG-5A, AG-5B, AG-5C) | 10,665,003 | 21,330,429 | 21,330,852 | 21,437,506 | 21,544,694 | 21,652,417 | 21,760,679 | 21,869,483 | 21,978,830 | 22,088,724 |
| SUBTOTAL - LOAD REQUIREMENTS | 1,657,835,979 | 3,315,731,111 | 3,315,790,265 | 3,332,369,216 | 3,349,031,062 | 3,365,776,217 | 3,382,605,098 | 3,399,518,124 | 3,416,515,714 | 3,433,598,293 |
| III. CCA OPERATING COSTS ($) | | | | | | | | | | |
| SHORT TERM MARKET PURCHASES | $4,317,715 | $9,146,064 | $9,447,042 | $10,113,129 | $10,711,727 | $11,179,941 | $11,614,587 | $12,036,883 | $12,152,944 | $12,437,741 |
| TERM CONTRACT PURCHASES | $41,968,188 | $121,399,342 | $141,922,816 | $177,540,042 | $184,130,035 | $189,457,267 | $193,504,832 | $197,434,581 | $215,997,537 | $218,419,119 |
| SHORT TERM RENEWABLE MARKET PURCHASES AND RECS | $35,506,512 | $48,420,548 | $32,533,688 | $11,131,853 | $10,861,824 | $14,256,163 | $19,533,378 | $25,379,987 | $13,422,459 | $19,479,769 |
| SHORT TERM CARBON FREE MARKET PURCHASES | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ANCILLARY SERVICES AND CAISO CHARGES | $5,023,326 | $10,384,953 | $10,707,528 | $11,126,782 | $11,553,418 | $12,008,301 | $12,483,099 | $12,974,910 | $13,447,977 | $13,956,940 |
| RESOURCE ADEQUACY CAPACITY | $8,333,154 | $15,125,285 | $13,325,313 | $13,004,024 | $13,384,817 | $13,780,229 | $14,354,007 | $14,952,071 | $14,990,346 | $15,629,044 |
| STAFF AND OTHER OPERATIONS COSTS | $6,224,813 | $8,108,680 | $8,270,918 | $8,454,641 | $8,642,498 | $8,834,583 | $9,030,992 | $9,231,824 | $9,437,181 | $9,647,164 |
| BILLING AND DATA MANAGEMENT | $2,977,618 | $6,133,894 | $6,317,911 | $6,539,985 | $6,769,866 | $7,007,827 | $7,254,152 | $7,509,135 | $7,773,081 | $8,046,305 |
| UNCOLLECTIBLES EXPENSE | $546,431 | $1,118,268 | $1,137,300 | $1,214,226 | $1,254,945 | $1,282,622 | $1,338,875 | $1,397,597 | $1,436,108 | $1,488,080 |
| STARTUP FINANCING | $4,934,813 | $4,934,813 | $4,934,813 | $4,934,813 | $4,934,813 | $0 | $0 | $0 | $0 | $0 |
| CCA BOND CARRYING COST | $4,498 | $9,266 | $9,544 | $9,879 | $10,227 | $10,586 | $10,958 | $11,343 | $11,742 | $12,155 |
| SUBTOTAL - CCA OPERATING COSTS | $109,837,068 | $224,781,113 | $228,606,873 | $244,069,374 | $252,254,169 | $257,817,517 | $269,124,881 | $280,928,332 | $288,669,375 | $299,116,319 |
| IV. REVENUES FROM GREEN PREMIUM AND MARKET SALES ($) | | | | | | | | | | |
| GREEN PRICING PREMIUM | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| MARKET SALES | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| V. CONTRIBUTION TO PROGRAM RESERVES ($) | $3,295,112 | $6,743,433 | $6,858,206 | $7,322,081 | $7,567,625 | $7,734,526 | $8,073,746 | $8,427,850 | $8,660,081 | $8,973,490 |
| VI. CCA REVENUE REQUIREMENT ($) | $113,132,180 | $231,524,547 | $235,465,080 | $251,391,455 | $259,821,794 | $265,552,043 | $277,198,627 | $289,356,182 | $297,329,456 | $308,089,808 |
| CCA PROGRAM AVERAGE RATE (CENTS/KWH) | 6.8 | 7.0 | 7.1 | 7.5 | 7.8 | 7.9 | 8.2 | 8.5 | 8.7 | 9.0 |
| PG&E AVERAGE GENERATION COST (CENTS/KWH) | 9.7 | 9.8 | 10.2 | 10.6 | 10.8 | 11.0 | 11.4 | 11.7 | 12.0 | 12.4 |
| VII. PG&E CCA CUSTOMER SURCHARGES ($) | | | | | | | | | | |
| POWER CHARGE INDIFFERENCE ADJUSTMENT | $25,915,755 | $51,553,829 | $57,388,579 | $59,734,338 | $68,565,139 | $71,009,591 | $73,095,756 | $72,606,186 | $75,773,871 | $75,292,787 |
| FRANCHISE FEE SURCHARGE | $1,200,075 | $2,433,427 | $2,518,727 | $2,627,661 | $2,713,295 | $2,773,731 | $2,884,199 | $2,971,981 | $3,073,169 | $3,173,136 |
| SUBTOTAL - PG&E CCA CUSTOMER SURCHARGES | $ 27,115,829 | $ 53,987,255 | $ 59,907,306 | $ 62,361,999 | $ 71,278,434 | $ 73,783,321 | $ 75,979,955 | $ 75,578,166 | $ 78,847,040 | $ 78,465,922 |
| VIII. CCA REVENUE REQUIREMENT PLUS PG&E CCA CUSTOMER SURCHARGES | $140,248,009 | $285,511,802 | $295,372,386 | $313,753,455 | $331,100,228 | $339,335,364 | $353,178,582 | $364,934,349 | $376,176,496 | $386,555,731 |
| IX. REVENUE AT PG&E GENERATION RATES | $160,662,350 | $325,779,825 | $337,199,584 | $351,783,272 | $363,247,732 | $371,338,653 | $386,127,844 | $397,879,787 | $411,426,593 | $424,809,838 |
| **X. TOTAL CHANGE IN CUSTOMER ELECTRIC CHARGES** | **$ (20,414,341)** | **$ (40,268,023)** | **$ (41,827,199)** | **$ (38,029,817)** | **$ (32,147,504)** | **$ (32,003,289)** | **$ (32,949,262)** | **$ (32,945,439)** | **$ (35,250,097)** | **$ (38,254,108)** |
| **CHANGE IN CUSTOMER ELECTRIC CHARGES (%)** | **-6%** | **-6%** | **-6%** | **-5%** | **-4%** | **-4%** | **-4%** | **-4%** | **-4%** | **-4%** |

PENINSULA CLEAN ENERGY
FINANCIAL PRO FORMA ANALYSIS
COMMUNITY CHOICE AGGREGATION
SCENARIO 2

| CATEGORY | YEAR 1 | YEAR 2 | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | YEAR 7 | YEAR 8 | YEAR 9 | YEAR 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| I, CUSTOMER ACCOUNTS: | | | | | | | | | | |
| RESIDENTIAL (E-1) | 114,351 | 228,702 | 228,702 | 229,845 | 230,995 | 232,150 | 233,310 | 234,477 | 235,649 | 236,827 |
| SMALL COMMERCIAL (A-1) | 9,080 | 18,159 | 18,159 | 18,250 | 18,341 | 18,433 | 18,525 | 18,618 | 18,711 | 18,805 |
| SMALL COMMERCIAL (A-6) | 726 | 1,452 | 1,452 | 1,459 | 1,466 | 1,474 | 1,481 | 1,488 | 1,496 | 1,503 |
| MEDIUM COMMERCIAL (A-10) | 1,133 | 2,265 | 2,265 | 2,277 | 2,288 | 2,299 | 2,311 | 2,322 | 2,334 | 2,346 |
| LARGE COMMERCIAL (E-19) | 567 | 1,133 | 1,133 | 1,139 | 1,144 | 1,150 | 1,156 | 1,162 | 1,167 | 1,173 |
| INDUSTRIAL (E-20) | 18 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 38 | 38 |
| STREET LIGHTING AND TRAFFIC CONTROL (LS-3) | 609 | 1,217 | 1,217 | 1,223 | 1,229 | 1,236 | 1,242 | 1,248 | 1,254 | 1,260 |
| AGRICULTURAL (AG-1B, AG-4A, AG-4B, AG-5A, AG-5B, AG-5C) | 117 | 234 | 234 | 235 | 236 | 237 | 238 | 240 | 241 | 242 |
| SUBTOTAL - CUSTOMER ACCOUNTS | 126,599 | 253,199 | 253,199 | 254,465 | 255,737 | 257,016 | 258,301 | 259,592 | 260,890 | 262,195 |
| II. LOAD REQUIREMENTS (KWH): | | | | | | | | | | |
| RESIDENTIAL (E-1) | 619,470,827 | 1,238,966,523 | 1,238,991,392 | 1,245,186,349 | 1,251,412,281 | 1,257,669,342 | 1,263,957,689 | 1,270,277,477 | 1,276,628,865 | 1,283,012,009 |
| SMALL COMMERCIAL (A-1) | 163,302,073 | 326,609,557 | 326,614,968 | 328,248,043 | 329,889,283 | 331,538,730 | 333,196,424 | 334,862,406 | 336,536,718 | 338,219,401 |
| SMALL COMMERCIAL (A-6) | 36,025,089 | 72,051,506 | 72,052,834 | 72,413,098 | 72,775,164 | 73,139,039 | 73,504,735 | 73,872,258 | 74,241,620 | 74,612,828 |
| MEDIUM COMMERCIAL (A-10) | 260,685,684 | 521,379,715 | 521,388,062 | 523,995,002 | 526,614,977 | 529,248,052 | 531,894,292 | 534,553,764 | 537,226,533 | 539,912,665 |
| LARGE COMMERCIAL (E-19) | 396,641,238 | 793,295,726 | 793,308,975 | 797,275,519 | 801,261,897 | 805,268,207 | 809,294,548 | 813,341,020 | 817,407,725 | 821,494,764 |
| INDUSTRIAL (E-20) | 160,824,374 | 321,653,919 | 321,659,091 | 323,267,386 | 324,883,723 | 326,508,142 | 328,140,683 | 329,781,386 | 331,430,293 | 333,087,445 |
| STREET LIGHTING AND TRAFFIC CONTROL (LS-3) | 10,221,691 | 20,443,736 | 20,444,090 | 20,546,311 | 20,649,042 | 20,752,288 | 20,856,049 | 20,960,329 | 21,065,131 | 21,170,457 |
| AGRICULTURAL (AG-1B, AG-4A, AG-4B, AG-5A, AG-5B, AG-5C) | 10,665,003 | 21,330,429 | 21,330,852 | 21,437,506 | 21,544,694 | 21,652,417 | 21,760,679 | 21,869,483 | 21,978,830 | 22,088,724 |
| SUBTOTAL - LOAD REQUIREMENTS | 1,657,835,979 | 3,315,731,111 | 3,315,790,265 | 3,332,369,216 | 3,349,031,062 | 3,365,776,217 | 3,382,605,098 | 3,399,518,124 | 3,416,515,714 | 3,433,598,293 |
| III. CCA OPERATING COSTS ($) | | | | | | | | | | |
| SHORT TERM MARKET PURCHASES | $5,484,255 | $10,740,437 | $9,997,917 | $9,920,684 | $10,057,485 | $10,258,693 | $10,468,437 | $10,659,214 | $10,485,292 | $10,558,285 |
| TERM CONTRACT PURCHASES | $13,820,323 | $59,565,501 | $75,292,315 | $104,240,553 | $105,356,913 | $106,640,147 | $106,991,504 | $107,297,295 | $124,293,855 | $124,131,155 |
| SHORT TERM RENEWABLE MARKET PURCHASES AND RECS | $50,723,588 | $80,389,117 | $65,645,113 | $46,132,244 | $53,831,801 | $62,555,187 | $72,833,119 | $84,035,886 | $76,947,164 | $88,633,621 |
| SHORT TERM CARBON FREE MARKET PURCHASES | $17,514,733 | $40,463,296 | $45,941,285 | $52,275,251 | $52,383,020 | $52,595,382 | $52,571,514 | $52,173,130 | $50,500,177 | $48,918,593 |
| ANCILLARY SERVICES AND CAISO CHARGES | $5,023,326 | $10,384,953 | $10,707,528 | $11,126,782 | $11,553,418 | $12,008,301 | $12,483,099 | $12,974,910 | $13,447,977 | $13,956,940 |
| RESOURCE ADEQUACY CAPACITY | $8,333,154 | $15,125,285 | $13,325,313 | $13,004,024 | $13,384,817 | $13,780,229 | $14,354,007 | $14,952,071 | $14,990,346 | $15,629,044 |
| STAFF AND OTHER OPERATIONS COSTS | $6,224,813 | $8,108,680 | $8,270,918 | $8,454,641 | $8,642,498 | $8,834,583 | $9,030,992 | $9,231,824 | $9,437,181 | $9,647,164 |
| BILLING AND DATA MANAGEMENT | $2,977,618 | $6,133,894 | $6,317,911 | $6,539,985 | $6,769,866 | $7,007,827 | $7,254,152 | $7,509,135 | $7,773,081 | $8,046,305 |
| UNCOLLECTIBLES EXPENSE | $575,183 | $1,179,230 | $1,202,166 | $1,283,145 | $1,334,573 | $1,368,402 | $1,429,934 | $1,494,167 | $1,539,375 | $1,597,606 |
| STARTUP FINANCING | $4,934,813 | $4,934,813 | $4,934,813 | $4,934,813 | $4,934,813 | $0 | $0 | $0 | $0 | $0 |
| CCA BOND CARRYING COST | $4,498 | $9,266 | $9,544 | $9,879 | $10,227 | $10,586 | $10,958 | $11,343 | $11,742 | $12,155 |
| SUBTOTAL - CCA OPERATING COSTS | $115,616,305 | $237,034,472 | $241,644,823 | $257,922,002 | $268,259,430 | $275,059,336 | $287,427,716 | $300,338,976 | $309,426,191 | $321,130,868 |
| IV. REVENUES FROM GREEN PREMIUM AND MARKET SALES ($) | | | | | | | | | | |
| GREEN PRICING PREMIUM | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| MARKET SALES | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,562 | $151,273 | $206,852 |
| V. CONTRIBUTION TO PROGRAM RESERVES ($) | $3,468,489 | $7,111,034 | $7,249,345 | $7,737,660 | $8,047,783 | $8,251,780 | $8,622,831 | $9,010,032 | $9,278,248 | $9,627,720 |
| VI. CCA REVENUE REQUIREMENT ($) | $119,084,794 | $244,145,506 | $248,894,168 | $265,659,662 | $276,307,213 | $283,311,116 | $296,050,547 | $309,344,446 | $318,553,166 | $330,551,736 |
| CCA PROGRAM AVERAGE RATE (CENTS/KWH) | 7.2 | 7.4 | 7.5 | 8.0 | 8.3 | 8.4 | 8.8 | 9.1 | 9.3 | 9.6 |
| PG&E AVERAGE GENERATION COST (CENTS/KWH) | 9.7 | 9.8 | 10.2 | 10.6 | 10.8 | 11.0 | 11.4 | 11.7 | 12.0 | 12.4 |
| VII. PG&E CCA CUSTOMER SURCHARGES ($) | | | | | | | | | | |
| POWER CHARGE INDIFFERENCE ADJUSTMENT | $25,915,755 | $51,553,829 | $57,388,579 | $59,734,338 | $68,565,139 | $71,009,591 | $73,095,756 | $72,606,186 | $75,773,871 | $75,292,787 |
| FRANCHISE FEE SURCHARGE | $1,200,075 | $2,433,427 | $2,518,727 | $2,627,661 | $2,713,295 | $2,773,731 | $2,884,199 | $2,971,981 | $3,073,169 | $3,173,136 |
| SUBTOTAL - PG&E CCA CUSTOMER SURCHARGES | $ 27,115,829 | $ 53,987,255 | $ 59,907,306 | $ 62,361,999 | $ 71,278,434 | $ 73,783,321 | $ 75,979,955 | $ 75,578,166 | $ 78,847,040 | $ 78,465,922 |
| VIII. CCA REVENUE REQUIREMENT PLUS PG&E CCA CUSTOMER SURCHARGES | $146,200,624 | $298,132,761 | $308,801,474 | $328,021,661 | $347,585,647 | $357,094,437 | $372,030,502 | $384,922,613 | $397,400,206 | $409,017,659 |
| IX. REVENUE AT PG&E GENERATION RATES | $160,662,350 | $325,779,825 | $337,199,584 | $351,783,272 | $363,247,732 | $371,338,653 | $386,127,844 | $397,879,787 | $411,426,593 | $424,809,838 |
| **X. TOTAL CHANGE IN CUSTOMER ELECTRIC CHARGES** | **$ (14,461,726)** | **$ (27,647,064)** | **$ (28,398,110)** | **$ (23,761,610)** | **$ (15,662,085)** | **$ (14,244,216)** | **$ (14,097,342)** | **$ (12,957,174)** | **$ (14,026,387)** | **$ (15,792,180)** |
| **CHANGE IN CUSTOMER ELECTRIC CHARGES (%)** | **-4%** | **-4%** | **-4%** | **-3%** | **-2%** | **-2%** | **-2%** | **-2%** | **-2%** | **-2%** |

PENINSULA CLEAN ENERGY
FINANCIAL PRO FORMA ANALYSIS
COMMUNITY CHOICE AGGREGATION
SCENARIO 3

| CATEGORY | YEAR 1 | YEAR 2 | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | YEAR 7 | YEAR 8 | YEAR 9 | YEAR 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| I, CUSTOMER ACCOUNTS: | | | | | | | | | | |
| RESIDENTIAL (E-1) | 100,898 | 199,778 | 197,780 | 196,781 | 195,787 | 194,799 | 193,815 | 192,836 | 191,862 | 190,894 |
| SMALL COMMERCIAL (A-1) | 8,012 | 15,863 | 15,704 | 15,625 | 15,546 | 15,467 | 15,389 | 15,312 | 15,234 | 15,157 |
| SMALL COMMERCIAL (A-6) | 641 | 1,268 | 1,256 | 1,249 | 1,243 | 1,237 | 1,230 | 1,224 | 1,218 | 1,212 |
| MEDIUM COMMERCIAL (A-10) | 666 | 1,319 | 1,306 | 1,299 | 1,293 | 1,286 | 1,280 | 1,273 | 1,267 | 1,261 |
| LARGE COMMERCIAL (E-19) | 333 | 660 | 653 | 650 | 647 | 643 | 640 | 637 | 634 | 630 |
| INDUSTRIAL (E-20) | 11 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 20 | 20 |
| STREET LIGHTING AND TRAFFIC CONTROL (LS-3) | 358 | 709 | 702 | 698 | 695 | 691 | 688 | 684 | 681 | 677 |
| AGRICULTURAL (AG-1B, AG-4A, AG-4B, AG-5A, AG-5B, AG-5C) | 69 | 136 | 135 | 134 | 133 | 133 | 132 | 131 | 131 | 130 |
| SUBTOTAL - CUSTOMER ACCOUNTS | 110,987 | 219,754 | 217,556 | 216,458 | 215,365 | 214,277 | 213,195 | 212,118 | 211,047 | 209,981 |
| II. LOAD REQUIREMENTS (KWH): | | | | | | | | | | |
| RESIDENTIAL (E-1) | 546,588,981 | 1,082,270,553 | 1,071,472,468 | 1,066,061,532 | 1,060,677,921 | 1,055,321,498 | 1,049,992,124 | 1,044,689,664 | 1,039,413,981 | 1,034,164,940 |
| SMALL COMMERCIAL (A-1) | 144,089,427 | 285,302,370 | 282,454,703 | 281,028,307 | 279,609,114 | 278,197,088 | 276,792,193 | 275,394,392 | 274,003,651 | 272,619,932 |
| SMALL COMMERCIAL (A-6) | 31,786,687 | 62,938,942 | 62,310,867 | 61,996,197 | 61,683,116 | 61,371,617 | 61,061,690 | 60,753,328 | 60,446,524 | 60,141,269 |
| MEDIUM COMMERCIAL (A-10) | 153,341,083 | 303,623,525 | 300,595,553 | 299,077,545 | 297,567,204 | 296,064,489 | 294,569,363 | 293,081,788 | 291,601,725 | 290,129,136 |
| LARGE COMMERCIAL (E-19) | 233,312,920 | 461,972,566 | 457,365,956 | 455,056,258 | 452,758,224 | 450,471,795 | 448,196,913 | 445,933,518 | 443,681,554 | 441,440,962 |
| INDUSTRIAL (E-20) | 94,600,443 | 187,313,946 | 185,445,927 | 184,509,425 | 183,577,652 | 182,650,585 | 181,728,199 | 180,810,472 | 179,897,379 | 178,988,897 |
| STREET LIGHTING AND TRAFFIC CONTROL (LS-3) | 6,012,613 | 11,905,322 | 11,786,619 | 11,727,097 | 11,667,875 | 11,608,952 | 11,550,327 | 11,491,998 | 11,433,963 | 11,376,222 |
| AGRICULTURAL (AG-1B, AG-4A, AG-4B, AG-5A, AG-5B, AG-5C) | 6,273,357 | 12,421,661 | 12,297,864 | 12,235,759 | 12,173,969 | 12,112,490 | 12,051,322 | 11,990,463 | 11,929,911 | 11,869,665 |
| SUBTOTAL - LOAD REQUIREMENTS | 1,216,005,512 | 2,407,748,884 | 2,383,729,957 | 2,371,692,121 | 2,359,715,075 | 2,347,798,514 | 2,335,942,132 | 2,324,145,624 | 2,312,408,689 | 2,300,731,025 |
| III. CCA OPERATING COSTS ($) | | | | | | | | | | |
| SHORT TERM MARKET PURCHASES | $2,385,719 | $4,926,973 | $4,023,550 | $5,433,830 | $5,725,297 | $6,078,150 | $6,424,208 | $6,778,524 | $8,689,459 | $9,043,848 |
| TERM CONTRACT PURCHASES | $0 | $32,499,600 | $50,097,564 | $79,240,428 | $80,012,052 | $80,788,240 | $80,611,042 | $80,436,075 | $97,870,918 | $97,524,276 |
| SHORT TERM RENEWABLE MARKET PURCHASES AND RECS | $74,410,453 | $128,589,039 | $115,897,016 | $96,062,612 | $99,237,287 | $103,007,382 | $107,765,197 | $112,620,822 | $94,053,514 | $97,605,172 |
| SHORT TERM CARBON FREE MARKET PURCHASES | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ANCILLARY SERVICES AND CAISO CHARGES | $3,684,672 | $7,541,370 | $7,697,915 | $7,919,341 | $8,140,769 | $8,376,683 | $8,620,819 | $8,870,866 | $9,102,359 | $9,352,391 |
| RESOURCE ADEQUACY CAPACITY | $6,241,143 | $10,683,118 | $8,614,069 | $7,987,352 | $8,047,796 | $8,107,225 | $8,328,632 | $8,557,143 | $8,207,844 | $8,440,055 |
| STAFF AND OTHER OPERATIONS COSTS | $5,765,132 | $7,145,122 | $7,262,026 | $7,393,976 | $7,528,367 | $7,665,246 | $7,804,659 | $7,946,655 | $8,091,281 | $8,238,586 |
| BILLING AND DATA MANAGEMENT | $2,610,411 | $5,323,673 | $5,428,549 | $5,563,169 | $5,701,127 | $5,842,507 | $5,987,392 | $6,135,870 | $6,288,031 | $6,443,965 |
| UNCOLLECTIBLES EXPENSE | $500,162 | $1,008,219 | $1,019,778 | $1,072,678 | $1,096,638 | $1,099,327 | $1,127,710 | $1,156,730 | $1,161,517 | $1,183,241 |
| STARTUP FINANCING | $4,934,813 | $4,934,813 | $4,934,813 | $4,934,813 | $4,934,813 | $0 | $0 | $0 | $0 | $0 |
| CCA BOND CARRYING COST | $3,943 | $8,042 | $8,200 | $8,404 | $8,612 | $8,826 | $9,045 | $9,269 | $9,499 | $9,734 |
| SUBTOTAL - CCA OPERATING COSTS | $100,536,449 | $202,659,969 | $204,983,481 | $215,616,603 | $220,432,758 | $220,973,585 | $226,678,704 | $232,511,954 | $233,474,421 | $237,841,269 |
| IV. REVENUES FROM GREEN PREMIUM AND MARKET SALES ($) | | | | | | | | | | |
| GREEN PRICING PREMIUM | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| MARKET SALES | $1,472,215 | $3,039,958 | $2,678,323 | $3,461,136 | $3,664,151 | $3,909,273 | $4,127,826 | $4,351,267 | $6,374,506 | $6,625,092 |
| V. CONTRIBUTION TO PROGRAM RESERVES ($) | $2,971,927 | $5,988,600 | $6,069,155 | $6,364,664 | $6,503,058 | $6,511,929 | $6,676,526 | $6,844,821 | $6,812,997 | $6,936,485 |
| VI. CCA REVENUE REQUIREMENT ($) | $102,036,160 | $205,608,611 | $208,374,313 | $218,520,131 | $223,271,665 | $223,576,241 | $229,227,405 | $235,005,508 | $233,912,913 | $238,152,662 |
| CCA PROGRAM AVERAGE RATE (CENTS/KWH) | 8.4 | 8.5 | 8.7 | 9.2 | 9.5 | 9.5 | 9.8 | 10.1 | 10.1 | 10.4 |
| PG&E AVERAGE GENERATION COST (CENTS/KWH) | 9.7 | 9.8 | 10.2 | 10.6 | 10.8 | 11.0 | 11.4 | 11.7 | 12.0 | 12.4 |
| VII. PG&E CCA CUSTOMER SURCHARGES ($) | | | | | | | | | | |
| POWER CHARGE INDIFFERENCE ADJUSTMENT | $19,557,655 | $38,516,914 | $42,447,673 | $43,740,896 | $49,705,239 | $50,962,534 | $51,935,146 | $51,071,430 | $52,766,594 | $51,907,266 |
| FRANCHISE FEE SURCHARGE | $878,739 | $1,764,038 | $1,807,627 | $1,866,948 | $1,908,513 | $1,931,513 | $1,988,354 | $2,028,382 | $2,076,469 | $2,122,574 |
| SUBTOTAL - PG&E CCA CUSTOMER SURCHARGES | $ 20,436,394 | $ 40,280,952 | $ 44,255,301 | $ 45,607,844 | $ 51,613,753 | $ 52,894,047 | $ 53,923,501 | $ 53,099,812 | $ 54,843,063 | $ 54,029,840 |
| VIII. CCA REVENUE REQUIREMENT PLUS PG&E CCA CUSTOMER SURCHARGES | $122,472,554 | $245,889,563 | $252,629,613 | $264,127,975 | $274,885,418 | $276,470,288 | $283,150,905 | $288,105,320 | $288,755,975 | $292,182,502 |
| IX. REVENUE AT PG&E GENERATION RATES | $117,856,580 | $236,592,953 | $242,439,155 | $250,395,263 | $255,969,977 | $259,054,698 | $266,678,270 | $272,046,774 | $278,496,189 | $284,679,804 |
| **X. TOTAL CHANGE IN CUSTOMER ELECTRIC CHARGES** | **$ 4,615,974** | **$ 9,296,610** | **$ 10,190,459** | **$ 13,732,712** | **$ 18,915,440** | **$ 17,415,590** | **$ 16,472,635** | **$ 16,058,546** | **$ 10,259,786** | **$ 7,502,697** |
| **CHANGE IN CUSTOMER ELECTRIC CHARGES (%)** | **2%** | **2%** | **2%** | **3%** | **3%** | **3%** | **3%** | **3%** | **2%** | **1%** |

ATTACHMENT D

Public Works

STAFF REPORT

**Environmental Quality Commission**
**Meeting Date:** **8/26/2015**
**Staff Report Number:** **15-001-EQC**

**Regular Business:** **Presentation Slides from San Mateo County's Peninsula Clean Energy**

## Recommendation

No recommendation is being requested at this time.

## Policy Issues

The EQC is exploring possible options for Community Choice Energy.

## Background

At its June 2015 meeting, the EQC requested a presentation from San Mateo County on its Community Choice Energy (CCE) project. Attached are the slides which Jim Eggemeyer, San Mateo County Director of Sustainability, plans to present on August 26, 2015.

Please note that CCE is also sometimes called Community Choice Aggregation (CCA).

Below is a history of the EQC's previous exploration of CCE.

- **January, 28, 2015**: Receive Informational Presentation from Michael Clossen on Community Choice Aggregation (CCA): http://menlopark.org/AgendaCenter/ViewFile/Agenda/04222015-2549

- **April 22, 2015**: Informational Presentation from Diane Bailey, Executive Director of Menlo Spark, on the California Clean Power Community Choice Aggregation (CCA): http://menlopark.org/AgendaCenter/ViewFile/Agenda/01282015-2503

  Please note that attachments to item B4 for the April 22, 2015 EQC meeting were provided by the presenter. The presentation was abbreviated due to time constraints; therefore the presenter was invited back to the following meeting: http://www.menlopark.org/DocumentCenter/View/7018

- **May 27, 2015**: Informational Presentation from Diane Bailey, Executive Director of Menlo Spark on the California Clean Power Community Choice Aggregation (CCA): http://menlopark.org/AgendaCenter/ViewFile/Agenda/05272015-2568

  Please note that attachments to item B3 for the May 27, 2015 EQC meeting were provided by the presenter: http://menlopark.org/AgendaCenter/ViewFile/Agenda/05272015-2568

Following the presentation, the EQC's Climate Action Plan (CAP) subcommittee agreed to review the issue further, and the CAP subcommittee returned to the following meeting with a brief discussion.

- **June 24, 2015**: Receive Update from CAP Subcommittee on California Clean Power and Potentially Make a Recommendation to City Council: http://menlopark.org/AgendaCenter/ViewFile/Agenda/06242015-2581

- **August 26, 2015**:

  Discuss and Adopt Criteria for Evaluation of Community Choice Energy (CCE) Options

  Informational Presentation on Peninsula Clean Energy by Jim Eggemeyer, Director of Sustainability, County of San Mateo

## Analysis

The purpose of the attached presentation is informational and the slides were prepared by the County of San Mateo Sustainability Department.

## Impact on City Resources

No current impact to City resources and staff will be working to assess possible future impacts.

## Environmental Review

An Environmental Review is not required at this time.

## Public Notice

Public Notification was achieved by posting the agenda, with the agenda items being listed, at least 72 hours prior to the meeting.

## Attachments

A. San Mateo County Slides

Report prepared by:
Heather Abrams, Environmental Services Manager

# Peninsula Clean Energy

Jim Eggemeyer
County of San Mateo
Office of Sustainability

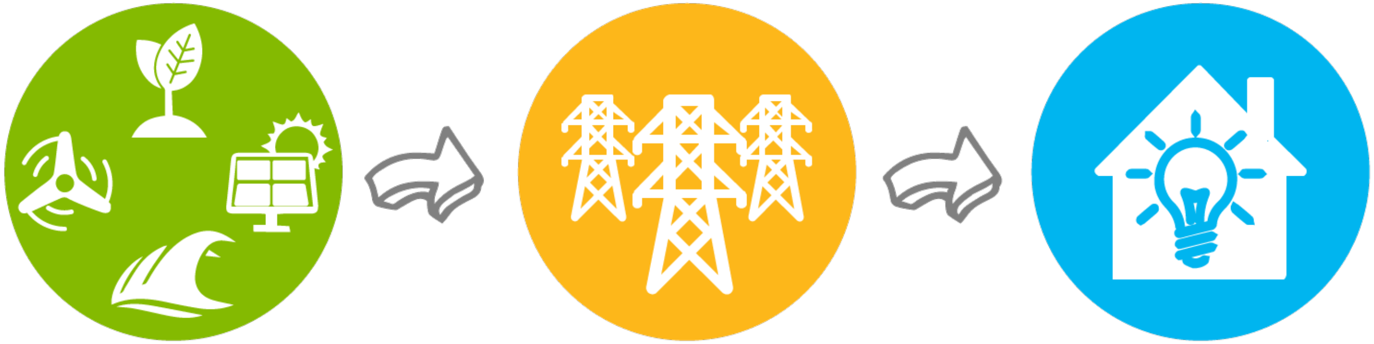
Presented to: Menlo Park Environmental Quality Commission

Wednesday, August 26, 2015

# Community Choice Energy

***CCE leverages the market power of group purchasing and local control.***

CCE allows communities to pool their electricity demand in order to purchase and potentially develop power on behalf of local residents, businesses, and municipal facilities.



Peninsula Clean Energy purchases electricity from renewable energy sources.

Utility companies deliver energy, maintain lines and bill customers.

Customers benefit from affordable rates, local control, and clean energy!

# Basic Program Features

- JPA or special district can operate a CCE in CA; local governments participate by passing an ordinance
  - No expenses for joining JPA in first round; JPA members have no financial liability if CCE fails

- Utility (PG&E) continues to provide consolidated billing, customer service, line maintenance

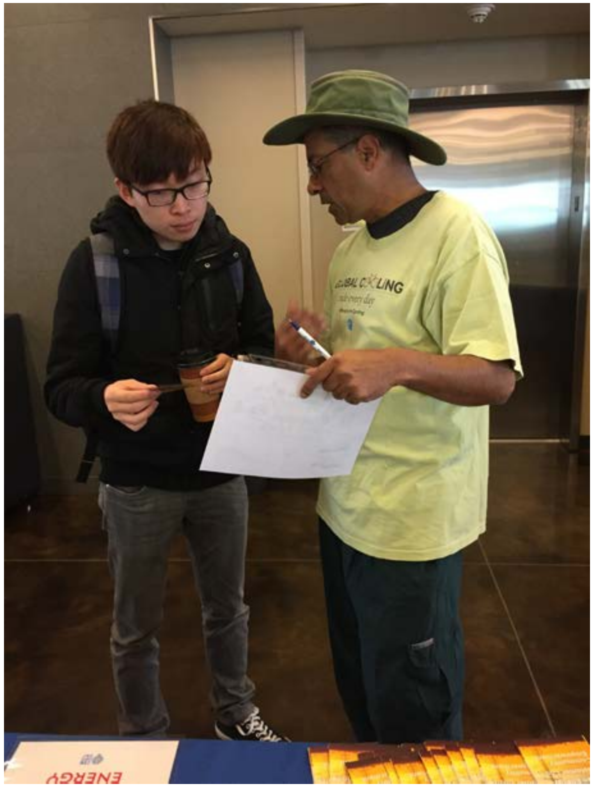
- CCE electric generation charges appear as a new section of customer bill; all other charges are the same

- In accordance with State law, CCE is an opt-out program; Customers receive *minimum* 4 opt-out notices over 120 days and *can return to PG&E service any time*.

- CPUC certifies CCE Plan; oversees utility/ CCE relationship and other requirements.

# Frequently Asked Questions

- Will my electricity service be altered? Will I be treated differently if I have an issue with my power supply and I am a CCE customer?
- I have solar panels on my house, how will this program affect me?
- What about programs for low-income individuals?
- Will I still have access to PG&E’s energy efficiency programs?
- Why is CCE an “opt-out” program? Why do people choose to opt out?



# Goals of a Countywide CCE Program

1. **Lower greenhouse gas intensity than PG&E**
2. Lower electricity rates
3. Priority on local power development, local energy programs and minimal/no use of unbundled RECs
4. Quantifiable and equitable economic development benefits; local jobs, local business partnerships, low-income communities
5. Different energy options, customer choice
6. Stimulate growth of new renewable power development
7. Promote energy conservation and demand reduction
8. Foster community resilience; local ownership of energy resources
9. Well managed, fiscally sound, publicly transparent organization
10. Foster inter-jurisdictional cooperation, consumer benefit and local business opportunity

# Overview of PCE Formation Timeline

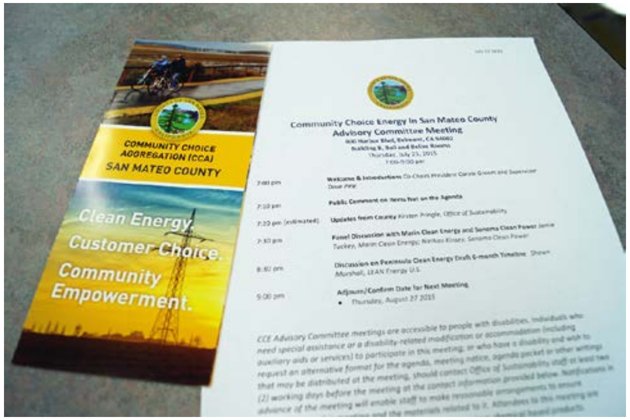
*San Mateo County could launch a CCA by Q3 2016.*

Phase 1 → Phase 2 → Phase 3 → ★

| January -September 2015 | Sept. 2015 - April 2016 | May – September 2016 |
|---|---|---|
| **Pre-Planning & Due Diligence** | **Community Outreach; CCA Planning & Development** | **Preparing for Launch** |
| • Internal planning team<br>• Initial outreach to cities and key stakeholders<br>• Workshops & education<br>• CCE technical study<br>• Formation of CCE advisory committee | • CCE Program design, JPA formation<br>• Public outreach<br>• Local ordinances<br>• Implementation Plan<br>• RFP for Energy Services<br>• JPA staffing/working capital | • Energy supply and other service contracts<br>• Utility Service Agreement<br>• Regulatory registrations<br>• Call Center & Customer Enrollment |

# Accomplishments Thus Far

- ✓ Focused outreach to all 20 cities; unanimous participation in Countywide Technical Study
- ✓ Formed internal staff + consultant team to manage process
- ✓ Unanimous Board agreement to fund CCA program development
- ✓ Robust community engagement: Stakeholder database, e-notifications, website, educational workshops and community events
- ✓ Monthly Advisory Committee meetings
- ✓ Technical Study underway in July
- ✓ Return to BOS in early September for study results and Phase II funding



# Key Dates Thru End January 2016

| Date | Group | Topic(s) |
|---|---|---|
| **August 27** | Advisory Committee Mtg. | JPA structural/governance issues |
| **September 1** | Tech Study Complete | |
| **September 24** | Advisory Committee Mtg. | Tech study results and recommendations; Draft JPA and CCE ordinances |
| **October 6** | County BOS Study Session | Tech study results; updated project/JPA plan; que-up ordinances |
| **October 7** | Community Workshops (2) | Burlingame and Redwood City |
| **October 20** | County BOS Approvals | Phase II funding; CCE and JPA Ordinances |
| **October 22** | Advisory Committee Mtg. | Update on BOS actions; Phase III workplan; dates/materials for cities |
| **November 19** | Advisory Committee Mtg. | RFP for marketing and other vendor svcs; other topics TBD. |
| **Nov 2015- February 29, 2016** | City Study Sessions & Council Mtgs. | Program and JPA Plans; Feedback and local ordinance adoption |

# 7-Month Goals (August-February)

1. **Complete Technical Study**
    a) Projected Operating Results
    b) Recommended Power Supply Portfolio
    c) Retail Product Options
    d) Quantitative Elements for RFP (load, demand, product specs)
2. **Prep Ordinances and JPA Plan**

    Package of materials: Results of Tech study and power product plan/initial pricing; CCE ordinance; JPA ordinance and operating agreement; Communications and PCE Agency devt. plan
3. **County: Phase II Funding Approval, County Ordinances (JPA/CCE)**
4. **Cities: Study Sessions, JPA Feedback, Local Ordinance Adoption**
5. **Community: Continue to build local awareness among key stakeholder groups and public**
6. **Prep for Phase III Implementation → Launch**

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ATTACHMENT E

To: City Council

Fr: EQC

Date: September 30, 2015

Re: 2015-16 CAP Strategy Recommendations

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We want to congratulate the City Council and city staff for continuing to make climate change an important priority for your work on behalf of our community. As you know, meeting your goal for emission reductions by 2020 must focus on emissions from transportation and from buildings. Your recent actions to install solar on many city buildings and to encourage no emissions transportation with bike lanes along El Camino Real are just two examples of city leadership that we endorse and applaud. Similarly, we want to recognize your leadership in hiring and devoting important city staff time to climate related goals. The EQC has been impressed by the knowledge and diligence of staff in working with us on these issues.

The recent report to the city on its emissions trajectory from staff is an example of the vital role city staff has been playing and it shows that the city's efforts on its own energy use are to be applauded. At that same time, it is also important to note that community-wide, at our current pace we will not meet the 2020 goals that you endorsed.

Fortunately, as a city council you have two vital opportunities coming up in the next few months to accelerate our community-wide emissions reductions to a level where we can meet our emissions goals. These are in the areas of electricity use (please see the Clean Power section below) and in building regulations regarding energy efficiency combined with development guidance that encourages low- or no-emission transportation (please see the M2 & General Plan section below).

The current budget allocates city funds to investigate strategies to achieve our greenhouse gas emission reduction goals. We recommend that you focus on two options, which we believe represent the most promising opportunities, i.e., the "biggest bang for the buck," by dedicating staff and/or consultant resources to provide you with critical information to make informed and responsible decisions. The two opportunities include the following:

**Clean Power**

We want to laud you for participating in the efforts by the San Mateo joint powers authority Community Choice Aggregate (JPA CCA) to provide renewable energy to Menlo Park residents and businesses as clean energy is a critical component of reducing our greenhouse gas emissions. Analysis shows that achieving our 2020 emission reduction goal will be attainable only if Menlo Park adopts 100 percent clean power, which the city may be able to implement with near parity to current energy costs.

Given how important this 100 percent clean energy target is for meeting our 2020 goals, we recommend that Menlo Park continue to participate in the San Mateo JPA CCA program and to urge adoption of 100 percent as the goal.

In addition, we encourage the city to explore simultaneously other sources for 100 percent clean energy (with our current provider, PG&E, or through an independent provider), in the event that the JPA CCA would choose an energy mix less than 100 percent clean power. With this advance preparation, Menlo Park would increases the likelihood that Menlo Park will be able to adopt the necessary 100 percent clean power while meeting other critical criteria related to costs and reliability. [Please refer to the EQC letter to Council on DATE that outlined a set of recommended criteria for assessing alternate power provider programs that can aid in your research (see Attachment A).] Without dedicating time and resources to exploring the full range of options, Menlo Park will not be fully informed when the San Mateo JPPA CCA announces its decision in February 2016, so immediate action is needed.

**M2 & General Plan**

The Menlo Park General Plan Update, with emphasis on the M2 district – is nearing final recommendations to the city council. EQC members have fully participated in that effort and we want to congratulate you on the thoughtfulness and community engagement. We recommend that the Council take advantage of this rare opportunity to include critical elements that will maximally reduce emissions from buildings and transportation, which will feed into the city's 2020 targets and beyond. Over the lifetime of the General Plan, strategies to reduce emissions would build a healthier community, contribute to the broader climate change reductions adopted by CA State, and provide financial benefits for residents and commuters.

Therefore, we urge you as members of the City Council to devote city resources to fully identify, research and vet these additions to the M2 recommendations so that you can be comfortable voting for their adoption when the final plan comes before City Council. [We include as Attachment B the previous recommendations sent to City Council regarding the M2 and General Plan for your reference.]

**Conclusion**

You wisely set aside funds in the city operating budget this year to address high priority opportunities to help meet our city's climate change target. We urge you to deploy those resources and your time to develop options in Clean Power along with carbon reduction recommendations for the General Plan so that Menlo Park can meet our greenhouse gas emission target of 27% below baseline levels by 2020. While our emission target is bold, the efforts are critical to help catalyze appropriate development, attract vibrant businesses, and maintain the character and quality of life in our community.

You have shown encouraging leadership on climate so far, and now is the time to take the next step on behalf of our entire community. We stand ready to work with you at EQC and know there are many residents, businesses and community groups eager to do the same.

Thank you for your time and consideration.

ATTACHMENT F

# COMMUNITY CHOICE AGGREGATION: TECHNICAL STUDY RESULTS

Peninsula Clean Energy

September 24, 2015

PEA
Pacific Energy Advisors, Inc.

# Table of Contents



PEA
Pacific Energy Advisors, Inc.

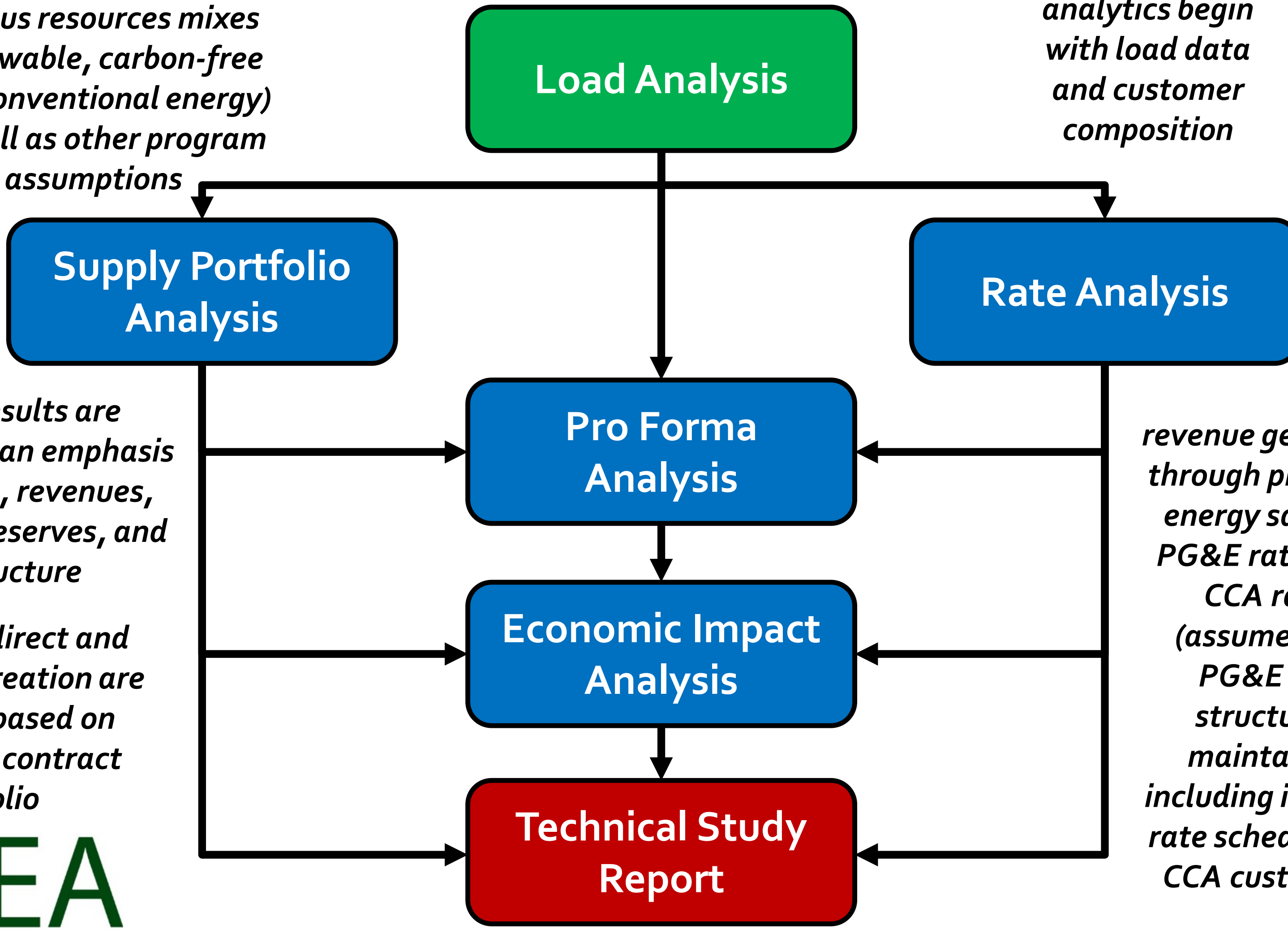
# Technical Study Methodology

Pacific Energy Advisors, Inc.

# Technical Study Methodology

*scenarios addressing various resources mixes (renewable, carbon-free and conventional energy) as well as other program assumptions*

*analytics begin with load data and customer composition*




*financial results are projected with an emphasis on cash flows, revenues, power costs, reserves, and debt structure*

*impacts on direct and indirect job creation are estimated based on anticipated contract portfolio*

*revenue generated through projected energy sales (at PG&E rates) and CCA rates (assumes that PG&E rate structure is maintained, including identical rate schedules for CCA customers)*

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# Load Study Results

Pacific Energy Advisors, Inc.

# PCE Load Composition

**Peninsula Clean Energy: Electric Energy Overview**

| Current Service Provider | Customer Accounts | Customer Accounts (% of Total) | Energy Use (MWh) | Energy Use (% of Total) |
|---|---|---|---|---|
| **PG&E ("Bundled" electric accounts)** | 297,881 | 99.8% | 3,900,930 | 90.3% |
| **Direct Access electric accounts** | 554 | 0.2% | 417,485 | 9.7% |
| **Total – CCE Study Partners** | **298,435** | **100.0%** | **4,318,415** | **100.0%** |

**Bundled Energy Use by Customer Classification**

| Customer Classification | Customer Accounts | Customer Accounts (% of Total) | Energy Use (MWh) | Share of Energy Use (%) |
|---|---|---|---|---|
| **Residential** | 269,061 | 90% | 1,457,637 | 37% |
| **Small Commercial** | 23,072 | 8% | 469,021 | 12% |
| **Medium Commercial** | 2,665 | 1% | 613,398 | 16% |
| **Large Commercial** | 1,333 | <1% | 933,305 | 24% |
| **Industrial** | 43 | <1% | 378,422 | 10% |
| **Ag and Pumping** | 275 | <1% | 25,095 | 1% |
| **Street Lighting** | 1,432 | <1% | 24,052 | 1% |
| **TOTAL** | **297,881** | **100.0%** | **3,900,930** | **100%** |
| | | | | |
| **Peak Demand (MW)** | 682 | | | |

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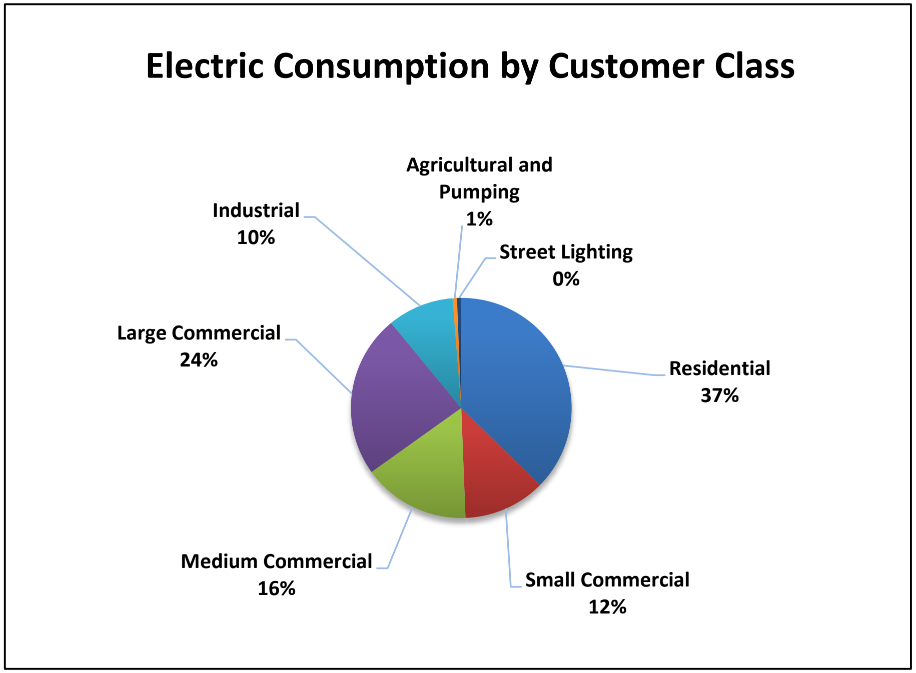
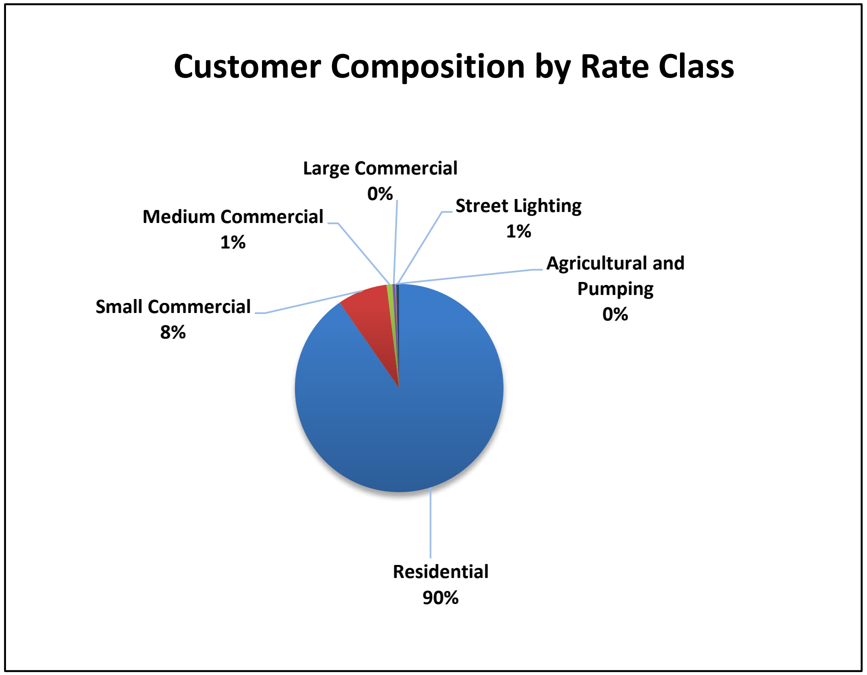
# Electricity Use by Customer Class

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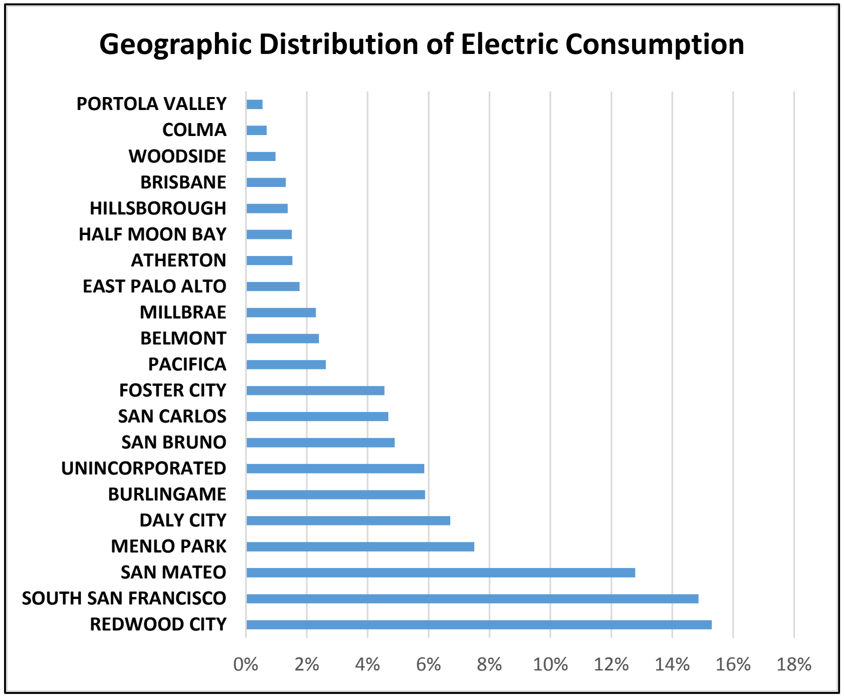
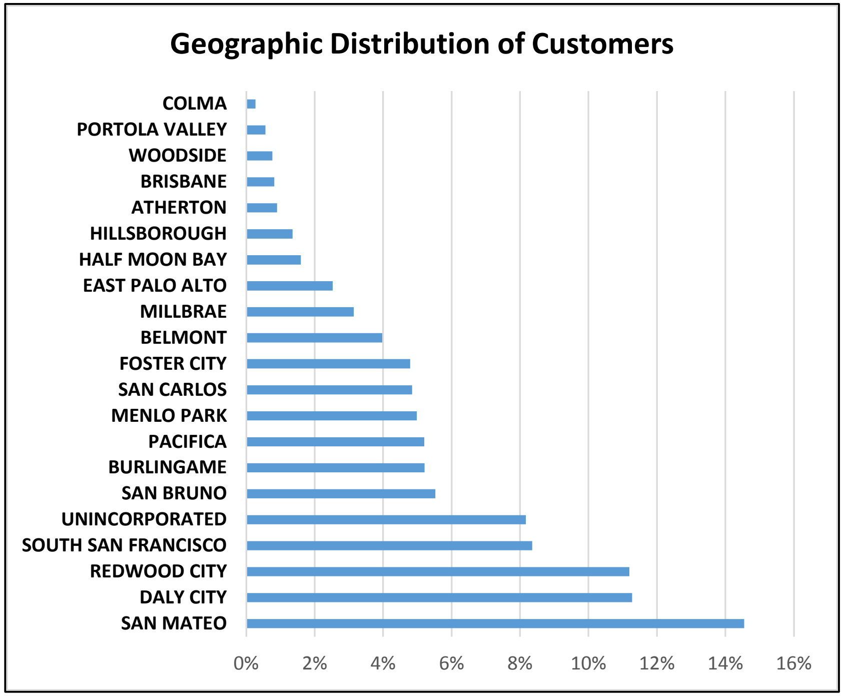
# Load Composition by Jurisdiction

*Top five cities account for almost 60% of total PCE electric consumption and 55% of total PCE customer accounts*

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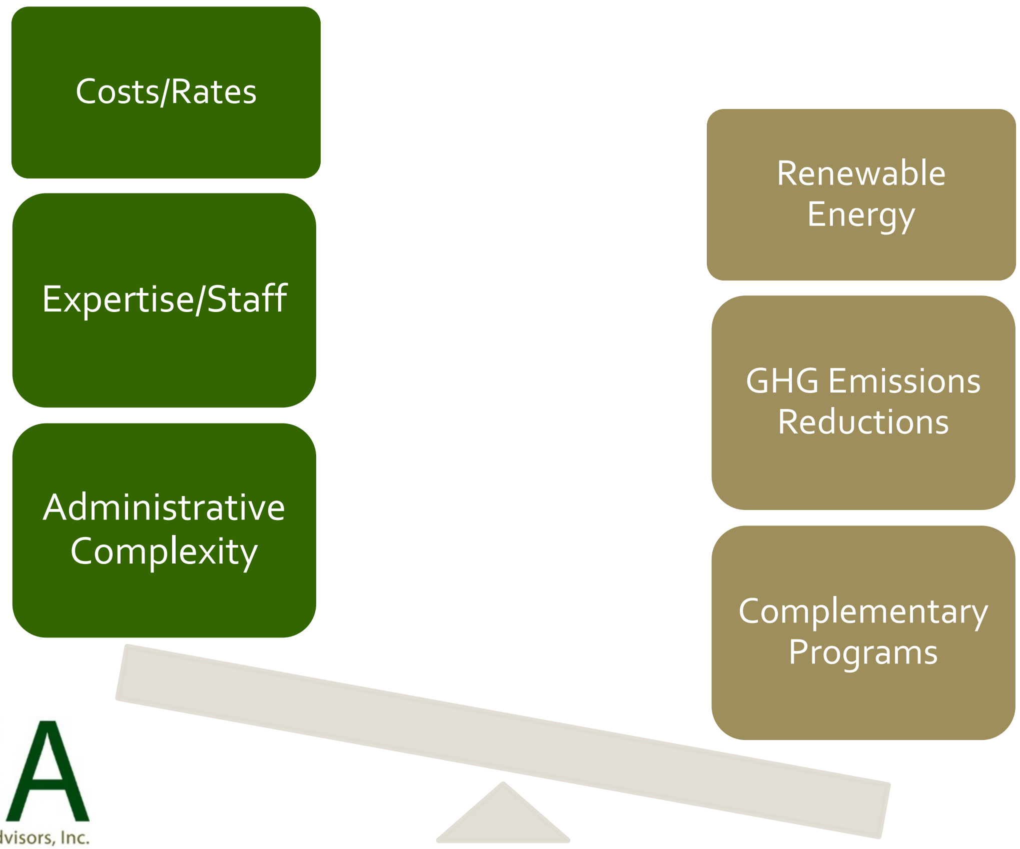
# Supply Portfolio Scenarios: Overview and Summary of Results

Pacific Energy Advisors, Inc.

# Identification of Planning Priorities

- Tradeoffs are inherent in CCA program development
- Generally, “program enhancements” will increase costs/rates, etc.

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# Current Electric Resource Mix: 2014

| Energy Resources | 2014 PG&E Power Mix[1] | 2014 California Power Mix[2] |
|---|---|---|
| Eligible Renewable | **27%** | **20%** |
| --Biomass & Waste | 5% | 3% |
| --Geothermal | 5% | 4% |
| --Small Hydroelectric | 1% | 1% |
| --Solar | 9% | 4% |
| --Wind | 7% | 8% |
| Coal | 0% | 6% |
| Large Hydroelectric | 8% | 6% |
| Natural Gas | 24% | 45% |
| Nuclear | 21% | 9% |
| Unspecified Sources of Power | 21% | 14% |
| Total[3] | **100%** | **100%** |

[1]Source: PG&E 2014 Power Source Disclosure Report; [2]Source: California Energy Commission; [3]Numbers may not add due to rounding

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# Prospective Supply Scenarios

- Unbundled renewable energy certificates excluded from all scenarios
- Nuclear- and coal-based energy also excluded from all scenarios

- **Scenario 1**: Baseline, minimum 35% renewable energy content scaling up to 50% by 2030
- **Scenario 2**: Minimum 50% renewable energy content scaling up to 75% by 2030; reduced overall GHG emissions relative to PG&E projections
  - Large hydro resources to be used for non-renewable, GHG-free supply
- **Scenario 3**: 100% renewable energy content with significant GHG emissions reductions

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# Summary of Scenario Results: Year 1

| Key Considerations | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| General Environmental Benefits | 35% Renewable<br>35% GHG-Free | 50% Renewable<br>63% GHG-Free | 100% Renewable<br>100% GHG-Free |
| Rate Competitiveness | Average 6% savings relative to PG&E rate projections | Average 4% savings relative to PG&E rate projections | Average 2% increase relative to PG&E rate projections |
| Projected Residential Customer Cost Impacts[1]<br>[1]Average monthly usage for PCE residential customers ≈ 450 kWh | Average \$5.40 monthly cost savings relative to PG&E rate projections | Average \$4.05 monthly cost savings relative to PG&E rate projections | Average \$1.80 monthly cost increase relative to PG&E rate projections |
| Assumed PCE Participation | 85% customer participation rate assumed across all customer groups | 85% customer participation rate assumed across all customer groups | 75% customer participation rate assumed for residential and small commercial customers; 50% for all other groups |
| Comparative GHG Emissions Impacts | 0.278 metric tons $CO_2$/MWh emissions rate; additional GHG emissions of ≈136,000 metric tons in Year 1 | 0.115 metric tons $CO_2$/MWh emissions rate; ≈75,000 metric ton GHG emissions reduction in Year 1 | Zero emissions rate; ≈130,000 metric ton GHG emissions reduction in Year 1 |

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# Pro Forma Financial Projections

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| **PCE Account Total (following phase-in)** | ≈250,000 | ≈250,000 | ≈220,000 |
| **Annual energy sales (following phase-in)** | ≈3.3 million MWh | ≈3.3 million MWh | ≈2.4 million MWh |
| **Annual operating costs** | ≈$225 million | ≈$235 million | ≈$200 million |
| **Annual contribution to reserves** | ≈$7 million | ≈$7 million | ≈$6 million |
| **Annual PCE Revenue Requirement** | ≈$230 million | ≈$245 million | ≈$206 million |
| **Annual Change in PCE Customer Charges*** | ≈$(40) million | ≈$(28) million | ≈$9 million |

*Negative amounts reflect the potential for customer savings (or complementary program funding, rebate distribution, additional reserve accrual, etc.); positive amounts reflect PCE's need to impose comparatively higher generation rates.

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# Summary of Environmental Impacts: 10-Year Average

| GHG Impact | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| Annual Change in GHG Emissions (Tons $CO_2$/Year) | 476,125 | -145,036 | -301,269 |
| Change in Electric Sector $CO_2$ Emissions in San Mateo County (%) | +111% | -34% | -100% |
| Projected PCE Portfolio Emissions Factor (metric tons/MWh) | 0.268 | 0.086 | 0 |
| Projected PG&E Portfolio Emissions Factor (metric tons/MWh) | 0.128 | 0.128 | 0.128 |

PEA
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# Risks and Uncertainties

- PG&E rate uncertainty (generation rates and exit fees)
- Length of current wholesale energy price trough
- Availability of large hydro resources to meet carbon-free content goals
- Opt-out rate uncertainty
- Overall program size given participation of specific jurisdictions
- Credit structure for power supply
- Future CCA specific legislation
- Regulatory changes around renewable and capacity mandates

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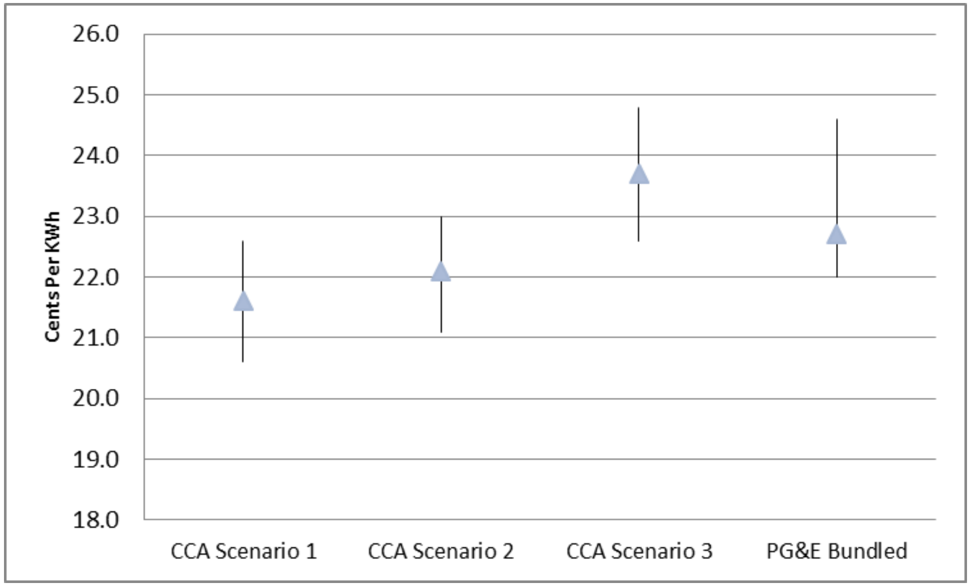
# Sensitivity Analysis Overview

- Six sensitivities were tested (high and low cases):
  - Natural gas prices
  - Renewable energy prices*
  - Carbon Free energy prices
  - PG&E generation rates*
  - PG&E exit fees*
  - Opt-out rates

*Key comparative influences

**Range of Electric Rate Impacts by Scenario**

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# Conclusions

# Key Findings and Conclusions

- Scenario 1 highlights CCA program viability on a rate competitive basis
- Scenario 2 highlights CCA program viability on renewable and carbon-free content basis (w/rate competitiveness)
- Scenario 3 highlights the CCA rate premium under a 100% renewable option as well as opt-out risk/uncertainty
- No "correct" answer, but in general terms, the technical study indicates that the Peninsula Clean Energy program could be economically viable while also achieving the County's environmental objectives

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# Questions & Discussion

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CITY OF MENLO PARK

**STAFF REPORT**

**Environmental Quality Commission**
**Meeting Date:** **10/28/2015**
**Staff Report Number:** **15-008-EQC**

**Regular Business:** **Discuss EQC Work Plan items upcoming**

## Recommendation

Staff recommends the commission review the EQC 2-Year Work Plan and discuss upcoming projects under each subcommittee's purview.

## Policy Issues

The proposed action is consistent with City policies.

## Background

The EQC 2-Year Work Plan (Attachment A) and subcommittee assignments (Attachment B) were approved by City Council on March 24, 2015. Priorities identified for the 2014-2016 work plan include: Water Resources Policy, San Franciscquito Creek, Climate Action Plan (CAP), Heritage Tree Ordinance, and General Plan Update.

On September 30, 2015 the commission reviewed the Work Plan and reassigned subcommittee members to balance assignments and align with EQC member priority topics.

## Analysis

Chair Bedwell provided the quarterly update to City Council on October 20, 2015. Staff suggests the EQC use this opportunity to plan a course of action for the upcoming quarter.

## Impact on City Resources

There are no additional City resources required for this item.

## Environmental Review

An Environmental Review is not required for this item.

## Public Notice

Public Notification was achieved by posting the agenda, with the agenda items being listed, at least 72 hours prior to the meeting.

**Attachments**

A. EQC 2-Year Work Plan 2014-2016
B. 2014 EQC Subcommittee List

Report prepared by:
Sheena Ignacio, Environmental Services Specialist

CITY OF MENLO PARK

ATTACHMENT A

# Commission Work Plan Guidelines

**Step 1** Review purpose of Commission as defined by Menlo Park Council Policy 3-13-01.

**Step 2** Develop a mission statement that reflects that purpose.

**Step 3** Discuss and outline any priorities established by Council.

**Step 4** Brainstorm goals, projects, or priorities of the Commission and determine the following:

A. Identify priorities, goals, projects, ideas, etc.
B. Determine benefit, if project or item is completed
C. Is it mandated by State of local law or by Council direction?
D. Would the task or item require a policy change at Council level?
E. Resources needed for completion? (Support staff, creation of subcommittees, etc.)
F. Completion time? (1-year, 2-year, or longer term?)
G. Measurement criteria? (How ill you know you are on track? Is it effective?, etc.)

**Step 5** Prioritize projects from urgent to low priority.

**Step 6** Prepare final Work Plan for submission to Council for review and approval in the following order:
- Work Plan cover sheet, Listing of Members, Priority List, Work Plan Worksheet – Steps 1 through 8

**Step 7** Use your “approved” work plan throughout the term of the plan as a guide to focus in on the work at hand

**Step 8** Report out on work plan priorities to the City Council, which should include:

A. List of “approved” priorities or goals
B. Status of each item, including any additional resources required in order to complete
C. If an item that was on the list is not finished, then indicate why it didn’t occur and list out any additional time and/or resources that will be needed in order to complete

**Environmental Quality Commission**

*Mission Statement*

The Environmental Quality Commission is charged primarily with advising the City Council on matters involving environmental protection, improvement, and sustainability.

Environmental Quality Commission
Work Plan for 2014-2016

**Environmental Quality Commission**
**2014-2016**

# <u>Commission Members Listing</u>

Commissioner (Chair) <u>Scott Marshall</u>

Commissioner (Vice Chair) <u>Allan Bedwell</u>

Commissioner <u>Chris DeCardy</u>

Commissioner <u>Kristin-Kuntz Duriseti</u>

Commissioner <u>Deborah Martin</u>

Commissioner <u>Mitchel Slomiak</u>

Commissioner <u>Christina Smolke</u>

# Environmental Commission
# Priority List

The Environmental Quality Commission has identified the following priorities to focus on during 2014-2016:

| | |
|---|---|
| **1.** | **Water Resource Policy**-Continue advocacy for responsible water resource management policy or strategy, including evaluating options for aquifer management, water transfers and purchases, water conservation, and water use. |
| **2.** | **San Francisquito Creek**-Research and evaluate alternatives for flood and erosion control that achieve the City's resource conservation goals for the creek. |
| **3.** | **Climate Action Plan (CAP)**-Implement CAP initiatives, evaluate and advocate new initiatives and prioritized City council transportation and development metrics to achieve or exceed the City's greenhouse gas (GHG) reduction target. |
| **4.** | **Heritage Tree Ordinance**-Improve the Heritage Tree Ordinance and heritage tree appeal process to preserve and maintain the urban canopy. |
| **5.** | **General Plan Update**-Improve the sustainability of the City's General Plan consistent with the EQC mission and City Council priorities (with focus on land use, building, and transportation). |

CITY OF MENLO PARK

# Environmental Quality Commission
# Work Plan Worksheet

**Step 1**

| | |
|---|---|
| Review purpose of Commission as defined by Menlo Park Council Policy 3-13-01 | The EQC is charged with advising the City Council on the following matters:<br>• Advising on programs and policies related to protection of natural areas, recycling and solid waste reduction, environmentally sustainable practices, air and water pollution prevention, climate protection, and water and energy conservation.<br>• Preserving heritage trees, expanding the urban canopy, using best practices to maintain City trees, and making determinations on appeals of heritage tree removal permits<br>• Organizing annual Arbor Day Tree Planting event and continuing to support and recognize exemplary environmental stewardship throughout the community. |

**Step 2**

| | |
|---|---|
| Develop or review a Mission Statement that reflects that purpose | The Environmental Quality Commission is charged primarily with advising the City Council on matters involving environmental protection, improvement, and sustainability. |

**Step 3**

| | |
|---|---|
| Discuss any priorities already established by Council | • Continue work on the General Plan Update<br>• Evaluate the City's Water Policy, including resources, uses, and conservation<br>• Make gains in our Climate Action Plan, reducing greenhouse gas emissions |

**Step 4** **The goals and priorities identified below are not listed in order of magnitude.*

| *Brainstorm goals, projects or priorities of the Commission | Benefit, if completed | Mandated by State/local law or by Council direction? | Required policy change at Council level? | Resources needed for completion? Staff or creation of subcommittees? | Estimated Completion Time | Measurement criteria How will we know how we are doing? |
|---|---|---|---|---|---|---|
| **Water Resource Policy**-Continue advocacy for responsible water resource management policy and strategy, including evaluating options for aquifer management, water transfers and purchases, water conservation, and water use. | • Research, engage, and advocate for a framework for city water management<br>• Efficient use of water resources and effective environmental protection<br>• Drought Resilience<br>• Offer/extend new water conservation programs | Yes ☑<br>No ☐ | Yes ☑<br>No ☐ | • Subcommittee | 2-3 years, draft framework before next summer | • Periodic reports<br>• Develop a framework to be considered by City Council<br>• Appropriate budget allocations over the next two years<br>• Measurable improvement in water conservation |
| **San Francisquito Creek**-Research and evaluate alternatives for flood and erosion control that achieve the City's resource conservation goals for the creek. | • Preserve, protect, and conserve wildlife habitat, scenic beauty, and quality and character of neighborhoods<br>• Minimize environmental impact of flood and erosion control<br>• Assist City Council on making more informed decisions through presenting better options | Yes ☑<br>No ☐ | Yes ☐<br>No ☑ | • Subcommittee | TBD | • Periodic Reports<br>• Proposed alternatives and evaluation recommendation of JPA proposals |
| **Climate Action Plan (CAP)**-Implement CAP initiatives, evaluate and advocate new initiatives, and prioritize City Council transportation and development metrics | • Meet GHG reduction target milestones<br>• Reduce commercial and residential energy usage<br>• Reduce GHG emissions from municipal operations<br>• Capture cost savings and economic prosperity from GHG reductions | Yes ☑<br>No ☐ | Yes ☐<br>No ☑ | • Subcommittee<br>• New staff person<br>• Budgeted funds for consultant services | Ongoing | • Periodic reports<br>• City GHG reduction milestones achieved (27% GHG reduction by 2020)<br>• Refined priorities (including evaluating new initiatives)<br>• City policies and actions in place that incentivize |

| | | | | | | |
|---|---|---|---|---|---|---|
| to achieve or exceed the City's GHG reduction target. | | | | | | community, private, and business action to reduce and conserve carbon-based energy use (or greenhouse gas)<br>• Support Staff efforts to identify additional funding sources |
| **Heritage Tree Ordinance**-Improve the Heritage Tree Ordinance and heritage tree appeal process to raise community awareness and to preserve and maintain the urban canopy. | • Approve and update ordinance<br>• Improve the awareness, evaluation, and appeal process for the community<br>• Improve coordination with other commissions and City departments<br>• Ensure adequate City resources to successfully implement and enforce the program | Yes ☑<br>No ☐ | Yes ☑<br>No ☐ | • Subcommittee<br>• Staff time budgeted | End of FY 2015 | • Periodic reports<br>• Recommendations adopted by Council<br>• Reduction in the number of healthy trees removed<br>• Increase in the diversity and quality of trees within the entire urban canopy<br>• Improved coordination with the planning process |
| **General Plan Update**-Improve the sustainability of the City's General Plan consistent with the EQC mission and City Council priorities (with focus on land use, building, and transportation). | • Reduce GHG emissions<br>• Increase sustainability measures in energy and water conservation, waste reduction, and land use, including maintaining a healthy tree canopy | Yes ☑<br>No ☐ | Yes ☑<br>No ☐ | • Creation of an Ad-Hoc Subcommittee<br>• General Plan Advisory Committee (GPAC) participation | In line with the City's General Plan Timeline | • Periodic reports<br>• Development in the M2 area and city-wide circulation in line with EQC priorities (e.g. 27% GHG reduction target by 2020) |

**Step 5** **Timelines have not been assigned to the goals and priorities identified below. This allows the flexibility for the Environmental Quality Commission to be able to shift work plan priorities as needed.

| List identified Goals, Priorities and/or Tasks for the Commission | **Prioritize Tasks by their significance | | | |
|---|---|---|---|---|
| | 1 Urgent | 2 1-year | 3 2-year | 4 Long Term |
| **Water Resource Policy**-Continue advocacy for responsible water resource management policy or strategy, including evaluating options for aquifer management, water transfers and purchases, water conservation, and water use. | | | | |
| **San Francisquito Creek**-Research and evaluate alternatives for flood and erosion control that achieve the City's resource conservation goals for the creek. | | | | |
| **Climate Action Plan (CAP)**-Implement CAP initiatives, evaluate and advocate new initiatives and prioritized City council transportation and development metrics to achieve or exceed the City's greenhouse gas reduction target. | | | | |
| **Heritage Tree Ordinance** –Improve the Heritage Tree Ordinance and heritage tree appeal process to preserve and maintain the urban canopy. | | | | |
| **General Plan Update**-Improve the sustainability of the City's General Plan consistent with the EQC mission and City Council priorities (with focus on land use, building, and transportation). | | | | |

**Step 6** Prepare final work plan for submission to the City Council for review, possible direction and approval and attach the Worksheets used to determine priorities, resources and time lines.

**Step 7** Once approved; use this plan as a tool to help guide you in your work as an advisory body.

**Step 8** Report out on status of items completed. Provide any information needed regarding additional resources needed or And to indicate items that will need additional time in order to complete.

ATTACHMENT B

# Current Subcommittees and Tasks
## As of July 2014

CITY OF MENLO PARK

### Water Resource Policy Subcommittee
**Priority Focus:** Continue advocacy for responsible water resource management policy or strategy, including evaluating options for aquifer management, water transfers and purchases, water conservation, and water use.
**Members:** Commissioners Bedwell, DeCardy, Martin

### San Francisquito Creek Subcommittee
**Priority Focus:** Research and evaluate alternatives for flood and erosion control that achieve the City's resource conservation goals for the creek.
**Members:** Commissioners Marshall, Slomiak, Smolke

### Climate Action Plan Subcommittee
**Priority Focus:** Implement CAP initiatives, evaluate and advocate new initiatives and prioritized City council transportation and development metrics to achieve or exceed the City's greenhouse gas (GHG) reduction target.
**Members:** Commissioners DeCardy, Slomiak, Kuntz-Duriseti

### Heritage Tree Subcommittee
**Priority Focus:** Improve the Heritage Tree Ordinance and heritage tree appeal process to preserve and maintain the urban canopy.
**Members:** Commissioners Marshall and Smolke

### General Plan Advisory Subcommittee
**Priority Focus:** Improve the sustainability of the City's General Plan consistent with the EQC mission and City Council priorities (with focus on land use, building, and transportation).
**Members:** Commissioners Kuntz-Duriseti, Bedwell as backup

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**SPECIAL MEETING MINUTES - DRAFT**

**Date:** **9/30/2015**
**Time:** **6:30 p.m.**
**Administration Building**
**701 Laurel St., Menlo Park, CA 94025**

**A.** Past-Chair DeCardy called the meeting to order at 6:50 p.m.

**B. Roll Call**

Present: Barnes, Chair Bedwell (arrived at 6:56 p.m.), DeCardy, Kuntz-Duriseti (left at 9:30 p.m.), Marshall, Vice Chair Martin, Smolke
Absent: Vice Chair Martin, Smolke
Staff: Environmental Services Manager Heather Abrams

**C. Public Comment**

There was no public comment.

**D. Regular Business**

D1. Informational presentation on PG&E Renewable Power Efforts and Options, by Sapna Dixit with Pacific Gas and Electric Company (PG&E) - *30 mins*

**ACTION:** Sapna Dixit presented information on PG&E solar choice programs and their renewable energy portfolio for information and questions from the EQC. No formal action was taken.

D2. Discuss EQC 2-Year work plan and subcommittee assignments, and possibly reassign subcommittee members (Attachment) - *30 mins*

**ACTION:** Motion and second (DeCardy/Bedwell) to keep the work plan as currently stated and to adjust the EQC sub-committee assignments as follows: Barnes replacing DeCardy on Water; DeCardy replacing Slomiak on Creek; affirming Martin replacing Slomiak on Climate; adding Barnes to General Plan, passes (5-0-2).

D3. Discuss and potentially make recommendations to the General Plan Advisory Committee (GPAC) to incorporate sustainability goals into the General Plan - *30 mins*

**ACTION:** Motion and second (Bedwell/Marshall) to deputize the General Plan subcommittee to work from the EQC's previous letter to the GPAC and other relevant sources of information on a statement in support of incorporating strengthened sustainability measures in the General Plan to be delivered by Commissioner Barnes at the next City Council meeting, passes (5-0-2).

D4. Approve a letter drafted by the CAP Subcommittee regarding the Annual Greenhouse Gas (GHG) Emissions Inventory and Climate Action Plan (CAP) update - *30 mins*

Public Comment: Mitch Slomiak provided his context and background on the city history and commitment to a climate action plan, stating that in the past Menlo Park historically has been a leader relative to other Bay Area communities regarding greenhouse gas reductions and now needs to act to provide high percentage clean power if it is to meet its 2020 emission reduction goals.

**ACTION:** Motion and second (Bedwell / Marshall) to adopt the letter as presented and submit it to City Council, passes (5-0-2).

D5. Update on the request to remove seven heritage trees at 133 Encinal Avenue (Attachment) - *10 mins*

**ACTION:** Staff provided a brief update based on the attachment. No formal action taken.

D6. Approve August 26, 2015 Environmental Quality Commission meeting minutes (Attachment) – *2 mins*

**ACTION:** Motion and second (DeCardy/Marshall) to approve the minutes as prepared, passes (3-0-4).

D7. Discuss and possibly change EQC meeting dates for 2015 (Attachment) – *5 mins*

**ACTION:** Motion and second (Bedwell/DeCardy) to hold the next EQC meeting on October 28th and to combine the November and December meetings on December 9th, passes (5-0-2).

**E. Committee/Subcommittee Reports**

E1. Update from the Water Resources Subcommittee

No update was provided.

E2. Update from the San Francisquito Subcommittee

No update was provided.

E3. Update from the Climate Action Plan (CAP) Subcommittee

No update was provided beyond item D4.

E4. Update from the Heritage Tree Ordinance Subcommittee

No update was provided.

E5. Update from the General Plan Subcommittee

No update was provided beyond item D3.

## F. Informational Items

F1. Update on the Water Efficient Landscaping Ordinance

Heather Abrams reported City Council will receive an informational WELO update on October 6, 2015.

F2. Update on the Special Meeting to be scheduled regarding heritage trees at 1020 Hermosa Way

Abrams reported the City Attorney is continuing to work on the case.

## G. Adjournment

Chair Bedwell adjourned the meeting at 10:00 p.m.

Meeting minutes taken by Chris DeCardy, EQC Commissioner

Meeting minutes prepared by Sheena Ignacio, Environmental Services Specialist

CITY OF MENLO PARK

**STAFF REPORT**

**City Council**
**Meeting Date:** **10/6/2015**
**Staff Report Number:** **15-149-CC**

**Informational Item:** **Update on the State of California Model Water Efficient Landscape Ordinance (CA MWELO)**

## Recommendation

This is an informational item only and requires no City Council action.

## Policy Issues

The City has a current Water Efficient Landscape Ordinance (WELO), which will need to be updated as a result of recent State action.

## Background

In April 2015, the Governor of California issued an executive order directing the California Department of Water Resources (DWR) to update the State's Model Water Efficient Landscape Ordinance (CA MWELO) in order to address the current four year drought and build resiliency for future droughts. In June 2015, the DWR invited comment on the new draft and held several public meetings. The draft, meeting notices, and additional information can be found at:

http://www.water.ca.gov/wateruseefficiency/docs/2015/EO_B_29_15_MWELO_Update_06_12_15%28VL%29_Public_Draft.pdf.

The DWR adopted the proposed CA MWELO in July 2015 and on September 15, 2015 the California Secretary of State ordered the regulations to be incorporated into Division 2, Title 23, California Code of Regulations to amend Chapter 2.7 Model Water Efficient Landscape Ordinance, Sections 490 through 495. It normally takes several weeks for new regulations to be published. Attachment A shows the regulations as submitted by the State for publication.

The Bay Area Water Supply and Conservation Agency (BAWSCA), of which the City of Menlo Park is a member, is planning to draft a regional MWELO for possible adoption by member agencies.

## Analysis

State law requires all land-use agencies, such as cities and counties, to adopt a water-efficient landscape ordinance that is at least as efficient as the CA MWELO prepared by DWR. DWR's model ordinance takes effect in those cities and counties that fail to adopt their own. Cities acting on their own are required to adopt their new WELO by December 1, 2015. Agencies adopting a regional ordinance, such as the model being designed by BAWSCA, have a deadline of February 1, 2016.

The revisions to the CA MWELO reduce the size threshold subject to the WELO ordinance from 2,500 square feet of landscaping to 500 square feet of landscaping for both commercial and residential property. The CA MWELO requires specific water efficiency, and will make it very difficult to install and maintain turf in new developments that are dependent on potable water, especially in commercial and industrial settings. Use of recycled water is exempt from these limitations. Land-use agencies also will be required to report on ordinance adoption and enforcement each year, beginning December 31, 2015. (Those agencies that plan to adopt a regional ordinance will report that they are planning to adopt a regional ordinance by February 1, 2016 for the first year). New third party inspections and annual reporting to the State, which are required in the 2015 CA MWELO, will increase the City's costs and therefore increase permit fees paid by builders.

The City of Menlo Park last updated its WELO in 2010 as municipal code section 12.44 (http://www.codepublishing.com/CA/menlopark/). The municipal code requires water efficient plans for commercial and single family buildings with a landscape area of 2,500 square feet or larger. Currently city Engineers, or their consultants, review the plans and an audit is required, which can be completed by the landscape designer. To date, City records indicate that all qualifying commercial projects and most qualifying residential projects complete this process. Approximately 20 percent of qualifying residential projects submit building permit applications and do not plan landscape improvements. Residents are allowed to make building alterations without making landscape upgrades, except when erosion control is required. As a result, there is a possibility that some deferred landscaping projects do not meet the current City WELO guidelines, as they are not reviewed by an auditor or engineer.

In the few cases where landscaping is installed without alteration of a building, no permit is required and WELO requirements do not apply. This is a non-issue for most projects, as permits are required for a variety of activities (including building construction, grading, hillside construction, retaining walls over two feet high, and fences over seven feet high), but permits are not required for basic landscaping. This is an area of possible concern in the current and forthcoming WELOs because residents sometimes express concerns to the City when they see neighbors or realtors install sod or other non-drought tolerant landscaping materials, especially in preparation for sale of a home. Staff is not aware of any city that requires permits for landscaping, and the City does not currently have the staff capacity to support an additional permit category of landscaping to monitor these projects. A resolution to this possible loop hole has not yet been identified.

Below is a summary of the most significant changes to measures included in the CA MWELO compared to the current BAWSCA WELO and current City WELO.

| Comparison of changes | | | |
|---|---|---|---|
| **Measure** | **CA MWELO 2015** | **Current BAWSCA WELO** | **Current City WELO** |
| Effective Date | December 1, 2015 | Varies by Agency | July 1, 2010 |
| Applicability: New Landscape | 500 sq. ft. | 1,000 sq. ft. | 2,500 sq. ft. |
| Applicability: Landscape Rehabilitation | 2,500 sq. ft. | 1,000 sq. ft. | 2,500 sq. ft. |
| Street Medians | No turf allowed | Turf allowed | Turf allowed |
| Parking Strips - No Turf Allowed | Less than 10 ft. wide | Less than 8 ft. wide | Less than 8 ft. wide |
| Mulch Depth Required | 3 inches | 2 inches required | 2 inches required |

| | | | |
|---|---|---|---|
| | required | | |
| Compost | Must be used | Not required | Not required |
| Swimming Pools | Must recirculate water | Must recirculate water | Recirculation not required; Covers required for new pools and spas |
| Commercial: Dedicated Irrigation Water Meter Required | Greater than 1,000 sq. ft. of landscaping | Greater than 5,000 sq. ft. of landscaping | Greater than 5,000 sq. ft. of landscaping (Above 5,000SF, Water Code 535 applies) |
| Residential: Dedicated Irrigation Water Meter Required | Greater than 5,000 sq. ft. of landscaping | Greater than 5,000 sq. ft. of landscaping | Not required |
| Non-volatile Irrigation Meter Memory (not lost in power outage) | Required | Not required | Not required |
| Commercial: Water Budget Efficiency Requirement | Greater than 92% | 70% | 70% |
| Residential: Water Budget Efficiency | Greater than 85% | 70% | 70% |
| Irrigation System Precipitation Rate | No greater than 1 inch/hour | Not required | Not required |
| 24 hour retention or infiltration capacity of storm water BMPs | Required | Not required | Not required |
| Subsurface Irrigation Only for Turf Less Than: | 10 ft. wide | 8 ft. wide | 8 ft. wide |
| Landscape Audit | Must be performed by 3rd party | May be conducted by applicant for Tier 1 landscapes; must be conducted by certified auditor for Tier 2 landscapes | May be self-certified by designer |
| Commercial: % of reference Evapotranspiration (ETo) allowance | 45% | Use full reference ETo | Use full reference ETo |
| Residential: % of reference ETo allowance | 55% | Use full reference ETo | Use full reference ETo |

The attached slides explaining the CA MWELO were created by BAWSCA and presented to the BAWSCA member agency Water Representative Group on August 5, 2015. The City is a BAWSCA member; however in the past the City adopted its own WELO. Staff provided the Environmental Quality Commission (EQC) information regarding the CA MWELO in August 2015, in anticipation of City Council consideration in December 2015 according to anticipated state requirements.

For 2015, staff anticipates recommending that the City Council adopt the BAWSCA MWELO, with the BAWSCA 1,000 sq. ft. threshold for rehabilitation landscapes, and possibly adding the Menlo Park requirement for covers on pools and spas. This will ensure alignment with neighboring BAWSCA members and provide additional time to adopt the ordinance. Alignment with neighboring communities' WELOs provides residents, designers, landscapers, and contractors with generally consistent compliance requirements across regional boundaries.

Below is staff's proposed timeline for 2015 WELO adoption based on adoption of the BAWSCA MWELO:

| Proposed timeline | |
|---|---|
| **Date** | **Action** |
| September 2015 | CA MWELO finalized |
| October 2015 | WELO City Council Information Item<br>Work with BAWSCA members to draft BAWSCA WELO |
| November 2015 | BAWSCA MWELO Final Draft |
| December 2015 | Menlo Park WELO 1st reading<br>Report regional WELO adoption progress to DWR |
| January 2016 | Menlo Park WELO 2nd reading |
| February 2016 | Full WELO implementation<br>Report adoption to DWR |

**Impact on City Resources**

There are two main impacts to City resources, which will require further study to determine the quantity of additional resources needed.

1. Additional projects will be covered by the MWELO and audits must be performed by a third party. Currently WELO plans are sorted by City staff and reviewed by a consultant who is overseen by City staff. Additional consultant work and auditing will be required, which should be covered by permit fees. City staff will be needed to oversee the process, and screen and select the consultants. Permit application fees may need to be adjusted in July 2016.
2. The 2015 MWELO includes new reporting by Cities to the State. A new system of tracking and reporting WELO activities will need to be designed and implemented to capture the required data points from various users, prepare reports and transmit the annual reports to the State. The cost of the new reporting required by the State is not yet known.

**Environmental Review**

Environmental review under the California Environmental Quality Act (CEQA) is not required at this time.

**Public Notice**

Public Notification was achieved by posting the agenda, with the agenda items being listed, at least 72 hours prior to the meeting.

**Attachments**

A. 2015 California Model Water Efficient Landscaping Ordinance as submitted for publication
B. BAWSCA MWELO Slides, dated August 5, 2015

Report prepared by:
Heather Abrams, Environmental Programs Manager

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STATE OF CALIFORNIA--OFFICE OF ADMINISTRATIVE LAW
**NOTICE PUBLICATION/REGULATIONS SUBMISSION** (See instructions on reverse)

FILE PRINT

STD. 400 (REV. 01-2013)

For use by Secretary of State only

ATTACHMENT A

ENDORSED - FILED
in the office of the Secretary of State
of the State of California
SEP 15 2015
1:42 PM

| OAL FILE NUMBERS | NOTICE FILE NUMBER | REGULATORY ACTION NUMBER | EMERGENCY NUMBER |
|---|---|---|---|
| | Z- | 2015-0810-02FP | |

For use by Office of Administrative Law (OAL) only

NOTICE

2015 AUG 10 P 1:22
OFFICE OF
ADMINISTRATIVE LAW

REGULATIONS

AGENCY WITH RULEMAKING AUTHORITY
~~California Natural Resources Agency~~ Department of Water Resources per agency LM request 9/9/15

AGENCY FILE NUMBER (If any)

## A. PUBLICATION OF NOTICE (Complete for publication in Notice Register)

| 1. SUBJECT OF NOTICE | TITLE(S) | FIRST SECTION AFFECTED | 2. REQUESTED PUBLICATION DATE |
|---|---|---|---|
| ~~Model Water Efficient Landscape Ordinance~~ | ~~23~~ | ~~490~~ | ~~August 3, 2015~~ |

| 3. NOTICE TYPE | 4. AGENCY CONTACT PERSON | TELEPHONE NUMBER | FAX NUMBER (Optional) |
|---|---|---|---|
| [X] Notice re Proposed Regulatory Action [ ] Other | ~~Diana S. Brooks~~ | ~~(916) 651-7032~~ | ~~(916) 651-7059~~ per agency LM request 9/9/15 |

| OAL USE ONLY | ACTION ON PROPOSED NOTICE | NOTICE REGISTER NUMBER | PUBLICATION DATE |
|---|---|---|---|
| | [ ] Approved as Submitted [ ] Approved as Modified [ ] Disapproved/Withdrawn | | |

## B. SUBMISSION OF REGULATIONS (Complete when submitting regulations)

| 1a. SUBJECT OF REGULATION(S) | 1b. ALL PREVIOUS RELATED OAL REGULATORY ACTION NUMBER(S) |
|---|---|
| Model Water Efficient Landscape Ordinance | |

2. SPECIFY CALIFORNIA CODE OF REGULATIONS TITLE(S) AND SECTION(S) (Including title 26, if toxics related)

| **SECTION(S) AFFECTED (List all section number(s) individually. Attach additional sheet if needed.)** | ADOPT: See Attachment per agency LM request 9/9/15 |
|---|---|
| | AMEND: ~~Chapter 2.7, Sections 490, 491, 492, 493, 494, 495.~~ See Attachment per agency LM request 9/9/15 |
| TITLE(S) 23 | REPEAL |

3. TYPE OF FILING

- [ ] Regular Rulemaking (Gov. Code §11346)
- [ ] Resubmittal of disapproved or withdrawn nonemergency filing (Gov. Code §§11349.3, 11349.4)
- [ ] Emergency (Gov. Code, §11346.1(b))
- [ ] Certificate of Compliance: The agency officer named below certifies that this agency complied with the provisions of Gov. Code §§11346.2-11347.3 either before the emergency regulation was adopted or within the time period required by statute.
- [ ] Resubmittal of disapproved or withdrawn emergency filing (Gov. Code, §11346.1)
- [ ] Emergency Readopt (Gov. Code, §11346.1(h))
- [X] File & Print
- [X] Other (Specify) Governor's Executive Order No. B-29-15 (4-1-2015)
- [ ] Changes Without Regulatory Effect (Cal. Code Regs., title 1, §100)
- [ ] Print Only per agency LM request 9/14/15

4. ALL BEGINNING AND ENDING DATES OF AVAILABILITY OF MODIFIED REGULATIONS AND/OR MATERIAL ADDED TO THE RULEMAKING FILE (Cal. Code Regs. title 1, §44 and Gov. Code §11347.1)

5. EFFECTIVE DATE OF CHANGES (Gov. Code, §§ 11343.4, 11346.1(d); Cal. Code Regs., title 1, §100)

- [ ] Effective January 1, April 1, July 1, or October 1 (Gov. Code §11343.4(a))
- [X] Effective on filing with Secretary of State
- [ ] §100 Changes Without Regulatory Effect
- [ ] Effective other (Specify)

6. CHECK IF THESE REGULATIONS REQUIRE NOTICE TO, OR REVIEW, CONSULTATION, APPROVAL OR CONCURRENCE BY, ANOTHER AGENCY OR ENTITY

- [ ] Department of Finance (Form STD. 399) (SAM §6660)
- [ ] Fair Political Practices Commission
- [ ] State Fire Marshal
- [X] Other (Specify) California Water Commission per agency LM request 9/9/15

| 7. CONTACT PERSON | TELEPHONE NUMBER | FAX NUMBER (Optional) | E-MAIL ADDRESS (Optional) |
|---|---|---|---|
| Diana Brooks, Chief, DWR, Water Use and Efficiency | (916) 651-7032 | (916) 651-7059 | Diana.Brooks@water.ca.gov |

8. **I certify that the attached copy of the regulation(s) is a true and correct copy of the regulation(s) identified on this form, that the information specified on this form is true and correct, and that I am the head of the agency taking this action, or a designee of the head of the agency, and am authorized to make this certification.**

SIGNATURE OF AGENCY HEAD OR DESIGNEE: [signature]

DATE: 8/7/2015

TYPED NAME AND TITLE OF SIGNATORY
Mark W. Cowin, Director, Department of Water Resources

For use by Office of Administrative Law (OAL) only

ENDORSED APPROVED
SEP 15 2015
Office of Administrative Law

Attachment to Form 400
OAL File No. 2015-0810-02FP

Title 23, Chapter 2.7, sections affected:

ADOPT: 492.15, 495, Appendix D

AMEND: 490, 490.1, 491, 492, 492.4, 492.5, 492.6, 492.7, 492.9, 492.11, 492.12, 492.13, 492.14, 492.16, 492.17, 492.18, 493, 493.1, 494, Appendix A, Appendix B, Appendix C

**TEXT OF PROPOSED REGULATIONS**

**NOTE:**

- Text proposed to be added is displayed in <u>underlined</u> type.
- Text proposed to be deleted is displayed in ~~strikeout~~ type.

In Division 2, Title 23, California Code of Regulations, to amend Chapter 2.7 Model Water Efficient Landscape Ordinance, Sections 490 through 495, to read as follows:

California Code of Regulations
Title 23. Waters
Division 2. Department of Water Resources
Chapter 2.7. Model Water Efficient Landscape Ordinance

**§ 490. Purpose.**

(a) The State Legislature has found:

(1) that the waters of the state are of limited supply and are subject to ever increasing demands;

(2) that the continuation of California's economic prosperity is dependent on the availability of adequate supplies of water for future uses;

(3) that it is the policy of the State to promote the conservation and efficient use of water and to prevent the waste of this valuable resource;

(4) that landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development; ~~and~~

(5) that landscape design, installation, maintenance and management can and should be water efficient; and

(6) that Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the beneficial use to be served and the right does not and shall not extend to waste or unreasonable method of use.

(b) Consistent with the legislative findings, the purpose of this model ordinance is to:

(1) promote the values and benefits of landscaping practices that integrate and go beyond the conservation and efficient use of water;~~landscapes while recognizing the need to invest water and other resources as efficiently as possible;~~

(2) establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and rehabilitated projects by encouraging the use of a watershed approach that requires cross-sector collaboration of industry, government and property owners to achieve the many benefits possible;

(3) establish provisions for water management practices and water waste prevention for existing landscapes;

(4) use water efficiently without waste by setting a Maximum Applied Water Allowance as an upper limit for water use and reduce water use to the lowest practical amount;

(5) promote the benefits of consistent landscape ordinances with neighboring local and regional agencies;

(6) encourage local agencies and water purveyors to use economic incentives that promote the efficient use of water, such as implementing a tiered-rate structure; and

(7) encourage local agencies to designate the necessary authority that implements and enforces the provisions of the Model Water Efficient Landscape Ordinance or its local landscape ordinance.

(c) Landscapes that are planned, designed, installed, managed and maintained with the watershed based approach can improve California's environmental conditions and provide benefits and realize sustainability goals. Such landscapes will make the urban environment resilient in the face of climatic extremes. Consistent with the legislative findings and purpose of the Ordinance, conditions in the urban setting will be improved by:

(1) Creating the conditions to support life in the soil by reducing compaction, incorporating organic matter that increases water retention, and promoting productive plant growth that leads to more carbon storage, oxygen production, shade, habitat and esthetic benefits.

LM per agency request 9/14/1

(2) Minimizing energy use by reducing irrigation water requirements, reducing reliance on petroleum based fertilizers and pesticides, and planting climate appropriate shade trees in urban areas.

(3) Conserving water by capturing and reusing rainwater and graywater wherever possible and selecting climate appropriate plants that need minimal supplemental water after establishment.

(4) Protecting air and water quality by reducing power equipment use and landfill disposal trips, selecting recycled and locally sourced materials, and using compost, mulch and efficient irrigation equipment to prevent erosion.

(5) Protecting existing habitat and creating new habitat by choosing local native plants, climate adapted non-natives and avoiding invasive plants. Utilizing integrated pest management with least toxic methods as the first course of action.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65593, Government Code. Reference: Sections 65591, 65593 and 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 490.1. Applicability.**

(a) After ~~January 1, 2010,~~ December 1, 2015, and consistent with Executive Order No. B-29-15, this ordinance shall apply to all of the following landscape projects:

(1) new construction projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check or design review;

(2) rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;

~~(1) new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check or design review;~~

~~(2) new construction and rehabilitated landscapes which are developer-installed in single-family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;~~

~~(3) new construction landscapes which are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check or design review;~~

(3) ~~(4)~~ existing landscapes limited to Sections 493, 493.1 and 493.2; and

(4) ~~(5)~~ cemeteries. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are limited to Sections 492.4, 492.11, and 492.12; and existing cemeteries are limited to Sections 493, 493.1, and 493.2.

(b) For local land use agencies working together to develop a regional water efficient landscape ordinance, the reporting requirements of this ordinance shall become effective December 1, 2015 and the remainder of this ordinance shall be effective no later than February 1, 2016.

(c) Any project with an aggregate landscape area of 2,500 square feet or less may comply with the performance requirements of this ordinance or conform to the prescriptive measures contained in Appendix D.

(d) For projects using treated or untreated graywater or rainwater captured on site, any lot or parcel within the project that has less than 2500 sq. ft. of landscape and meets the lot or parcel's landscape water requirement (Estimated Total Water Use) entirely with treated or untreated graywater or through stored rainwater captured on site is subject only to Appendix D section (5).

(~~b~~e) This ordinance does not apply to:

(1) registered local, state or federal historical sites;

(2) ecological restoration projects that do not require a permanent irrigation system;

(3) mined-land reclamation projects that do not require a permanent irrigation system; or

per agency request LM 4/14/15

(4) existing plant collections, as part of botanical gardens and arboretums open to the public.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 491. Definitions.**

The terms used in this ordinance have the meaning set forth below:

(a) "applied water" means the portion of water supplied by the irrigation system to the landscape.

(b) "automatic irrigation controller" means an ~~automatic~~ timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers are able to self-adjust and schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.

(c) "backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

(d) "Certificate of Completion" means the document required under Section 492.9.

(e) "certified irrigation designer" means a person certified to design irrigation systems by an accredited academic institution, a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation designer certification program and Irrigation Association's Certified Irrigation Designer program.

(f) "certified landscape irrigation auditor" means a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation auditor certification program and Irrigation Association's Certified Landscape Irrigation Auditor program.

(g) "check valve" or "anti-drain valve" means a valve located under a sprinkler head, or other location in the irrigation system, to hold water in the system to prevent drainage from sprinkler heads when the sprinkler is off.

(h) "common interest developments" means community apartment projects, condominium projects, planned developments, and stock cooperatives per Civil Code Section 1351.

(i) "compost" means the safe and stable product of controlled biologic decomposition of organic materials that is beneficial to plant growth.

(~~i~~j) "conversion factor (0.62)" means the number that converts acre-inches per acre per year to gallons per square foot per year.

(k) "distribution uniformity" means the measure of the uniformity of irrigation water over a defined area.

(~~j~~l) "drip irrigation" means any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

(~~k~~m) "ecological restoration project" means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

(~~l~~n) "effective precipitation" or "usable rainfall" (Eppt) means the portion of total precipitation which becomes available for plant growth.

(~~m~~o) "emitter" means a drip irrigation emission device that delivers water slowly from the system to the soil.

(~~n~~p) "established landscape" means the point at which plants in the landscape have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.

(~~o~~q) "establishment period of the plants" means the first year after installing the plant in the landscape or the first two years if irrigation will be terminated after establishment. Typically, most plants are established after one or two years of growth. Native habitat mitigation areas and trees may need three to five years for establishment.

(~~p~~r) "Estimated Total Water Use" (ETWU) means the total water used for the landscape as described in Section 492.4.

(~~q~~s) "ET adjustment factor" (ETAF) means a factor of ~~0.7~~0.55 for residential areas and 0.45 for non-residential areas, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. ~~A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. For purposes of the ETAF, the average irrigation efficiency is 0.71. Therefore, the ET Adjustment Factor is (0.7)=(0.5/0.71).~~ The ETAF for ~~a~~ new and existing (non-rehabilitated) Special Landscape Areas shall not exceed 1.0. The ETAF for existing non-rehabilitated landscapes is 0.8.

(~~r~~t) "evapotranspiration rate" means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

(~~s~~u) "flow rate" means the rate at which water flows through pipes, valves and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.

(v) "flow sensor" means an inline device installed at the supply point of the irrigation system that produces a repeatable signal proportional to flow rate. Flow sensors must be connected to an automatic irrigation controller, or flow monitor capable of receiving flow signals and operating master valves. This combination flow sensor/controller may also function as a landscape water meter or submeter.

(w) "friable" means a soil condition that is easily crumbled or loosely compacted down to a minimum depth per planting material requirements, whereby the root structure of newly planted material will be allowed to spread unimpeded.

(x) "Fuel Modification Plan Guideline" means guidelines from a local fire authority to assist residents and businesses that are developing land or building structures in a fire hazard severity zone.

(y) "graywater" means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers. Health and Safety Code Section 17922.12.

(~~t~~z) "hardscapes" means any durable material (pervious and non-pervious).

~~(u) "homeowner-provided landscaping" means any landscaping either installed by a private individual for a single family residence or installed by a licensed contractor hired by a homeowner. A homeowner, for purposes of this ordinance, is a person who occupies the dwelling he or she owns. This excludes speculative homes, which are not owner-occupied dwellings.~~

(aa) ~~(v)~~ "hydrozone" means a portion of the landscaped area having plants with similar water needs and rooting depth. A hydrozone may be irrigated or non-irrigated.

(bb) ~~(w)~~ "infiltration rate" means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

(cc) ~~(x)~~ "invasive plant species" means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. ~~"Noxious weeds" means any weed as described in the Food and Agricultural Code, Section 5004.~~ Lists of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.

(dd) ~~(y)~~ "irrigation audit" means an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule. The audit must be conducted in a manner consistent with the Irrigation Association's Landscape Irrigation Auditor Certification program or other U.S. Environmental Protection Agency "Watersense" labeled auditing program.

(ee) ~~(z)~~ "irrigation efficiency" (IE) means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The ~~minimum average~~ irrigation efficiency for purposes of this ordinance are 0.75 for overhead spray devices and 0.81 for drip systems.~~is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems~~.

(ff) ~~(aa)~~ "irrigation survey" means an evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.

(gg) ~~(bb)~~ "irrigation water use analysis" means an analysis of water use data based on meter readings and billing data.

(hh) ~~(cc)~~ "landscape architect" means a person who holds a license to practice landscape architecture in the state of California Business and Professions Code, Section 5615.

(ii) ~~(dd)~~ "landscape area" means all the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

(jj) ~~(ee)~~ "landscape contractor" means a person licensed by the state of California to construct, maintain, repair, install, or subcontract the development of landscape systems.

(kk) ~~(ff)~~ "Landscape Documentation Package" means the documents required under Section 492.3.

(ll) ~~(gg)~~ "landscape project" means total area of landscape in a project as defined in "landscape area" for the purposes of this ordinance, meeting requirements under Section 490.1.

(mm) "landscape water meter" means an inline device installed at the irrigation supply point that measures the flow of water into the irrigation system and is connected to a totalizer to record water use.

(nn) ~~(hh)~~ "lateral line" means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

(oo) ~~(ii)~~ "local agency" means a city or county, including a charter city or charter county, that is responsible for adopting and implementing the ordinance. The local agency is also responsible for the enforcement of this ordinance, including but not limited to, approval of a permit and plan check or design review of a project.

(pp) ~~(jj)~~ "local water purveyor" means any entity, including a public agency, city, county, or private water company that provides retail water service.

(qq) ~~(kk)~~ "low volume irrigation" means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip, drip lines, and bubblers. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

(rr) ~~(ll)~~ "main line" means the pressurized pipeline that delivers water from the water source to the valve or outlet.

(ss) "master shut-off valve" is an automatic valve installed at the irrigation supply point which controls water flow into the irrigation system. When this valve is closed water will not be supplied to the irrigation system. A master valve will greatly reduce any water loss due to a leaky station valve.

(tt) ~~(mm)~~ "Maximum Applied Water Allowance" (MAWA) means the upper limit of annual applied water for the established landscaped area as specified in Section 492.4. It is based upon the area's reference evapotranspiration, the ET Adjustment Factor, and the size of the landscape area. The Estimated Total Water Use shall not exceed the Maximum Applied Water Allowance. Special Landscape Areas, including recreation areas, areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens, and areas irrigated with recycled water are subject to the MAWA with an ETAF not to exceed 1.0. MAWA = (ETo) (0.62) [(ETAF x LA) + ((1-ETAF) x SLA)]

(uu) "median" is an area between opposing lanes of traffic that may be unplanted or planted with trees, shrubs, perennials, and ornamental grasses.

(vv)~~(nn)~~ "microclimate" means the climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.

(ww) ~~(oo)~~ "mined-land reclamation projects" means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.
(xx) ~~(pp)~~ "mulch" means any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, ~~and~~or decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.
(yy) ~~(qq)~~ "new construction" means, for the purposes of this ordinance, a new building with a landscape or other new landscape, such as a park, playground, or greenbelt without an associated building.
(zz) "non-residential landscape" means landscapes in commercial, institutional, industrial and public settings that may have areas designated for recreation or public assembly. It also includes portions of common areas of common interest developments with designated recreational areas.
(aaa) ~~(rr)~~ "operating pressure" means the pressure at which the parts of an irrigation system are designed by the manufacturer to operate.
(bbb) ~~(ss)~~ "overhead sprinkler irrigation systems" or "overhead spray irrigation systems" means systems that deliver water through the air (e.g., spray heads and rotors).
(ccc) ~~(tt)~~ "overspray" means the irrigation water which is delivered beyond the target area.
(ddd)"parkway" means the area between a sidewalk and the curb or traffic lane. It may be planted or unplanted, and with or without pedestrian egress.
(eee) ~~(uu)~~ "permit" means an authorizing document issued by local agencies for new construction or rehabilitated landscapes.
(fff) ~~(vv)~~ "pervious" means any surface or material that allows the passage of water through the material and into the underlying soil.
(ggg) ~~(ww)~~ "plant factor" or "plant water use factor" is a factor, when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this ordinance, the plant factor range for very low water use plants is 0 to 0.1, the plant factor range for low water use plants is ~~0~~0.1 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant factor range for high water use plants is 0.7 to 1.0. Plant factors cited in this ordinance are derived from the ~~Department of Water Resources 2000~~ publication "Water Use Classification of Landscape Species". Plant factors may also be obtained from horticultural researchers from academic institutions or professional associations as approved by the California Department of Water Resources (DWR).
~~(xx) "precipitation rate" means the rate of application of water measured in inches per hour.~~
(hhh) ~~(yy)~~ "project applicant" means the individual or entity submitting a Landscape Documentation Package required under Section 492.3, to request a permit, plan check, or design review from the local agency. A project applicant may be the property owner or his or her designee.
(iii) ~~(zz)~~ "rain sensor" or "rain sensing shutoff device" means a component which automatically suspends an irrigation event when it rains.
(jjj) ~~(aaa)~~ "record drawing" or "as-builts" means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.
(kkk) ~~(bbb)~~ "recreational area" means areas, excluding private single family residential areas, ~~dedicated~~ designated ~~to~~for active play, recreation or public assembly ~~such as~~in parks, sports fields, picnic grounds, amphitheaters ~~and~~or golf course~~s where turf provides a playing surface.~~ tees, fairways, roughs, surrounds and greens.
(lll) ~~(ccc)~~ "recycled water," "reclaimed water," or "treated sewage effluent water" means treated or recycled waste water of a quality suitable for nonpotable uses such as landscape irrigation and water features. This water is not intended for human consumption.
(mmm) ~~(ddd)~~ "reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches per day, month, or year as represented in Appendix A ~~Section 495.1~~, and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration is used as

the basis of determining the Maximum Applied Water Allowances so that regional differences in climate can be accommodated.

(nnn) "Regional Water Efficient Landscape Ordinance" means a local Ordinance adopted by two or more local agencies, water suppliers and other stakeholders for implementing a consistent set of landscape provisions throughout a geographical region. Regional ordinances are strongly encouraged to provide a consistent framework for the landscape industry and applicants to adhere to.

(ooo) ~~(eee)~~ "rehabilitated landscape" means any relandscaping project that requires a permit, plan check, or design review, meets the requirements of Section 490.1, and the modified landscape area is equal to or greater than 2,500 square feet~~, is 50% of the total landscape area, and the modifications are completed within one year~~.

(ppp) "residential landscape" means landscapes surrounding single or multifamily homes.

(qqq) ~~(fff)~~ "run off" means water which is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, run off may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a slope.

(rrr) ~~(ggg)~~ "soil moisture sensing device" or "soil moisture sensor" means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.

(sss) ~~(hhh)~~ "soil texture" means the classification of soil based on its percentage of sand, silt, and clay.

(ttt) ~~(iii)~~ "Special Landscape Area" (SLA) means an area of the landscape dedicated solely to edible plants, recreational areas, areas irrigated with recycled water, or water features using recycled water ~~and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface~~.

(uuu) ~~(jjj)~~ "sprinkler head" or "spray head" means a device which delivers water through a nozzle.

(vvv) ~~(kkk)~~ "static water pressure" means the pipeline or municipal water supply pressure when water is not flowing.

(www) ~~(lll)~~ "station" means an area served by one valve or by a set of valves that operate simultaneously.

(xxx) ~~(mmm)~~ "swing joint" means an irrigation component that provides a flexible, leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.

(yyy) "submeter" means a metering device to measure water applied to the landscape that is installed after the primary utility water meter.

(zzz) ~~(nnn)~~ "turf" means a ground cover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

(aaaa) ~~(ooo)~~ "valve" means a device used to control the flow of water in the irrigation system.
~~(ss) "water conservation concept statement" means a one page checklist and a narrative summary of the project as shown in Section 492(c)(1).~~

(bbbb) ~~(ppp)~~ "water conserving plant species" means a plant species identified as having a very low or low plant factor.

(cccc) ~~(qqq)~~ "water feature" means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied). The surface area of water features is included in the high water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment or stormwater best management practices that are not irrigated and used solely for water treatment or stormwater retention are not water features and, therefore, are not subject to the water budget calculation.

(dddd) ~~(rrr)~~ "watering window" means the time of day irrigation is allowed.

(eeee) ~~(sss)~~ "WUCOLS" means the Water Use Classification of Landscape Species published by the University of California Cooperative Extension~~,~~ and the Department of Water Resources ~~and the Bureau of Reclamation, 2000~~2014.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

per agency request 9/14/15 LM

Note: Authority cited: Section 65595, Government Code. Reference: Sections 65592 and 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492. Provisions for New Construction or Rehabilitated Landscapes.**

(a) A local agency may designate by mutual agreement, another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.4. Water Efficient Landscape Worksheet.**

(a) A project applicant shall complete the Water Efficient Landscape Worksheet in Appendix B which contains information on the plant factor, irrigation method, irrigation efficiency, and area associated with each hydrozone. Calculations are then made to show that the evapotranspiration adjustment factor (ETAF) for the landscape project does not exceed a factor of 0.55 for residential areas and 0.45 for non-residential areas, exclusive of Special Landscape Areas. The ETAF for a landscape project is based on the plant factors and irrigation methods selected. The Maximum Applied Water Allowance is calculated based on the maximum ETAF allowed (0.55 for residential areas and 0.45 for non-residential areas) and expressed as annual gallons required. The Estimated Total Water Use (ETWU) is calculated based on the plants used and irrigation method selected for the landscape design. ETWU must be below the MAWA. ~~two sections (see sample worksheet in Appendix B):~~

~~(1) a hydrozone information table (see Appendix B, Section A) for the landscape project; and~~

~~(2) a water budget calculation (see Appendix B, Section B) for the landscape project. For the calculation of the~~

(1) In calculating the Maximum Applied Water Allowance and Estimated Total Water Use, a project applicant shall use the ETo values from the Reference Evapotranspiration Table in Appendix A. For geographic areas not covered in Appendix A, use data from other cities located nearby in the same reference evapotranspiration zone, as found in the CIMIS Reference Evapotranspiration Zones Map, Department of Water Resources, 1999.

(b) Water budget calculations shall adhere to the following requirements:

(1) The plant factor used shall be from WUCOLS or from horticultural researchers with academic institutions or professional associations as approved by the California Department of Water Resources (DWR). The plant factor ranges from 0 to 0.1 for very low water using plants, 0.1 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.

(2) All water features shall be included in the high water use hydrozone and temporarily irrigated areas shall be included in the low water use hydrozone.

(3) All Special Landscape Areas shall be identified and their water use calculated as shown in Appendix B ~~described below~~.

(4) ETAF for new and existing (non-rehabilitated) Special Landscape Areas shall not exceed 1.0.

~~(c) Maximum Applied Water Allowance~~

~~The Maximum Applied Water Allowance shall be calculated using the equation;~~

~~MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]~~

~~The example calculations below are hypothetical to demonstrate proper use of the equations and do not represent an existing and/or planned landscape project. The ETo values used in these calculations are from the Reference Evapotranspiration Table in Appendix A, for planning purposes only. For actual irrigation scheduling, automatic irrigation controllers are required and shall use current reference~~

~~evapotranspiration data, such as from the California Irrigation Management Information System (CIMIS), other equivalent data, or soil moisture sensor data.~~

~~(1) Example MAWA calculation: a hypothetical landscape project in Fresno, CA with an irrigated landscape area of 50,000 square feet without any Special Landscape Area (SLA= 0, no edible plants or recreational areas or use of recycled water). To calculate MAWA, the annual reference evapotranspiration value for Fresno is 51.1 inches as listed in the Reference Evapotranspiration Table in Appendix A.~~

~~MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]~~
~~MAWA = Maximum Applied Water Allowance (gallons per year)~~
~~ETo = Reference Evapotranspiration (inches per year)~~
~~0.62 = Conversion Factor (to gallons)~~
~~0.7 = ET Adjustment Factor (ETAF)~~
~~LA = Landscape Area including SLA (square feet)~~
~~0.3 = Additional Water Allowance for SLA~~
~~SLA = Special Landscape Area (square feet)~~
~~MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 0)]~~
~~= 1,108,870 gallons per year~~
~~To convert from gallons per year to hundred-cubic-feet per year:~~
~~= 1,108,870 /748 = 1,482 hundred-cubic-feet per year~~
~~(100 cubic feet = 748 gallons)~~

~~(2) In this next hypothetical example, the landscape project in Fresno, CA has the same ETo value of 51.1 inches and a total landscape area of 50,000 square feet. Within the 50,000 square foot project, there is now a 2,000 square foot area planted with edible plants. This 2,000 square foot area is considered to be a Special Landscape Area.~~

~~MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]~~
~~MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 2,000 square feet)]~~
~~= 31.68 x [35,000 + 600] gallons per year~~
~~= 31.68 x 35,600 gallons per year~~
~~=1,127,808 gallons per year or 1,508 hundred-cubic-feet per year~~

~~(d) Estimated Total Water Use.~~

~~The Estimated Total Water Use shall be calculated using the equation below. The sum of the Estimated Total Water Use calculated for all hydrozones shall not exceed MAWA.~~

$$\cancel{ETWU = (ETo)(0.62)\left(\frac{PF\ x\ HA}{IE} + SLA\right)}$$

~~Where:~~

~~ETWU = Estimated Total Water Use per year (gallons)~~
~~ETo = Reference Evapotranspiration (inches)~~
~~PF = Plant Factor from WUCOLS (see Section 491)~~
~~HA = Hydrozone Area [high, medium, and low water use areas] (square feet)~~
~~SLA = Special Landscape Area (square feet)~~
~~0.62 = Conversion Factor~~
~~IE = Irrigation Efficiency (minimum 0.71)~~

~~(1) Example ETWU calculation: landscape area is 50,000 square feet; plant water use type, plant factor, and hydrozone area are shown in the table below. The ETo value is 51.1 inches per year.~~

~~There are no Special Landscape Areas (recreational area, area permanently and solely dedicated to edible plants, and area irrigated with recycled water) in this example.~~

| ~~Hydrozone~~ | ~~Plant Water Use Type(s)~~ | ~~Plant Factor (PF)*~~ | ~~Hydrozone Area (HA) (square feet)~~ | ~~PF x HA (square feet)~~ |
|---|---|---|---|---|
| ~~1~~ | ~~High~~ | ~~0.8~~ | ~~7,000~~ | ~~5,600~~ |
| ~~2~~ | ~~High~~ | ~~0.7~~ | ~~10,000~~ | ~~7,000~~ |
| ~~3~~ | ~~Medium~~ | ~~0.5~~ | ~~16,000~~ | ~~8,000~~ |
| ~~4~~ | ~~Low~~ | ~~0.3~~ | ~~7,000~~ | ~~2,100~~ |
| ~~5~~ | ~~Low~~ | ~~0.2~~ | ~~10,000~~ | ~~2,000~~ |
| | | | ~~Sum~~ | ~~24,700~~ |

~~*Plant Factor from WUCOLS~~

$$\cancel{ETWU = (51.1)(0.62)\left(\frac{24,700}{0.71} + 0\right)}$$

~~= 1,102,116 gallons per year~~

~~Compare ETWU with MAWA: For this example MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 0)] = 1,108,870 gallons per year. The ETWU (1,102,116 gallons per year) is less than MAWA (1,108,870 gallons per year). In this example, the water budget complies with the MAWA.~~

~~(2) Example ETWU calculation: total landscape area is 50,000 square feet, 2,000 square feet of which is planted with edible plants. The edible plant area is considered a Special Landscape Area (SLA). The reference evapotranspiration value is 51.1 inches per year. The plant type, plant factor, and hydrozone area are shown in the table below.~~

| ~~Hydrozone~~ | ~~Plant Water Use Type(s)~~ | ~~Plant Factor (PF)*~~ | ~~Hydrozone Area (HA) (square feet)~~ | ~~PF x HA (square feet)~~ |
|---|---|---|---|---|
| ~~1~~ | ~~High~~ | ~~0.8~~ | ~~7,000~~ | ~~5,600~~ |
| ~~2~~ | ~~High~~ | ~~0.7~~ | ~~9,000~~ | ~~6,300~~ |
| ~~3~~ | ~~Medium~~ | ~~0.5~~ | ~~15,000~~ | ~~7,500~~ |
| ~~4~~ | ~~Low~~ | ~~0.3~~ | ~~7,000~~ | ~~2,100~~ |
| ~~5~~ | ~~Low~~ | ~~0.2~~ | ~~10,000~~ | ~~2,000~~ |
| | | | ~~Sum~~ | ~~23,500~~ |
| ~~6~~ | ~~SLA~~ | ~~1.0~~ | ~~2,000~~ | ~~2,000~~ |

~~*Plant Factor from WUCOLS~~

$$\cancel{ETWU = (51.1)(0.62)\left(\frac{23,500}{0.71} + 2,000\right)}$$

~~= (31.68) (33,099 + 2,000)~~

~~= 1,111,936 gallons per year~~

~~Compare ETWU with MAWA. For this example:~~

~~MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 2,000)]~~

~~= 31.68 x [35,000 + 600]~~

~~= 31.68 x 35,600~~

~~= 1,127,808 gallons per year~~

~~The ETWU (1,111,936 gallons per year) is less than MAWA (1,127,808 gallons per year). For this example, the water budget complies with the MAWA.~~

Note: Authority cited: Section 65595, Government Code; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015). Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.5. Soil Management Report.**

(a) In order to reduce runoff and encourage healthy plant growth, a soil management report shall be completed by the project applicant, or his/her designee, as follows:

(1) Submit soil samples to a laboratory for analysis and recommendations.

(A) Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.

(B) The soil analysis ~~may~~shall include:

1. soil texture;
2. infiltration rate determined by laboratory test or soil texture infiltration rate table;
3. pH;
4. total soluble salts;
5. sodium;
6. percent organic matter; and
7. recommendations.

(C) In projects with multiple landscape installations (i.e. production home developments) a soil sampling rate of 1 in 7 lots or approximately 15% will satisfy this requirement. Large landscape projects shall sample at a rate equivalent to 1 in 7 lots.

(2) The project applicant, or his/her designee, shall comply with one of the following:

(A) If significant mass grading is not planned, the soil analysis report shall be submitted to the local agency as part of the Landscape Documentation Package; or

(B) If significant mass grading is planned, the soil analysis report shall be submitted to the local agency as part of the Certificate of Completion.

(3) The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans.

(4) The project applicant, or his/her designee, shall submit documentation verifying implementation of soil analysis report recommendations to the local agency with Certificate of Completion.

Note: Authority cited: Section 65595, Government Code; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015). Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.6. Landscape Design Plan.**

(a) For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. A landscape design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.

(1) Plant Material

(A) Any plant may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance. ~~To encourage the efficient use of water, the following is highly recommended~~ Methods to achieve water efficiency shall include one or more of the following:

1. protection and preservation of native species and natural vegetation;
2. selection of water-conserving plant, tree and turf species, especially local native plants;
3. selection of plants based on local climate suitability, disease and pest resistance;
4. selection of trees based on applicable local tree ordinances or tree shading guidelines, and size at maturity as appropriate for the planting area; and
5. selection of plants from local and regional landscape program plant lists.
6. selection of plants from local Fuel Modification Plan Guidelines.

(B) Each hydrozone shall have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use, as specified in Section 492.7(a)(2)(D).

(C) Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. ~~To encourage the efficient use of water, the following is highly recommended~~ Methods to achieve water efficiency shall include one or more of the following:

1. use the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate;
2. recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure [e.g., buildings, sidewalks, power lines]; allow for adequate soil volume for healthy root growth; and
3. consider the solar orientation for plant placement to maximize summer shade and winter solar gain.

(D) Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).

(E) High water use plants, characterized by a plant factor of 0.7 to 1.0, are prohibited in street medians.

(F) ~~(E)~~ A landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4291(a) and (b). Avoid fire-prone plant materials and highly flammable mulches. Refer to the local Fuel Modification Plan guidelines.

(G) ~~(F)~~ The use of invasive ~~and/or noxious~~ plant species, such as those listed by the California Invasive Plant Council, is strongly discouraged.

(H) ~~(G)~~ The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.

(2) Water Features

(A) Recirculating water systems shall be used for water features.

(B) Where available, recycled water shall be used as a source for decorative water features.

(C) Surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.

(D) Pool and spa covers are highly recommended.

(3) Soil Preparation, Mulch and Amendments

(A) Prior to the planting of any materials, compacted soils shall be transformed to a friable condition. On engineered slopes, only amended planting holes need meet this requirement.

(B) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 492.5).

(C) For landscape installations, compost at a rate of a minimum of four cubic yards per 1,000 square feet of permeable area shall be incorporated to a depth of six inches into the soil. Soils with greater than 6% organic matter in the top 6 inches of soil are exempt from adding compost and tilling.

(D) ~~(A)~~ A minimum ~~two~~three inch (~~2~~3") layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated. To provide habitat for beneficial insects and other wildlife, up to 5 % of the landscape area may be left without mulch. Designated insect habitat must be included in the landscape design plan as such.

(E) ~~(B)~~ Stabilizing mulching products shall be used on slopes that meet current engineering standards.

(F) ~~(C)~~ The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement.

(G) Organic mulch materials made from recycled or post-consumer shall take precedence over inorganic materials or virgin forest products unless the recycled post-consumer organic products are not locally available. Organic mulches are not required where prohibited by local Fuel Modification Plan Guidelines or other applicable local ordinances.

~~(D) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 492.5).~~

(b) The landscape design plan, at a minimum, shall:

(1) delineate and label each hydrozone by number, letter, or other method;

(2) identify each hydrozone as low, moderate, high water, or mixed water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation;

(3) identify recreational areas;

(4) identify areas permanently and solely dedicated to edible plants;

(5) identify areas irrigated with recycled water;

(6) identify type of mulch and application depth;

(7) identify soil amendments, type, and quantity;

(8) identify type and surface area of water features;

(9) identify hardscapes (pervious and non-pervious);

(10) identify location, ~~and~~ installation details, and 24-hour retention or infiltration capacity of any applicable stormwater best management practices that encourage on-site retention and infiltration of stormwater. Project applicants shall refer to the local agency or regional Water Quality Control Board for information on any applicable stormwater technical requirements. Stormwater best management practices are encouraged in the landscape design plan and examples ~~include, but are not limited to:~~ are provided in Section 492.16.

~~(A) infiltration beds, swales, and basins that allow water to collect and soak into the ground;~~

~~(B) constructed wetlands and retention ponds that retain water, handle excess flow, and filter pollutants; and~~

~~(C) pervious or porous surfaces (e.g., permeable pavers or blocks, pervious or porous concrete, etc.) that minimize runoff.~~

(11) identify any applicable rain harvesting or catchment technologies ~~(e.g., rain gardens, cisterns, etc.)~~as discussed in Section 492.16 and their 24-hour retention or infiltration capacity;

(12) identify any applicable graywater discharge piping, system components and area(s) of distribution;

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(13) ~~(12)~~ contain the following statement: "I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan"; and
(14) ~~(13)~~ bear the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agriculture Code.)

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code Reference: Section 65596, Government Code; ~~and~~ Section 1351, Civil Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.7. Irrigation Design Plan.**

(a) This section applies to landscaped areas requiring permanent irrigation, not areas that require temporary irrigation solely for the plant establishment period. For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance. An irrigation design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.

(1) System

(A) ~~Dedicated l~~Landscape water meters, defined as either a dedicated water service meter or private submeter, ~~are highly recommended on landscape areas smaller than 5,000 square feet to facilitate water management.~~shall be installed for all non-residential irrigated landscapes of 1,000 sq. ft. but not more than 5,000 sq.ft. (the level at which *Water Code* 535 applies) and residential irrigated landscapes of 5,000 sq. ft. or greater. A landscape water meter may be either:

1. a customer service meter dedicated to landscape use provided by the local water purveyor; or
2. a privately owned meter or submeter.

(B) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data utilizing non-volatile memory shall be required for irrigation scheduling in all irrigation systems.

(C) If the water pressure is below or exceeds the recommended pressure of the specified irrigation devices, the installation of a pressure regulating device is required ~~The irrigation system shall be designed~~ to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.

1. If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed to meet the required dynamic pressure of the irrigation system.
2. Static water pressure, dynamic or operating pressure, and flow reading of the water supply shall be measured at the point of connection. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.

(D) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.

(E) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.

(F) Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system. A project applicant shall refer to the applicable local agency code (i.e., public health) for additional backflow prevention requirements.

(G) ~~High~~ F~~f~~low sensors that detect ~~and report~~ high flow conditions created by system damage or malfunction are ~~recommended~~required for all on non-residential landscapes and residential landscapes of 5000 sq. ft. or larger.

(H) Master shut-off valves are required on all projects except landscapes that make use of technologies that allow for the individual control of sprinklers that are individually pressurized in a system equipped with low pressure shut down features.

(I) ~~(H)~~ The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.

(J) ~~(I)~~ Relevant information from the soil management plan, such as soil type and infiltration rate, shall be utilized when designing irrigation systems.

(K) ~~(J)~~ The design of the irrigation system shall conform to the hydrozones of the landscape design plan.

(L) ~~(K)~~ The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria as described in Section 492.4 regarding the Maximum Applied Water Allowance.

(M) All irrigation emission devices must meet the requirements set in the American National Standards Institute (ANSI) standard, American Society of Agricultural and Biological Engineers'/International Code Council's (ASABE/ICC) 802-2014 "Landscape Irrigation Sprinkler and Emitter Standard. All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.

(N) ~~(L)~~ It is highly recommended that the project applicant or local agency inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.

(O) ~~(M)~~ In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.

(P) ~~(N)~~ Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.

(Q) ~~(O)~~ Head to head coverage is recommended. However, sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.

(R) ~~(P)~~ Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to hardscapes or in high traffic areas of turfgrass.

(S) ~~(Q)~~ Check valves or anti-drain valves are required ~~for all irrigation systems~~on all sprinkler heads where low point drainage could occur.

(T) ~~(R) Narrow or irregularly shaped areas, including turf,~~ Areas less than ten~~eight~~ (~~8~~10) feet in width in any direction shall be irrigated with subsurface irrigation or ~~low volume irrigation system.~~ other means that produces no runoff or overspray.

(U) ~~(S)~~ Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:

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1. the landscape area is adjacent to permeable surfacing and no runoff occurs; or
2. the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping; or
3. the irrigation designer specifies an alternative design or technology, as part of the Landscape Documentation Package and clearly demonstrates strict adherence to irrigation system design criteria in Section 492.7 (a)(1)(~~H~~I). Prevention of overspray and runoff must be confirmed during the irrigation audit.

(V) ~~(T)~~ Slopes greater than 25% shall not be irrigated with an irrigation system with a ~~precipitation~~application rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.

(2) Hydrozone

(A) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
(B) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
(C) Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf to facilitate the appropriate irrigation of trees. The mature size and extent of the root zone shall be considered when designing irrigation for the tree.
(D) Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:
1. plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
2. the plant factor of the higher water using plant is used for calculations.
(E) Individual hydrozones that mix high and low water use plants shall not be permitted.
(F) On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the Hydrozone Information Table (see Appendix B Section A). This table can also assist with the irrigation audit and programming the controller.

(b) The irrigation design plan, at a minimum, shall contain:
(1) location and size of separate water meters for landscape;
(2) location, type and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices;
(3) static water pressure at the point of connection to the public water supply;
(4) flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;
(5) recycled water irrigation systems as specified in Section 492.14;
(6) the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan"; and
(7) the signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agricultural Code.)

; and Sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and Section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.9. Certificate of Completion.**

(a) The Certificate of Completion (see Appendix C for a sample certificate) shall include the following six (6) elements:

(1) project information sheet that contains:

(A) date;

(B) project name;

(C) project applicant name, telephone, and mailing address;

(D) project address and location; and

(E) property owner name, telephone, and mailing address;

(2) certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package;

(A) where there have been significant changes made in the field during construction, these "as-built" or record drawings shall be included with the certification;

(B) A diagram of the irrigation plan showing hydrozones shall be kept with the irrigation controller for subsequent management purposes.

(3) irrigation scheduling parameters used to set the controller (see Section 492.10);

(4) landscape and irrigation maintenance schedule (see Section 492.11);

(5) irrigation audit report (see Section 492.12); and

(6) soil analysis report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of soil report recommendations (see Section 492.5).

(b) The project applicant shall:

(1) submit the signed Certificate of Completion to the local agency for review;

(2) ensure that copies of the approved Certificate of Completion are submitted to the local water purveyor and property owner or his or her designee.

(c) The local agency shall:

(1) receive the signed Certificate of Completion from the project applicant;

(2) approve or deny the Certificate of Completion. If the Certificate of Completion is denied, the local agency shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.11. Landscape and Irrigation Maintenance Schedule.**

(a) Landscapes shall be maintained to ensure water use efficiency. A regular maintenance schedule shall be submitted with the Certificate of Completion.

(b) A regular maintenance schedule shall include, but not be limited to, routine inspection; auditing, adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; topdressing with compost, replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing ~~and~~ obstructions to emission devices. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

(c) Repair of all irrigation equipment shall be done with the originally installed components or their equivalents or with components with greater efficiency.

(d) A project applicant is encouraged to implement established landscape industry sustainable Best Practices ~~or environmentally-friendly practices~~for ~~overall~~ all landscape maintenance activities.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.12. Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.**

LM per agency request 9/14/15

(a) All landscape irrigation audits shall be conducted by a local agency landscape irrigation auditor or a third party certified landscape irrigation auditor. Landscape audits shall not be conducted by the person who designed the landscape or installed the landscape.
(b) In large projects or projects with multiple landscape installations (i.e. production home developments) an auditing rate of 1 in 7 lots or approximately 15% will satisfy this requirement.
~~(b)~~(c) For new construction and rehabilitated landscape projects installed after ~~January 1, 2010~~December 1, 2015, as described in Section 490.1:

(1) the project applicant shall submit an irrigation audit report with the Certificate of Completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule, including configuring irrigation controllers with application rate, soil types, plant factors, slope, exposure and any other factors necessary for accurate programming;

(2) the local agency shall administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Allowance.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.13. Irrigation Efficiency.**

(a) For the purpose of determining ~~Maximum Applied Water Allowance~~Estimated Total Water Use, average irrigation efficiency is assumed to be 0.75~~0.71~~ for overhead spray devices and 0.81 for drip system devices. ~~Irrigation systems shall be designed, maintained, and managed to meet or exceed an average landscape irrigation efficiency of 0.71.~~

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.14. Recycled Water.**

(a) The installation of recycled water irrigation systems shall allow for the current and future use of recycled water~~, unless a written exemption has been granted as described in Section 492.14(b)~~.
~~(b) Irrigation systems and decorative water features shall use recycled water unless a written exemption has been granted by the local water purveyor stating that recycled water meeting all public health codes and standards is not available and will not be available for the foreseeable future.~~
~~(c)~~ (b) All recycled water irrigation systems shall be designed and operated in accordance with all applicable local and State laws.
~~(d)~~ (c) Landscapes using recycled water are considered Special Landscape Areas. The ET Adjustment Factor for new and existing (non-rehabilitated) Special Landscape Areas shall not exceed 1.0.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.15. Graywater Systems.**

(a) Graywater systems promote the efficient use of water and are encouraged to assist in on-site landscape irrigation. All graywater systems shall conform to the California Plumbing Code (Title 24, Part 5, Chapter 16) and any applicable local ordinance standards. Refer to § 490.1 (d) for the applicability of this ordinance to landscape areas less than 2,500 square feet with the Estimated Total Water Use met entirely by graywater.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code. Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.16~~5~~. Stormwater Management and Rainwater Retention.**

(a) Stormwater management practices minimize runoff and increase infiltration which recharges groundwater and improves water quality. Implementing stormwater best management practices into the landscape and grading design plans to minimize runoff and to increase on-site rainwater retention and infiltration are encouraged.
(b) Project applicants shall refer to the local agency or Regional Water Quality Control Board for information on any applicable stormwater technical requirements~~ordinances and stormwater management plans~~.
(c) All planted landscape areas are required to have friable soil to maximize water retention and infiltration. Refer to § 492.6(a)(3).
(d) It is strongly recommended that landscape areas be designed for capture and infiltration capacity that is sufficient to prevent runoff from impervious surfaces (i.e. roof and paved areas) from either: the one inch, 24-hour rain event or (2) the 85th percentile, 24-hour rain event, and/or additional capacity as required by any applicable local, regional, state or federal regulation.
(e) It is recommended that storm water projects incorporate any of the following elements to improve on-site storm water and dry weather runoff capture and use:

- Grade impervious surfaces, such as driveways, during construction to drain to vegetated areas.
- Minimize the area of impervious surfaces such as paved areas, roof and concrete driveways.
- Incorporate pervious or porous surfaces (e.g., gravel, permeable pavers or blocks, pervious or porous concrete) that minimize runoff.
- Direct runoff from paved surfaces and roof areas into planting beds or landscaped areas to maximize site water capture and reuse.
- Incorporate rain gardens, cisterns, and other rain harvesting or catchment systems.
- Incorporate infiltration beds, swales, basins and drywells to capture storm water and dry weather runoff and increase percolation into the soil.
- Consider constructed wetlands and ponds that retain water, equalize excess flow, and filter pollutants.

~~(c) Rain gardens, cisterns, and other landscapes features and practices that increase rainwater capture and create opportunities for infiltration and/or onsite storage are recommended.~~

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).
Note: Authority cited: Section 65595, Government Code Reference: Section 65596, Government Code;
and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.176. Public Education.**
(a) Publications. Education is a critical component to promote the efficient use of water in landscapes. The use of appropriate principles of design, installation, management and maintenance that save water is encouraged in the community.

(1) A local agency or water supplier/purveyor shall provide information to owners of permitted renovations and new, single-family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes based on a water budget.

(b) Model Homes. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes described in this ordinance.

(1) Signs shall be used to identify the model as an example of a water efficient landscape featuring elements such as hydrozones, irrigation equipment, and others that contribute to the overall water efficient theme. Signage shall include information about the site water use as designed per the local ordinance; specify who designed and installed the water efficient landscape; and demonstrate low water use approaches to landscaping such as using native plants, graywater systems, and rainwater catchment systems.

(2) Information shall be provided about designing, installing, managing, and maintaining water efficient landscapes.

; and sections 11 an[illegible]0, Governor's Exec. Order No. B-29[illegible] (April 1, 2015).

LM per agency 9/14/1 request

Note: Authority cited: Section 65595, Government Code; Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 492.18~~7~~. Environmental Review.**

(a) The local agency must comply with the California Environmental Quality Act (CEQA), as appropriate.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 21082, Public Resources Code; Reference: Sections 21080 and 21082, Public Resources Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 493. Provisions for Existing Landscapes.**

(a) A local agency may by mutual agreement, designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code; Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 493.1. Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.**

(a) This section, 493.1, shall apply to all existing landscapes that were installed before ~~January 1, 2010~~ December 1, 2015 and are over one acre in size.

(1) For all landscapes in 493.1(a) that have a water meter, the local agency shall administer programs that may include, but not be limited to, irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes. The Maximum Applied Water Allowance for existing landscapes shall be calculated as: MAWA = (0.8) (ETo)(LA)(0.62).

(2) For all landscapes in 493.1(a), that do not have a meter, the local agency shall administer programs that may include, but not be limited to, irrigation surveys and irrigation audits to evaluate water use and provide recommendations as necessary in order to prevent water waste.

(b) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code; Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 494. Effective Precipitation.**

(a) A local agency may consider Effective Precipitation (25% of annual precipitation) in tracking water use and may use the following equation to calculate Maximum Applied Water Allowance:

MAWA= (ETo - Eppt) (0.62) [(~~0.7~~0.55 x LA) + (~~0.3~~0.45 x SLA)] for residential areas.

MAWA= (ETo-EPPT) (0.62) [(0.45 x LA) + (0.55 x SLA)] for non-residential areas.

; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Note: Authority cited: Section 65595, Government Code; Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

**§ 495. Reporting.**

(a) Local agencies shall report on implementation and enforcement by December 31, 2015. Local agencies responsible for administering individual ordinances shall report on their updated ordinance, while those agencies developing a regional ordinance shall report on their existing ordinance. Those agencies crafting a regional ordinances shall also report on their new ordinance by March 1, 2016. Subsequently, reporting for all agencies will be due by January 31st of each year. Reports shall be submitted to the Department of Water Resources.

(b) Local agencies are to address the following:

(1) State whether you are adopting a single agency ordinance or a regional agency alliance ordinance, and the date of adoption or anticipated date of adoption.

LM per agency request 9/14/1

(2) Define the reporting period. The reporting period shall commence on December 1, 2015 and the end on December 28, 2015. For local agencies crafting regional ordinances with other agencies, there shall be an additional reporting period commencing on February 1, 2016 and ending on February 28, 2016. In subsequent years, all local agency reporting will be for the calendar year.

(3) State if using a locally modified Water Efficient Landscape Ordinance (WELO) or the MWELO. If using a locally modified WELO, how is it different than MWELO, is it at least as efficient as MWELO, and are there any exemptions specified?

(4) State the entity responsible for implementing the ordinance.

(5) State number and types of projects subject to the ordinance during the specified reporting period.

(6) State the total area (in square feet or acres) subject to the ordinance over the reporting period, if available.

(7) Provide the number of new housing starts, new commercial projects, and landscape retrofits during the reporting period.

(8) Describe the procedure for review of projects subject to the ordinance.

(9) Describe actions taken to verify compliance. Is a plan check performed; if so, by what entity? Is a site inspection performed; if so, by what entity? Is a post-installation audit required; if so, by whom?

(10) Describe enforcement measures.

(11) Explain challenges to implementing and enforcing the ordinance.

(12) Describe educational and other needs to properly apply the ordinance.

Note: Authority cited: Section 65595, Government Code; and sections 11 and 30, Governor's Exec. Order No. B-29-15 (April 1, 2015). Reference: Section 65596, Government Code; and section 11, Governor's Exec. Order No. B-29-15 (April 1, 2015).

Appendix A. Reference Evapotranspiration (ETo) Table.

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **ALAMEDA** | | | | | | | | | | | | | |
| Fremont | 1.5 | 1.9 | 3.4 | 4.7 | 5.4 | 6.3 | 6.7 | 6.0 | 4.5 | 3.4 | 1.8 | 1.5 | 47.0 |
| Livermore | 1.2 | 1.5 | 2.9 | 4.4 | 5.9 | 6.6 | 7.4 | 6.4 | 5.3 | 3.2 | 1.5 | [illegible] | 47.2 |
| Oakland | 1.5 | 1.5 | 2.8 | 3.9 | 5.1 | 5.3 | 6.0 | 5.5 | 4.8 | 3.1 | 1.4 | [illegible] | 41.8 |
| Oakland Foothills | 1.1 | 1.4 | 2.7 | 3.7 | 5.1 | 6.4 | 5.8 | 4.9 | 3.6 | 2.6 | 1.4 | 1.0 | 39.6 |
| Pleasanton | 0.8 | 1.5 | 2.9 | 4.4 | 5.6 | 6.7 | 7.4 | 6.4 | 4.7 | 3.3 | [illegible] | 1.0 | 46.2 |
| Union City | 1.4 | 1.8 | 3.1 | 4.2 | 5.4 | 5.9 | 6.4 | 5.7 | 4.4 | 3.1 | [illegible] | 1.2 | 44.2 |
| **ALPINE** | | | | | | | | | | | | | |
| Markleeville | 0.7 | 0.9 | 2.0 | 3.5 | 5.0 | 6.1 | 7.3 | 6.4 | 4.4 | [illegible] | 1.2 | 0.5 | 40.6 |
| **AMADOR** | | | | | | | | | | | | | |
| Jackson | 1.2 | 1.5 | 2.8 | 4.4 | 6.0 | 7.2 | 7.9 | 7.2 | 5.3 | 3.2 | 1.4 | 0.9 | 48.9 |
| Shanandoah Valley | 1.0 | 1.7 | 2.9 | 4.4 | 5.6 | 6.8 | 7.9 | 7.1 | [illegible] | 3.6 | 1.7 | 1.0 | 48.8 |
| **BUTTE** | | | | | | | | | | | | | |
| Chico | [illegible] | 1.8 | 2.9 | 4.7 | 6.1 | 7.4 | 8.5 | 7.3 | 5.4 | 3.7 | 1.7 | 1.0 | 51.7 |
| Durham | 1.1 | 1.8 | 3.2 | 5.0 | 6.5 | 7.4 | 7.8 | [illegible] | 5.3 | 3.6 | 1.7 | 1.0 | 51.1 |
| Gridley | 1.2 | [illegible] | 3.0 | 4.7 | 6.1 | 7.7 | 8.5 | [illegible] | 5.4 | 3.7 | 1.7 | 1.0 | 51.9 |
| Oroville | 1.2 | [illegible] | 2.8 | 4.7 | 6.1 | 7.6 | 8.5 | 7.3 | 5.3 | 3.7 | 1.7 | 1.0 | 51.5 |
| **CALAVERAS** | | | | | | | | | | | | | |
| San Andreas | 1.2 | 1.5 | [illegible] | 4.4 | 6.0 | 7.3 | [illegible] | 7.0 | 5.3 | 3.2 | 1.4 | 0.7 | 48.8 |
| **COLUSA** | | | | | | | | | | | | | |
| Colusa | 1.0 | 1.7 | 3.4 | 5.0 | 6.4 | [illegible] | 8.3 | 7.2 | 5.4 | 3.8 | 1.8 | 1.1 | 52.8 |
| Williams | 1.2 | 1.7 | 2.9 | [illegible] | 6.1 | [illegible] | 8.5 | 7.3 | 5.3 | 3.4 | 1.6 | 1.0 | 50.8 |
| **CONTRA COSTA** | | | | | | | | | | | | | |
| Benicia | 1.3 | 1.4 | 2.7 | 3.8 | [illegible] | 5.0 | 6.4 | 5.5 | 4.4 | 2.9 | 1.2 | 0.7 | 40.3 |
| Brentwood | 1.0 | 1.5 | 2.9 | 4.5 | [illegible] | 7.1 | 7.9 | 6.7 | 5.2 | 3.2 | 1.4 | 0.7 | 48.3 |
| Concord | 1.1 | 1.4 | 2.4 | 4.0 | [illegible] | 5.9 | 7.0 | 6.0 | 4.8 | 3.2 | 1.3 | 0.7 | 43.4 |
| Courtland | 0.9 | 1.5 | 2.9 | [illegible] | 6.1 | 6.9 | 7.9 | 6.7 | 5.3 | 3.2 | 1.4 | 0.7 | 48.0 |
| Martinez | 1.2 | 1.4 | 2.4 | [illegible] | 5.3 | [illegible] | 6.7 | 5.6 | 4.7 | 3.1 | 1.2 | 0.7 | 41.8 |
| Moraga | 1.2 | 1.5 | 3.4 | 4.2 | 5.5 | [illegible] | 6.7 | 5.9 | 4.6 | 3.2 | 1.6 | 1.0 | 44.9 |
| Pittsburg | 1.0 | 1.5 | [illegible] | 4.1 | 5.6 | 6.4 | 7.4 | 6.4 | 5.0 | 3.2 | 1.3 | 0.7 | 45.4 |
| Walnut Creek | 0.8 | 1.5 | 2.9 | 4.4 | 5.6 | 6.7 | [illegible] | 6.4 | 4.7 | 3.3 | 1.5 | 1.0 | 46.2 |
| **DEL NORTE** | | | | | | | | | | | | | |
| Crescent City | 0.5 | [illegible] | 2.0 | 3.0 | 3.7 | 3.5 | 4.3 | 3.7 | 3.0 | 2.0 | 0.9 | 0.5 | 27.7 |
| **EL DORADO** | | | | | | | | | | | | | |
| Camino | 0.9 | 1.7 | 2.5 | 3.9 | 5.9 | 7.2 | 7.8 | [illegible] | 5.1 | 3.1 | 1.5 | 0.9 | 47.3 |
| **FRESNO** | | | | | | | | | | | | | |
| Clovis | 1.0 | 1.5 | 3.2 | 4.8 | 6.4 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.4 |
| Coalinga | 1.2 | 1.7 | 3.1 | 4.6 | 6.2 | 7.2 | 8.5 | 7.3 | [illegible] | 3.4 | 1.6 | 0.7 | 50.9 |
| Firebaugh | 1.0 | 1.8 | 3.7 | 5.7 | 7.3 | 8.1 | 8.2 | 7.2 | 5.5 | 3.9 | 2.0 | 1.1 | 55.4 |
| FivePoints | 1.3 | 2.0 | 4.0 | 6.1 | 7.7 | 8.5 | 8.7 | 8.0 | 6.2 | 4.5 | 2.4 | 1.2 | 60.4 |
| **FRESNO** | | | | | | | | | | | | | |
| Fresno | 0.9 | 1.7 | 3.3 | 4.8 | 6.7 | 7.8 | 8.4 | 7.1 | 5.2 | 3.2 | 1.4 | 0.6 | 51.1 |
| Fresno State | 0.9 | 1.6 | 3.2 | 5.2 | 7.0 | 8.0 | 8.7 | 7.6 | 5.4 | 3.6 | 1.7 | 0.9 | 53.7 |
| Friant | 1.2 | 1.5 | 3.1 | 4.7 | 6.4 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | [illegible] | 0.7 | 51.3 |
| Kerman | 0.9 | 1.5 | 3.2 | 4.8 | 6.6 | 7.7 | 8.4 | 7.2 | 5.3 | 3.4 | 1.4 | 0.7 | 51.2 |
| Kingsburg | 1.0 | 1.5 | 3.4 | 4.8 | 6.6 | 7.7 | 8.4 | 7.2 | 5.3 | 3.4 | 1.4 | 0.7 | 51.6 |
| Mendota | 1.5 | 2.5 | 4.6 | 6.2 | 7.9 | 8.6 | 8.8 | 7.5 | 5.9 | 4.5 | 2.4 | [illegible] | 61.7 |
| Orange Cove | 1.2 | 1.9 | 3.5 | 4.7 | 7.4 | 8.5 | 8.9 | 7.9 | 5.9 | 3.7 | 1.8 | 1.2 | 56.7 |
| Panoche | 1.1 | 2.0 | 4.0 | 5.6 | 7.8 | 8.5 | 8.3 | 7.3 | 5.6 | 3.9 | 1.8 | 1.2 | 57.2 |
| Parlier | 1.0 | 1.9 | 3.6 | 5.2 | 6.8 | 7.6 | 8.1 | 7.0 | 5.1 | 3.4 | 1.7 | 0.9 | [illegible] |
| Reedley | 1.1 | 1.5 | 3.2 | 4.7 | 6.4 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | [illegible] |
| Westlands | 0.9 | 1.7 | 3.8 | 6.3 | 8.0 | 8.6 | 8.6 | 7.8 | 5.9 | 4.3 | 2.1 | 1.1 | 58.8 |

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **GLENN** | | | | | | | | | | | | | |
| Orland | 1.1 | 1.8 | 3.4 | 5.0 | 6.4 | 7.5 | 7.9 | 6.7 | 5.3 | 3.9 | 1.8 | 1.4 | 52.1 |
| Willows | 1.2 | 1.7 | 2.9 | 4.7 | 6.1 | 7.2 | 8.5 | 7.3 | 5.3 | 3.6 | 1.7 | [illegible] | 51.3 |
| **HUMBOLDT** | | | | | | | | | | | | | |
| Eureka | 0.5 | 1.1 | 2.0 | 3.0 | 3.7 | 3.7 | 3.7 | 3.7 | 3.0 | 2.0 | 0.9 | 0.5 | 27.5 |
| Ferndale | 0.5 | 1.1 | 2.0 | 3.0 | 3.7 | 3.7 | 3.7 | 3.7 | 3.0 | 2.0 | [illegible] | 0.5 | 27.5 |
| Garberville | 0.6 | 1.2 | 2.2 | 3.1 | 4.5 | 5.0 | 5.5 | 4.9 | 3.8 | 2.4 | [illegible] | 0.7 | 34.9 |
| Hoopa | 0.5 | 1.1 | 2.1 | 3.0 | 4.4 | 5.4 | 6.1 | 5.1 | 3.8 | 2.4 | 0.9 | 0.7 | 35.6 |
| **IMPERIAL** | | | | | | | | | | | | | |
| Brawley | 2.8 | 3.8 | 5.9 | 8.0 | 10.4 | 11.5 | 11.7 | 10.0 | 8.4 | [illegible] | 3.5 | 2.1 | 84.2 |
| Calipatria/Mulberry | 2.4 | 3.2 | 5.1 | 6.8 | 8.6 | 9.2 | 9.2 | 8.6 | 7.0 | 5.2 | 3.1 | 2.3 | 70.7 |
| El Centro | 2.7 | 3.5 | 5.6 | 7.9 | 10.1 | 11.1 | 11.6 | 9.5 | [illegible] | 6.1 | 3.3 | 2.0 | 81.7 |
| Holtville | [illegible] | 3.8 | 5.9 | 7.9 | 10.4 | 11.6 | 12.0 | 10.0 | [illegible] | 6.2 | 3.5 | 2.1 | 84.7 |
| Meloland | [illegible] | 3.2 | 5.5 | 7.5 | 8.9 | 9.2 | 9.0 | 8.5 | 6.8 | 5.3 | 3.1 | 2.2 | 71.6 |
| Palo Verde II | 2.5 | 3.3 | 5.7 | 6.9 | 8.5 | 8.9 | 8.6 | [illegible] | 6.2 | 4.5 | 2.9 | 2.3 | 68.2 |
| Seeley | 2.7 | [illegible] | 5.9 | 7.7 | 9.7 | 10.1 | 9.3 | [illegible] | 6.9 | 5.5 | 3.4 | 2.2 | 75.4 |
| Westmoreland | 2.4 | [illegible] | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.4 |
| Yuma | 2.5 | 3.4 | 5.3 | 6.9 | 8.7 | 9.6 | [illegible] | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.6 |
| **INYO** | | | | | | | | | | | | | |
| Bishop | 1.7 | 2.7 | [illegible] | 6.7 | 8.2 | 10.9 | 7.4 | 9.6 | 7.4 | 4.8 | 2.5 | 1.6 | 68.3 |
| Death Valley Jct | 2.2 | 3.3 | 5.4 | 7.7 | 9.8 | [illegible] | 11.4 | 10.1 | 8.3 | 5.4 | 2.9 | 1.7 | 79.1 |
| Independence | 1.7 | 2.7 | 3.4 | [illegible] | 8.5 | [illegible] | 9.8 | 8.5 | 7.1 | 3.9 | 2.0 | 1.5 | 65.2 |
| Lower Haiwee Res. | 1.8 | 2.7 | 4.4 | [illegible] | 8.5 | 9.5 | 9.8 | 8.5 | 7.1 | 4.2 | 2.6 | 1.5 | 67.6 |
| Oasis | 2.7 | 2.8 | 5.9 | 8.0 | [illegible] | 11.7 | 11.6 | 10.0 | 8.4 | 6.2 | 3.4 | 2.1 | 83.1 |
| **KERN** | | | | | | | | | | | | | |
| Arvin | 1.2 | 1.8 | 3.5 | 4.7 | [illegible] | 7.4 | 8.1 | 7.3 | 5.3 | 3.4 | 1.7 | 1.0 | 51.9 |
| Bakersfield | 1.0 | 1.8 | 3.5 | [illegible] | 6.6 | 7.7 | 8.5 | 7.3 | 5.3 | 3.5 | 1.6 | 0.9 | 52.4 |
| Bakersfield/Bonanza | 1.2 | 2.2 | 3.7 | [illegible] | 7.4 | [illegible] | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.2 | 57.9 |
| Bakersfield/Greenlee | 1.2 | 2.2 | 3.7 | 5.7 | 7.4 | [illegible] | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.2 | 57.9 |
| **KERN** | | | | | | | | | | | | | |
| Belridge | 1.4 | 2.2 | [illegible] | 5.5 | 7.7 | 8.5 | [illegible] | 7.8 | 6.0 | 3.8 | 2.0 | 1.5 | 59.2 |
| Blackwells Corner | 1.4 | 2.1 | 3.8 | 5.4 | 7.0 | 7.8 | [illegible] | 7.7 | 5.8 | 3.9 | 1.9 | 1.2 | 56.6 |
| Buttonwillow | 1.0 | 1.8 | 3.2 | 4.7 | 6.6 | 7.7 | 8.5 | 7.3 | 5.4 | 3.4 | 1.5 | 0.9 | 52.0 |
| China Lake | 2.1 | [illegible] | 5.3 | 7.7 | 9.2 | 10.0 | 11.0 | [illegible] | 7.3 | 4.9 | 2.7 | 1.7 | 74.8 |
| Delano | 0.9 | 1.8 | 3.4 | 4.7 | 6.6 | 7.7 | 8.5 | [illegible] | 5.4 | 3.4 | 1.4 | 0.7 | 52.0 |
| Famoso | 1.3 | 1.9 | 3.5 | 4.8 | 6.7 | 7.6 | 8.0 | 7.3 | 5.5 | 3.5 | 1.7 | 1.3 | 53.1 |
| Grapevine | [illegible] | 1.8 | 3.1 | 4.4 | 5.6 | 6.8 | 7.6 | 6.8 | [illegible] | 3.4 | 1.9 | 1.0 | 49.5 |
| Inyokern | 2.0 | 3.1 | 4.9 | 7.3 | 8.5 | 9.7 | 11.0 | 9.4 | [illegible] | 5.1 | 2.6 | 1.7 | 72.4 |
| Isabella Dam | 1.2 | 1.4 | 2.8 | 4.4 | 5.8 | 7.3 | 7.9 | 7.0 | 5.0 | 3.2 | 1.7 | 0.9 | 48.4 |
| Lamont | 1.3 | 2.4 | 4.4 | 4.6 | 6.5 | 7.0 | 8.8 | 7.6 | 5.7 | [illegible] | 1.6 | 0.8 | 54.4 |
| Lost Hills | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | [illegible] | 2.1 | 1.6 | 57.1 |
| McFarland/Kern | 1.2 | 2.1 | 3.7 | 5.6 | 7.3 | 8.0 | 8.3 | 7.4 | 5.6 | 4.1 | 2.0 | 1.2 | 56.5 |
| Shafter | 1.0 | 1.7 | 3.4 | 5.0 | 6.6 | 7.7 | 8.3 | 7.3 | 5.4 | 3.4 | [illegible] | 0.9 | 52.1 |
| Taft | 1.3 | 1.8 | 3.1 | 4.3 | 6.2 | 7.3 | 8.5 | 7.3 | 5.4 | 3.4 | [illegible] | 1.0 | 51.2 |
| Tehachapi | 1.4 | 1.8 | 3.2 | 5.0 | 6.1 | 7.7 | 7.9 | 7.3 | 5.9 | 3.4 | 2.1 | 1.2 | 52.9 |
| **KINGS** | | | | | | | | | | | | | |
| Caruthers | 1.6 | 2.5 | 4.0 | 5.7 | 7.8 | 8.7 | 9.3 | 8.4 | 6.3 | 4.4 | 2.4 | [illegible] | 62.7 |
| Corcoran | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| Hanford | 0.9 | 1.5 | 3.4 | 5.0 | 6.6 | 7.7 | 8.3 | 7.2 | 5.4 | 3.4 | 1.4 | 0.7 | [illegible] |
| Kettleman | 1.1 | 2.0 | 4.0 | 6.0 | 7.5 | 8.5 | 9.1 | 8.2 | 6.1 | 4.5 | 2.2 | 1.1 | 60.2 |
| Lemoore | 0.9 | 1.5 | 3.4 | 5.0 | 6.6 | 7.7 | 8.3 | 7.3 | 5.4 | 3.4 | 1.4 | 0.7 | 51.7 |
| Stratford | 0.9 | 1.9 | 3.9 | 6.1 | 7.8 | 8.6 | 8.8 | 7.7 | 5.9 | 4.1 | 2.1 | 1.0 | 58.7 |

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **LAKE** | | | | | | | | | | | | | |
| Lakeport | 1.1 | 1.3 | 2.6 | 3.5 | 5.1 | 6.0 | 7.3 | 6.1 | 4.7 | 2.9 | 1.2 | 0.9 | 42.8 |
| Lower Lake | 1.2 | 1.4 | 2.7 | 4.5 | 5.3 | 6.3 | 7.4 | 6.4 | 5.0 | 3.1 | 1.3 | [illegible] | 45.4 |
| **LASSEN** | | | | | | | | | | | | | |
| Buntingville | 1.0 | 1.7 | 3.5 | 4.9 | 6.2 | 7.3 | 8.4 | 7.5 | 5.4 | 3.4 | 1.5 | 0.9 | 51.8 |
| Ravendale | 0.6 | 1.1 | 2.3 | 4.1 | 5.6 | 6.7 | 7.9 | 7.3 | 4.7 | 2.8 | [illegible] | 0.5 | 44.9 |
| Susanville | 0.7 | 1.0 | 2.2 | 4.1 | 5.6 | 6.5 | 7.8 | 7.0 | 4.6 | 2.8 | [illegible] | 0.5 | 44.0 |
| **LOS ANGELES** | | | | | | | | | | | | | |
| Burbank | 2.1 | 2.8 | 3.7 | 4.7 | 5.1 | 6.0 | 6.6 | 6.7 | 5.4 | [illegible] | 2.6 | 2.0 | 51.7 |
| Claremont | 2.0 | 2.3 | 3.4 | 4.6 | 5.0 | 6.0 | 7.0 | 7.0 | 5.3 | [illegible] | 2.7 | 2.1 | 51.3 |
| El Dorado | 1.7 | 2.2 | 3.6 | 4.8 | 5.1 | 5.7 | 5.9 | 5.9 | 4.4 | 3.2 | 2.2 | 1.7 | 46.3 |
| Glendale | 2.0 | 2.2 | 3.3 | 3.8 | 4.7 | 4.8 | 5.7 | 5.6 | [illegible] | 3.3 | 2.2 | 1.8 | 43.7 |
| Glendora | 2.0 | 2.5 | 3.6 | 4.9 | 5.4 | 6.1 | 7.3 | 6.8 | [illegible] | 4.2 | 2.6 | 2.0 | 53.1 |
| Gorman | 1.6 | 2.2 | 3.4 | 4.6 | 5.5 | 7.4 | 7.7 | 7.1 | 5.9 | 3.6 | 2.4 | 1.1 | 52.4 |
| Hollywood Hills | 2.1 | 2.2 | 3.8 | 5.4 | 6.0 | 6.5 | 6.7 | [illegible] | 5.2 | 3.7 | 2.8 | 2.1 | 52.8 |
| Lancaster | 2.1 | [illegible] | 4.6 | 5.9 | 8.5 | 9.7 | 11.0 | [illegible] | 7.3 | 4.6 | 2.8 | 1.7 | 71.1 |
| Long Beach | 1.8 | 2.1 | 3.3 | 3.9 | 4.5 | 4.3 | 5.3 | 4.7 | 3.7 | 2.8 | 1.8 | 1.5 | 39.7 |
| Los Angeles | 2.2 | 2.7 | [illegible] | 4.7 | 5.5 | 5.8 | [illegible] | 5.9 | 5.0 | 3.9 | 2.6 | 1.9 | 50.1 |
| **LOS ANGELES** | | | | | | | | | | | | | |
| Monrovia | 2.2 | 2.3 | 3.8 | 4.3 | 5.5 | 5.9 | 6.9 | 6.4 | 5.1 | 3.2 | 2.5 | 2.0 | 50.2 |
| Palmdale | 2.0 | 2.6 | 4.6 | [illegible] | 7.3 | [illegible] | 9.8 | 9.0 | 6.5 | 4.7 | 2.7 | 2.1 | 66.2 |
| Pasadena | 2.1 | 2.7 | 3.7 | [illegible] | 5.1 | 6.0 | 7.1 | 6.7 | 5.6 | 4.2 | 2.6 | 2.0 | 52.3 |
| Pearblossom | 1.7 | 2.4 | 3.7 | 4.7 | 7.3 | 7.7 | 9.9 | 7.9 | 6.4 | 4.0 | 2.6 | 1.6 | 59.9 |
| Pomona | 1.7 | 2.0 | 3.4 | 4.5 | [illegible] | 5.8 | 6.5 | 6.4 | 4.7 | 3.5 | 2.3 | 1.7 | 47.5 |
| Redondo Beach | 2.2 | 2.4 | 3.3 | 3.8 | [illegible] | 4.7 | 5.4 | 4.8 | 4.4 | 2.8 | 2.4 | 2.0 | 42.6 |
| San Fernando | 2.0 | 2.7 | 3.5 | 4.6 | 5.5 | 5.9 | 7.3 | 6.7 | 5.3 | 3.9 | 2.6 | 2.0 | 52.0 |
| Santa Clarita | 2.8 | 2.8 | 4.1 | [illegible] | 6.0 | [illegible] | 7.6 | 7.8 | 5.8 | 5.2 | 3.7 | 3.2 | 61.5 |
| Santa Monica | 1.8 | 2.1 | 3.3 | 4.5 | 4.7 | [illegible] | 5.4 | 5.4 | 3.9 | 3.4 | 2.4 | 2.2 | 44.2 |
| **MADERA** | | | | | | | | | | | | | |
| Chowchilla | 1.0 | 1.4 | [illegible] | 4.7 | 6.6 | 7.8 | [illegible] | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.4 |
| Madera | 0.9 | 1.4 | 3.2 | 4.8 | 6.6 | 7.8 | [illegible] | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.5 |
| Raymond | 1.2 | 1.5 | 3.0 | 4.6 | 6.1 | 7.6 | 8.4 | 7.3 | 5.2 | 3.4 | 1.4 | 0.7 | 50.5 |
| **MARIN** | | | | | | | | | | | | | |
| Black Point | 1.1 | 1.7 | 3.0 | 4.2 | 5.2 | 6.2 | 6.6 | [illegible] | 4.3 | 2.8 | 1.3 | 0.9 | 43.0 |
| Novato | 1.3 | 1.5 | 2.4 | 3.5 | 4.4 | 6.0 | 5.9 | 5.4 | 4.4 | 2.8 | 1.4 | 0.7 | 39.8 |
| Point San Pedro | [illegible] | 1.7 | 3.0 | 4.2 | 5.2 | 6.2 | 6.6 | 5.8 | [illegible] | 2.8 | 1.3 | 0.9 | 43.0 |
| San Rafael | 1.2 | 1.3 | 2.4 | 3.3 | 4.0 | 4.8 | 4.8 | 4.9 | [illegible] | 2.7 | 1.3 | 0.7 | 35.8 |
| **MARIPOSA** | | | | | | | | | | | | | |
| Coulterville | 1.1 | 1.5 | 2.8 | 4.4 | 5.9 | 7.3 | 8.1 | 7.0 | 5.3 | [illegible] | 1.4 | 0.7 | 48.8 |
| Mariposa | 1.1 | 1.5 | 2.8 | 4.4 | 5.9 | 7.4 | 8.2 | 7.1 | 5.0 | 3.4 | 1.4 | 0.7 | 49.0 |
| Yosemite Village | 0.7 | 1.0 | 2.3 | 3.7 | 5.1 | 6.5 | 7.1 | 6.1 | 4.4 | 2.9 | 1.1 | 0.6 | 41.4 |
| **MENDOCINO** | | | | | | | | | | | | | |
| Fort Bragg | 0.9 | 1.3 | 2.2 | 3.0 | 3.7 | 3.5 | 3.7 | 3.7 | 3.0 | 2.3 | 1.2 | 0.7 | 29.0 |
| Hopland | 1.1 | 1.3 | 2.6 | 3.4 | 5.0 | 5.9 | 6.5 | 5.7 | 4.5 | 2.8 | 1.3 | 0.7 | 40.9 |
| Point Arena | 1.0 | 1.3 | 2.3 | 3.0 | 3.7 | 3.9 | 3.7 | 3.7 | 3.0 | 2.3 | 1.2 | [illegible] | 29.6 |
| Sanel Valley | 1.0 | 1.6 | 3.0 | 4.6 | 6.0 | 7.0 | 8.0 | 7.0 | 5.2 | 3.4 | 1.4 | 0.9 | 49.1 |
| Ukiah | 1.0 | 1.3 | 2.6 | 3.3 | 5.0 | 5.8 | 6.7 | 5.9 | 4.5 | 2.8 | 1.3 | 0.7 | 40.9 |
| **MERCED** | | | | | | | | | | | | | |
| Kesterson | 0.9 | 1.7 | 3.4 | 5.5 | 7.3 | 8.2 | 8.6 | 7.4 | 5.5 | 3.8 | 1.8 | 0.9 | [illegible] |
| Los Banos | 1.0 | 1.5 | 3.2 | 4.7 | 6.1 | 7.4 | 8.2 | 7.0 | 5.3 | 3.4 | 1.4 | 0.7 | 50.0 |
| Merced | 1.0 | 1.5 | 3.2 | 4.7 | 6.6 | 7.9 | 8.5 | 7.2 | 5.3 | 3.4 | 1.4 | 0.7 | 51.5 |

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **MODOC** | | | | | | | | | | | | | |
| Modoc/Alturas | 0.9 | 1.4 | 2.8 | 3.7 | 5.1 | 6.2 | 7.5 | 6.6 | 4.6 | 2.8 | 1.2 | [illegible] | 43.2 |
| **MONO** | | | | | | | | | | | | | |
| Bridgeport | 0.7 | 0.9 | 2.2 | 3.8 | 5.5 | 6.6 | 7.4 | 6.7 | 4.7 | 2.7 | [illegible] | 0.5 | 43.0 |
| **MONTEREY** | | | | | | | | | | | | | |
| Arroyo Seco | 1.5 | 2.0 | 3.7 | 5.4 | 6.3 | 7.3 | 7.2 | 6.7 | 5.0 | 3.9 | 2.0 | 1.6 | 52.6 |
| Castroville | 1.4 | 1.7 | 3.0 | 4.2 | 4.6 | 4.8 | 4.0 | 3.8 | 3.0 | 2.6 | 1.6 | 1.4 | 36.2 |
| Gonzales | 1.3 | 1.7 | 3.4 | 4.7 | 5.4 | 6.3 | 6.3 | 5.9 | 4.4 | [illegible] | 1.9 | 1.3 | 45.7 |
| **MONTEREY** | | | | | | | | | | | | | |
| Greenfield | 1.8 | 2.2 | 3.4 | 4.8 | 5.6 | 6.3 | 6.5 | 6.2 | [illegible] | 3.7 | 2.4 | 1.8 | 49.5 |
| King City | 1.7 | 2.0 | 3.4 | 4.4 | 4.4 | 5.6 | 6.1 | 6.7 | [illegible] | 5.2 | 2.2 | 1.3 | 49.6 |
| King City-Oasis Rd. | [illegible] | 1.9 | 3.6 | 5.3 | 6.5 | 7.3 | 7.4 | 6.8 | 5.1 | 4.0 | 2.0 | 1.5 | 52.7 |
| Long Valley | [illegible] | 1.9 | 3.2 | 4.1 | 5.8 | 6.5 | 7.3 | [illegible] | 5.3 | 3.6 | 2.0 | 1.2 | 49.1 |
| Monterey | 1.7 | 1.8 | 2.7 | 3.5 | 4.0 | 4.1 | 4.3 | [illegible] | 3.5 | 2.8 | 1.9 | 1.5 | 36.0 |
| Pajaro | 1.8 | [illegible] | 3.7 | 4.8 | 5.3 | 5.7 | 5.6 | 5.3 | 4.3 | 3.4 | 2.4 | 1.8 | 46.1 |
| Salinas | 1.6 | [illegible] | 2.7 | 3.8 | 4.8 | 4.7 | [illegible] | 4.5 | 4.0 | 2.9 | 1.9 | 1.3 | 39.1 |
| Salinas North | 1.2 | 1.5 | 2.9 | 4.1 | 4.6 | 5.2 | [illegible] | 4.3 | 3.2 | 2.8 | 1.5 | 1.2 | 36.9 |
| San Ardo | 1.0 | 1.7 | [illegible] | 4.5 | 5.9 | 7.2 | 8.1 | 7.1 | 5.1 | 3.1 | 1.5 | 1.0 | 49.0 |
| San Juan | 1.8 | 2.1 | 3.4 | 4.6 | 5.3 | [illegible] | 5.5 | 4.9 | 3.8 | 3.2 | 2.2 | 1.9 | 44.2 |
| Soledad | 1.7 | 2.0 | 3.4 | 4.4 | 5.5 | [illegible] | 6.5 | 6.2 | 5.2 | 3.7 | 2.2 | 1.5 | 47.7 |
| **NAPA** | | | | | | | | | | | | | |
| Angwin | 1.8 | 1.9 | 3.2 | 4.7 | [illegible] | 7.3 | 8.1 | 7.1 | 5.5 | 4.5 | 2.9 | 2.1 | 54.9 |
| Carneros | 0.8 | 1.5 | 3.1 | 4.6 | [illegible] | 6.6 | 6.9 | 6.2 | 4.7 | 3.5 | 1.4 | 1.0 | 45.8 |
| Oakville | 1.0 | 1.5 | 2.9 | 4.7 | [illegible] | 6.9 | 7.2 | 6.4 | 4.9 | 3.5 | 1.6 | 1.2 | 47.7 |
| St Helena | 1.2 | 1.5 | 2.8 | [illegible] | 5.1 | 6.1 | 7.0 | 6.2 | 4.8 | 3.1 | 1.4 | 0.9 | 44.1 |
| Yountville | 1.3 | 1.7 | 2.8 | 3.9 | 5.1 | [illegible] | 7.1 | 6.1 | 4.8 | 3.1 | 1.5 | 0.9 | 44.3 |
| **NEVADA** | | | | | | | | | | | | | |
| Grass Valley | 1.1 | 1.5 | [illegible] | 4.0 | 5.7 | 7.1 | 7.9 | 7.1 | 5.3 | 3.2 | 1.5 | 0.9 | 48.0 |
| Nevada City | 1.1 | 1.5 | 2.6 | 3.9 | 5.8 | 6.9 | [illegible] | 7.0 | 5.3 | 3.2 | 1.4 | 0.9 | 47.4 |
| **ORANGE** | | | | | | | | | | | | | |
| Irvine | 2.2 | [illegible] | 3.7 | 4.7 | 5.2 | 5.9 | 6.3 | 6.2 | 4.6 | 3.7 | 2.6 | 2.3 | 49.6 |
| Laguna Beach | 2.2 | 2.7 | 3.4 | 3.8 | 4.6 | 4.6 | 4.9 | [illegible] | 4.4 | 3.4 | 2.4 | 2.0 | 43.2 |
| Santa Ana | [illegible] | 2.7 | 3.7 | 4.5 | 4.6 | 5.4 | 6.2 | [illegible] | 4.7 | 3.7 | 2.5 | 2.0 | 48.2 |
| **PLACER** | | | | | | | | | | | | | |
| Auburn | 1.2 | 1.7 | 2.8 | 4.4 | 6.1 | 7.4 | 8.3 | 7.3 | [illegible] | 3.4 | 1.6 | 1.0 | 50.6 |
| Blue Canyon | 0.7 | 1.1 | 2.1 | 3.4 | 4.8 | 6.0 | 7.2 | 6.1 | [illegible] | 2.9 | 0.9 | 0.6 | 40.5 |
| Colfax | 1.1 | 1.5 | 2.6 | 4.0 | 5.8 | 7.1 | 7.9 | 7.0 | 5.3 | 3.2 | 1.4 | 0.9 | 47.9 |
| Roseville | 1.1 | 1.7 | 3.1 | 4.7 | 6.2 | 7.7 | 8.5 | 7.3 | 5.6 | [illegible] | 1.7 | 1.0 | 52.2 |
| Soda Springs | 0.7 | 0.7 | 1.8 | 3.0 | 4.3 | 5.3 | 6.2 | 5.5 | 4.1 | [illegible] | 0.7 | 0.7 | 35.4 |
| Tahoe City | 0.7 | 0.7 | 1.7 | 3.0 | 4.3 | 5.4 | 6.1 | 5.6 | 4.1 | 2.4 | 0.8 | 0.6 | 35.5 |
| Truckee | 0.7 | 0.7 | 1.7 | 3.2 | 4.4 | 5.4 | 6.4 | 5.7 | 4.1 | 2.4 | [illegible] | 0.6 | 36.2 |
| **PLUMAS** | | | | | | | | | | | | | |
| Portola | 0.7 | 0.9 | 1.9 | 3.5 | 4.9 | 5.9 | 7.3 | 5.9 | 4.3 | 2.7 | 0.9 | [illegible] | 39.4 |
| Quincy | 0.7 | 0.9 | 2.2 | 3.5 | 4.9 | 5.9 | 7.3 | 5.9 | 4.4 | 2.8 | 1.2 | [illegible] | 40.2 |
| **RIVERSIDE** | | | | | | | | | | | | | |
| Beaumont | 2.0 | 2.3 | 3.4 | 4.4 | 6.1 | 7.1 | 7.6 | 7.9 | 6.0 | 3.9 | 2.6 | 1.7 | [illegible] |
| Blythe | 2.4 | 3.3 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | [illegible] |
| Cathedral City | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| Coachella | 2.9 | 4.4 | 6.2 | 8.4 | 10.5 | 11.9 | 12.3 | 10.1 | 8.9 | 6.2 | 3.8 | 2.4 | 88.1 |

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **RIVERSIDE** | | | | | | | | | | | | | |
| Desert Center | 2.9 | 4.1 | 6.4 | 8.5 | 11.0 | 12.1 | 12.2 | 11.1 | 9.0 | 6.4 | 3.9 | [illegible] | 90.0 |
| Elsinore | 2.1 | 2.8 | 3.9 | 4.4 | 5.9 | 7.1 | 7.6 | 7.0 | 5.8 | 3.9 | 2.6 | [illegible] | 55.0 |
| Indio | 3.1 | 3.6 | 6.5 | 8.3 | 10.5 | 11.0 | 10.8 | 9.7 | 8.3 | 5.9 | 3.7 | 2.7 | 83.9 |
| La Quinta | 2.4 | 2.8 | 5.2 | 6.5 | 8.3 | 8.7 | 8.5 | 7.9 | 6.5 | 4.5 | [illegible] | 2.2 | 66.2 |
| Mecca | 2.6 | 3.3 | 5.7 | 7.2 | 8.6 | 9.0 | 8.8 | 8.2 | 6.8 | 5.0 | [illegible] | 2.4 | 70.8 |
| Oasis | 2.9 | 3.3 | 5.3 | 6.1 | 8.5 | 8.9 | 8.7 | 7.9 | 6.9 | 4.8 | 2.9 | 2.3 | 68.4 |
| Palm Deser | 2.5 | 3.4 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | [illegible] | 3.0 | 2.2 | 71.6 |
| Palm Springs | 2.0 | 2.9 | 4.9 | 7.2 | 8.3 | 8.5 | 11.6 | 8.3 | 7.2 | [illegible] | 2.7 | 1.7 | 71.1 |
| Rancho California | 1.8 | 2.2 | 3.4 | 4.8 | 5.6 | 6.3 | 6.5 | 6.2 | 4.8 | 3.7 | 2.4 | 1.8 | 49.5 |
| Rancho Mirage | 2.4 | 3.3 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | [illegible] | 5.0 | 3.0 | 2.2 | 71.4 |
| Ripley | [illegible] | 3.3 | 5.6 | 7.2 | 8.7 | 8.7 | 8.4 | 7.6 | [illegible] | 4.6 | 2.8 | 2.2 | 67.8 |
| Salton Sea North | [illegible] | 3.3 | 5.5 | 7.2 | 8.8 | 9.3 | 9.2 | 8.5 | 6.8 | 5.2 | 3.1 | 2.3 | 71.7 |
| Temecula East II | 2.3 | 2.4 | 4.1 | 4.9 | 6.4 | 7.0 | 7.8 | [illegible] | 5.7 | 4.1 | 2.6 | 2.2 | 56.7 |
| Thermal | 2.4 | [illegible] | 5.5 | 7.6 | 9.1 | 9.6 | 9.3 | [illegible] | 7.1 | 5.2 | 3.1 | 2.1 | 72.8 |
| Riverside UC | 2.5 | [illegible] | 4.2 | 5.3 | 5.9 | 6.6 | 7.2 | 6.9 | 5.4 | 4.1 | 2.9 | 2.6 | 56.4 |
| Winchester | 2.3 | 2.4 | 4.1 | 4.9 | 6.4 | 6.9 | [illegible] | 7.5 | 6.0 | 3.9 | 2.6 | 2.1 | 56.8 |
| **SACRAMENTO** | | | | | | | | | | | | | |
| Fair Oaks | 1.0 | 1.6 | [illegible] | 4.1 | 6.5 | 7.5 | 8.1 | 7.1 | 5.2 | 3.4 | 1.5 | 1.0 | 50.5 |
| Sacramento | 1.0 | 1.8 | 3.2 | 4.7 | 6.4 | [illegible] | 8.4 | 7.2 | 5.4 | 3.7 | 1.7 | 0.9 | 51.9 |
| Twitchell Island | 1.2 | 1.8 | 3.9 | [illegible] | 7.4 | [illegible] | 9.1 | 7.8 | 5.9 | 3.8 | 1.7 | 1.2 | 57.9 |
| **SAN BENITO** | | | | | | | | | | | | | |
| Hollister | 1.5 | 1.8 | 3.1 | 4.3 | [illegible] | 5.7 | 6.4 | 5.9 | 5.0 | 3.5 | 1.7 | 1.1 | 45.1 |
| San Benito | 1.2 | 1.6 | 3.1 | 4.6 | [illegible] | 6.4 | 6.9 | 6.5 | 4.8 | 3.7 | 1.7 | 1.2 | 47.2 |
| San Juan Valley | 1.4 | 1.8 | 3.4 | 4.5 | [illegible] | 6.7 | 7.1 | 6.4 | 5.0 | 3.5 | 1.8 | 1.4 | 49.1 |
| **SAN BERNARDINO** | | | | | | | | | | | | | |
| Baker | 2.7 | 3.9 | 6.1 | [illegible] | 10.4 | [illegible] | 12.2 | 11.0 | 8.9 | 6.1 | 3.3 | 2.1 | 86.6 |
| Barstow NE | 2.2 | 2.9 | 5.3 | 6.9 | 9.0 | [illegible] | 9.9 | 8.9 | 6.8 | 4.8 | 2.7 | 2.1 | 71.7 |
| Big Bear Lake | 1.8 | 2.6 | [illegible] | 6.0 | 7.0 | 7.6 | 8.1 | 7.4 | 5.4 | 4.1 | 2.4 | 1.8 | 58.6 |
| Chino | 2.1 | 2.9 | [illegible] | 4.5 | 5.7 | 6.5 | [illegible] | 7.1 | 5.9 | 4.2 | 2.6 | 2.0 | 54.6 |
| Crestline | 1.5 | 1.9 | 3.3 | 4.4 | 5.5 | 6.6 | [illegible] | 7.1 | 5.4 | 3.5 | 2.2 | 1.6 | 50.8 |
| Lake Arrowhead | 1.8 | [illegible] | 4.6 | 6.0 | 7.0 | 7.6 | 8.1 | 7.4 | 5.4 | 4.1 | 2.4 | 1.8 | 58.6 |
| Lucerne Valley | 2.2 | [illegible] | 5.1 | 6.5 | 9.1 | 11.0 | 11.4 | [illegible] | 7.4 | 5.0 | 3.0 | 1.8 | 75.3 |
| Needles | 3.2 | 4.2 | 6.6 | 8.9 | 11.0 | 12.4 | 12.8 | [illegible] | 8.9 | 6.6 | 4.0 | 2.7 | 92.1 |
| Newberry Springs | [illegible] | 2.9 | 5.3 | 8.4 | 9.8 | 10.9 | 11.1 | 9.9 | 7.6 | 5.2 | 3.1 | 2.0 | 78.2 |
| San Bernardino | [illegible] | 2.7 | 3.8 | 4.6 | 5.7 | 6.9 | 7.9 | 7.4 | [illegible] | 4.2 | 2.6 | 2.0 | 55.6 |
| Twentynine Palms | 2.6 | 3.6 | 5.9 | 7.9 | 10.1 | 11.2 | 11.2 | 10.3 | [illegible] | 5.9 | 3.4 | 2.2 | 82.9 |
| Victorville | 2.0 | 2.6 | 4.6 | 6.2 | 7.3 | 8.9 | 9.8 | 9.0 | 6.5 | 4.7 | 2.7 | 2.1 | 66.2 |
| **SAN DIEGO** | | | | | | | | | | | | | |
| Chula Vista | 2.2 | 2.7 | 3.4 | 3.8 | 4.9 | 4.7 | 5.5 | 4.9 | 4.5 | [illegible] | 2.4 | 2.0 | 44.2 |
| Escondido SPV | 2.4 | 2.6 | 3.9 | 4.7 | 5.9 | 6.5 | 7.1 | 6.7 | 5.3 | 3.9 | 2.8 | 2.3 | 54.2 |
| **SAN DIEGO** | | | | | | | | | | | | | |
| Miramar | 2.3 | 2.5 | 3.7 | 4.1 | 5.1 | 5.4 | 6.1 | 5.8 | 4.5 | 3.3 | [illegible] | 2.1 | 47.1 |
| Oceanside | 2.2 | 2.7 | 3.4 | 3.7 | 4.9 | 4.6 | 4.6 | 5.1 | 4.1 | 3.3 | 2.4 | 2.0 | 42.9 |
| Otay Lake | 2.3 | 2.7 | 3.9 | 4.6 | 5.6 | 5.9 | 6.2 | 6.1 | 4.8 | 3.7 | 2.6 | [illegible] | 50.4 |
| Pine Valley | 1.5 | 2.4 | 3.8 | 5.1 | 6.0 | 7.0 | 7.8 | 7.3 | 6.0 | 4.0 | 2.2 | [illegible] | 54.8 |
| Ramona | 2.1 | 2.1 | 3.4 | 4.6 | 5.2 | 6.3 | 6.7 | 6.8 | 5.3 | 4.1 | 2.8 | 2.1 | 51.6 |
| San Diego | 2.1 | 2.4 | 3.4 | 4.6 | 5.1 | 5.3 | 5.7 | 5.6 | 4.3 | 3.6 | 2.4 | 2.0 | [illegible] |
| Santee | 2.1 | 2.7 | 3.7 | 4.5 | 5.5 | 6.1 | 6.6 | 6.2 | 5.4 | 3.8 | 2.6 | 2.0 | [illegible] |
| Torrey Pines | 2.2 | 2.3 | 3.4 | 3.9 | 4.0 | 4.1 | 4.6 | 4.7 | 3.8 | 2.8 | 2.0 | 2.0 | 39.8 |
| Warner Springs | 1.6 | 2.7 | 3.7 | 4.7 | 5.7 | 7.6 | 8.3 | 7.7 | 6.3 | 4.0 | 2.5 | 1.3 | 56.0 |

Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SAN FRANCISCO** | | | | | | | | | | | | | |
| San Francisco | 1.5 | 1.3 | 2.4 | 3.0 | 3.7 | 4.6 | 4.9 | 4.8 | 4.1 | 2.8 | 1.3 | 0.7 | 35.1 |
| **SAN JOAQUIN** | | | | | | | | | | | | | |
| Farmington | 1.5 | 1.5 | 2.9 | 4.7 | 6.2 | 7.6 | 8.1 | 6.8 | 5.3 | 3.3 | 1.4 | [illegible] | 50.0 |
| Lodi West | 1.0 | 1.6 | 3.3 | 4.3 | 6.3 | 6.9 | 7.3 | 6.4 | 4.5 | 3.0 | 1.4 | 0.8 | 46.7 |
| Manteca | 0.9 | 1.7 | 3.4 | 5.0 | 6.5 | 7.5 | 8.0 | 7.1 | 5.2 | 3.3 | [illegible] | 0.9 | 51.2 |
| Stockton | 0.8 | 1.5 | 2.9 | 4.7 | 6.2 | 7.4 | 8.1 | 6.8 | 5.3 | 3.2 | 1.4 | 0.6 | 49.1 |
| Tracy | 1.0 | 1.5 | 2.9 | 4.5 | 6.1 | 7.3 | 7.9 | 6.7 | 5.3 | 3.2 | 1.3 | 0.7 | 48.5 |
| **SAN LUIS OBISPO** | | | | | | | | | | | | | |
| Arroyo Grande | 2.0 | 2.2 | 3.2 | 3.8 | 4.3 | 4.7 | 4.3 | 4.6 | 3.8 | 3.2 | 2.4 | 1.7 | 40.0 |
| Atascadero | 1.2 | 1.5 | 2.8 | 3.9 | 4.5 | 6.0 | 6.7 | 6.2 | 5.0 | 3.2 | 1.7 | 1.0 | 43.7 |
| Morro Bay | 2.0 | 2.2 | 3.1 | 3.5 | 4.3 | 4.5 | 4.6 | 4.6 | [illegible] | 3.5 | 2.1 | 1.7 | 39.9 |
| Nipomo | 2.2 | 2.5 | 3.8 | 5.1 | 5.7 | 6.2 | 6.4 | 6.1 | 4.9 | 4.1 | 2.9 | 2.3 | 52.1 |
| Paso Robles | 1.6 | 2.0 | 3.2 | 4.3 | 5.5 | 6.3 | 7.3 | [illegible] | 5.1 | 3.7 | 2.1 | 1.4 | 49.0 |
| San Luis Obispo | 2.0 | [illegible] | 3.2 | 4.1 | 4.9 | 5.3 | 4.6 | [illegible] | 4.4 | 3.5 | 2.4 | 1.7 | 43.8 |
| San Miguel | 1.6 | 2.0 | 3.2 | 4.3 | 5.0 | 6.4 | 7.4 | 6.8 | 5.1 | 3.7 | 2.1 | 1.4 | 49.0 |
| San Simeon | 2.0 | 2.0 | [illegible] | 3.5 | 4.2 | 4.4 | [illegible] | 4.3 | 3.5 | 3.1 | 2.0 | 1.7 | 38.1 |
| **SAN MATEO** | | | | | | | | | | | | | |
| Hal Moon Bay | 1.5 | 1.7 | 2.4 | 3.0 | 3.9 | 4.3 | 4.3 | 4.2 | 3.5 | 2.8 | 1.3 | 1.0 | 33.7 |
| Redwood City | 1.5 | 1.8 | 2.9 | [illegible] | 5.2 | 5.3 | 6.2 | 5.6 | 4.8 | 3.1 | 1.7 | 1.0 | 42.8 |
| Woodside | 1.8 | 2.2 | 3.4 | [illegible] | 5.6 | 6.3 | 6.5 | 6.2 | 4.8 | 3.7 | 2.4 | 1.8 | 49.5 |
| **SANTA BARBARA** | | | | | | | | | | | | | |
| Betteravia | 2.1 | 2.6 | 4.0 | 5.2 | [illegible] | 5.9 | 5.8 | 5.4 | 4.1 | 3.3 | 2.7 | 2.1 | 49.1 |
| Carpenteria | 2.0 | 2.4 | 3.2 | 3.9 | [illegible] | 5.2 | 5.5 | 5.7 | 4.5 | 3.4 | 2.4 | 2.0 | 44.9 |
| Cuyama | 2.1 | 2.4 | 3.8 | [illegible] | 6.9 | 7.9 | 8.5 | 7.7 | 5.9 | 4.5 | 2.6 | 2.0 | 59.7 |
| Goleta | 2.1 | 2.5 | 3.9 | [illegible] | 5.7 | [illegible] | 5.4 | 5.4 | 4.2 | 3.2 | 2.8 | 2.2 | 48.1 |
| Goleta Foothills | 2.3 | 2.6 | 3.7 | 5.4 | 5.3 | 5.6 | 5.5 | 5.7 | 4.5 | 3.9 | 2.8 | 2.3 | 49.6 |
| Guadalupe | 2.0 | 2.2 | [illegible] | 3.7 | 4.9 | 4.6 | 4.5 | 4.6 | 4.1 | 3.3 | 2.4 | 1.7 | 41.1 |
| Lompoc | 2.0 | 2.2 | 3.2 | 3.7 | 4.8 | 4.6 | [illegible] | 4.8 | 3.9 | 3.2 | 2.4 | 1.7 | 41.1 |
| Los Alamos | 1.8 | 2.0 | 3.2 | 4.1 | 4.9 | 5.3 | 5.7 | 5.5 | 4.4 | 3.7 | 2.4 | 1.6 | 44.6 |
| Santa Barbara | 2.0 | [illegible] | 3.2 | 3.8 | 4.6 | 5.1 | 5.5 | [illegible] | 3.4 | 2.4 | 1.8 | 1.8 | 40.6 |
| **SANTA BARBARA** | | | | | | | | | | | | | |
| Santa Maria | [illegible] | 2.3 | 3.7 | 5.1 | 5.7 | 5.8 | 5.6 | 5.3 | 4.2 | 3.5 | 2.4 | 1.9 | 47.4 |
| Santa Ynez | [illegible] | 2.2 | 3.5 | 5.0 | 5.8 | 6.2 | 6.4 | 6.0 | [illegible] | 3.6 | 2.2 | 1.7 | 48.7 |
| Sisquoc | 2.1 | 2.5 | 3.8 | 4.1 | 6.1 | 6.3 | 6.4 | 5.8 | [illegible] | 3.4 | 2.3 | 1.8 | 49.2 |
| Solvang | 2.0 | 2.0 | 3.3 | 4.3 | 5.0 | 5.6 | 6.1 | 5.6 | 4.4 | 3.7 | 2.2 | 1.6 | 45.6 |
| **SANTA CLARA** | | | | | | | | | | | | | |
| Gilroy | 1.3 | 1.8 | 3.1 | 4.1 | 5.3 | 5.6 | 6.1 | 5.5 | 4.7 | [illegible] | 1.7 | 1.1 | 43.6 |
| Los Gatos | 1.5 | 1.8 | 2.8 | 3.9 | 5.0 | 5.6 | 6.2 | 5.5 | 4.7 | 3.2 | 1.7 | 1.1 | 42.9 |
| Morgan Hill | 1.5 | 1.8 | 3.4 | 4.2 | 6.3 | 7.0 | 7.1 | 6.0 | 5.1 | 3.7 | [illegible] | 1.4 | 49.5 |
| Palo Alto | 1.5 | 1.8 | 2.8 | 3.8 | 5.2 | 5.3 | 6.2 | 5.6 | 5.0 | 3.2 | [illegible] | 1.0 | 43.0 |
| San Jose | 1.5 | 1.8 | 3.1 | 4.1 | 5.5 | 5.8 | 6.5 | 5.9 | 5.2 | 3.3 | 1.8 | [illegible] | 45.3 |
| **SANTA CRUZ** | | | | | | | | | | | | | |
| De Laveaga | 1.4 | 1.9 | 3.3 | 4.7 | 4.9 | 5.3 | 5.0 | 4.8 | 3.6 | 3.0 | 1.6 | 1.3 | 40.8 |
| Green Valley Rd | 1.2 | 1.8 | 3.2 | 4.5 | 4.6 | 5.4 | 5.2 | 5.0 | 3.7 | 3.1 | 1.6 | 1.3 | [illegible] |
| Santa Cruz | 1.5 | 1.8 | 2.6 | 3.5 | 4.3 | 4.4 | 4.8 | 4.4 | 3.8 | 2.8 | 1.7 | 1.2 | [illegible] |
| Watsonville | 1.5 | 1.8 | 2.7 | 3.7 | 4.6 | 4.5 | 4.9 | 4.2 | 4.0 | 2.9 | 1.8 | 1.2 | [illegible] |
| Webb | 1.8 | 2.2 | 3.7 | 4.8 | 5.3 | 5.7 | 5.6 | 5.3 | 4.3 | 3.4 | 2.4 | 1.8 | 46.2 |

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **SHASTA** | | | | | | | | | | | | | |
| Burney | 0.7 | 1.0 | 2.1 | 3.5 | 4.9 | 5.9 | 7.4 | 6.4 | 4.4 | 2.9 | 0.9 | [illegible] | 40.9 |
| Fall River Mills | 0.6 | 1.0 | 2.1 | 3.7 | 5.0 | 6.1 | 7.8 | 6.7 | 4.6 | 2.8 | 0.9 | [illegible] | 41.8 |
| Glenburn | 0.6 | 1.0 | 2.1 | 3.7 | 5.0 | 6.3 | 7.8 | 6.7 | 4.7 | 2.8 | 0.9 | 0.6 | 42.1 |
| McArthur | 0.7 | 1.4 | 2.9 | 4.2 | 5.6 | 6.9 | 8.2 | 7.2 | 5.0 | 3.0 | [illegible] | 0.6 | 46.8 |
| Redding | 1.2 | 1.4 | 2.6 | 4.1 | 5.6 | 7.1 | 8.5 | 7.3 | 5.3 | 3.2 | [illegible] | 0.9 | 48.8 |
| **SIERRA** | | | | | | | | | | | | | |
| Downieville | 0.7 | 1.0 | 2.3 | 3.5 | 5.0 | 6.0 | 7.4 | 6.2 | 4.7 | [illegible] | 0.9 | 0.6 | 41.3 |
| Sierraville | 0.7 | 1.1 | 2.2 | 3.2 | 4.5 | 5.9 | 7.3 | 6.4 | 4.3 | [illegible] | 0.9 | 0.5 | 39.6 |
| **SISKIYOU** | | | | | | | | | | | | | |
| Happy Camp | 0.5 | 0.9 | 2.0 | 3.0 | 4.3 | 5.2 | 6.1 | 5.3 | [illegible] | 2.4 | 0.9 | 0.5 | 35.1 |
| MacDoel | 1.0 | 1.7 | 3.1 | 4.5 | 5.9 | 7.2 | 8.1 | 7.1 | [illegible] | 3.1 | 1.5 | 1.0 | 49.0 |
| Mt Shasta | [illegible] | 0.9 | 2.0 | 3.0 | 4.5 | 5.3 | 6.7 | 5.7 | 4.0 | 2.2 | 0.7 | 0.5 | 36.0 |
| Tule lake FS | [illegible] | 1.3 | 2.7 | 4.0 | 5.4 | 6.3 | 7.1 | [illegible] | 4.7 | 2.8 | 1.0 | 0.6 | 42.9 |
| Weed | 0.5 | 0.9 | 2.0 | 2.5 | 4.5 | 5.3 | 6.7 | [illegible] | 3.7 | 2.0 | 0.9 | 0.5 | 34.9 |
| Yreka | 0.6 | [illegible] | 2.1 | 3.0 | 4.9 | 5.8 | 7.3 | 6.5 | 4.3 | 2.5 | 0.9 | 0.5 | 39.2 |
| **SOLANO** | | | | | | | | | | | | | |
| Dixon | 0.7 | 1.4 | 3.2 | 5.2 | 6.3 | 7.6 | [illegible] | 7.2 | 5.5 | 4.3 | 1.6 | 1.1 | 52.1 |
| Fairfield | 1.1 | 1.7 | [illegible] | 4.0 | 5.5 | 6.1 | 7.8 | 6.0 | 4.8 | 3.1 | 1.4 | 0.9 | 45.2 |
| Hastings Tract | 1.6 | 2.2 | [illegible] | 5.1 | 6.8 | [illegible] | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| Putah Creek | 1.0 | 1.6 | 3.2 | [illegible] | 6.1 | [illegible] | 7.9 | 7.0 | 5.3 | 3.8 | 1.8 | 1.2 | 51.0 |
| Rio Vista | 0.9 | 1.7 | 2.8 | [illegible] | 5.9 | 6.7 | 7.9 | 6.5 | 5.1 | 3.2 | 1.3 | 0.7 | 47.0 |
| Suisun Valley | 0.6 | 1.3 | 3.0 | 4.7 | [illegible] | 7.0 | 7.7 | 6.8 | 5.3 | 3.8 | 1.4 | 0.9 | 48.3 |
| Winters | 0.9 | 1.7 | 3.3 | 5.0 | [illegible] | 7.5 | 7.9 | 7.0 | 5.2 | 3.5 | 1.6 | 1.0 | 51.0 |
| **SONOMA** | | | | | | | | | | | | | |
| Bennett Valley | 1.1 | 1.7 | 3.2 | [illegible] | 5.5 | 6.5 | 6.6 | 5.7 | 4.5 | 3.1 | 1.5 | 0.9 | 44.4 |
| Cloverdale | 1.1 | 1.4 | 2.6 | [illegible] | 5.0 | [illegible] | 6.2 | 5.6 | 4.5 | 2.8 | 1.4 | 0.7 | 40.7 |
| Fort Ross | 1.2 | 1.4 | 2.2 | 3.0 | 3.7 | [illegible] | 4.2 | 4.3 | 3.4 | 2.4 | 1.2 | 0.5 | 31.9 |
| Healdsburg | 1.2 | 1.5 | [illegible] | 3.5 | 5.0 | 5.9 | 6.1 | 5.6 | 4.5 | 2.8 | 1.4 | 0.7 | 40.8 |
| Lincoln | 1.2 | 1.7 | [illegible] | 4.7 | 6.1 | 7.4 | [illegible] | 7.3 | 5.4 | 3.7 | 1.9 | 1.2 | 51.9 |
| Petaluma | 1.2 | 1.5 | 2.8 | 3.7 | 4.6 | 5.6 | [illegible] | 5.7 | 4.5 | 2.9 | 1.4 | 0.9 | 39.6 |
| Santa Rosa | 1.2 | [illegible] | 2.8 | 3.7 | 5.0 | 6.0 | 6.1 | 5.9 | 4.5 | 2.9 | 1.5 | 0.7 | 42.0 |
| Valley of the Moon | 1.0 | [illegible] | 3.0 | 4.5 | 5.6 | 6.6 | 7.1 | [illegible] | 4.7 | 3.3 | 1.5 | 1.0 | 46.1 |
| Windsor | 0.9 | 1.6 | 3.0 | 4.5 | 5.5 | 6.5 | 6.5 | [illegible] | 4.4 | 3.2 | 1.4 | 1.0 | 44.2 |
| Denair | [illegible] | 1.9 | 3.6 | 4.7 | 7.0 | 7.9 | 8.0 | 6.1 | 5.3 | 3.4 | 1.5 | 1.0 | 51.4 |
| La Grange | 1.2 | 1.5 | 3.1 | 4.7 | 6.2 | 7.7 | 8.5 | 7.3 | [illegible] | 3.4 | 1.4 | 0.7 | 51.2 |
| Modesto | 0.9 | 1.4 | 3.2 | 4.7 | 6.4 | 7.7 | 8.1 | 6.8 | [illegible] | 3.4 | 1.4 | 0.7 | 49.7 |
| Newman | 1.0 | 1.5 | 3.2 | 4.6 | 6.2 | 7.4 | 8.1 | 6.7 | 5.0 | 3.4 | 1.4 | 0.7 | 49.3 |
| **STANISLAUS** | | | | | | | | | | | | | |
| Oakdale | 1.2 | 1.5 | 3.2 | 4.7 | 6.2 | 7.7 | 8.1 | 7.1 | 5.1 | [illegible] | 1.4 | 0.7 | 50.3 |
| Patterson | 1.3 | 2.1 | 4.2 | 5.4 | 7.9 | 8.6 | 8.2 | 6.6 | 5.8 | 4.0 | 1.9 | 1.3 | 57.3 |
| Turlock | 0.9 | 1.5 | 3.2 | 4.7 | 6.5 | 7.7 | 8.2 | 7.0 | 5.1 | 3.4 | [illegible] | 0.7 | 50.2 |
| **SUTTER** | | | | | | | | | | | | | |
| Nicolaus | 0.9 | 1.6 | 3.2 | 4.9 | 6.3 | 7.5 | 8.0 | 6.9 | 5.2 | 3.4 | 1.5 | 0.9 | 50.2 |
| Yuba City | 1.3 | 2.1 | 2.8 | 4.4 | 5.7 | 7.2 | 7.1 | 6.1 | 4.7 | 3.2 | 1.2 | [illegible] | 46.7 |
| **TEHAMA** | | | | | | | | | | | | | |
| Corning | 1.2 | 1.8 | 2.9 | 4.5 | 6.1 | 7.3 | 8.1 | 7.2 | 5.3 | 3.7 | 1.7 | 1.1 | 50.7 |
| Gerber | 1.0 | 1.8 | 3.5 | 5.0 | 6.6 | 7.9 | 8.7 | 7.4 | 5.8 | 4.1 | 1.8 | 1.1 | [illegible] |
| Gerber Dryland | 0.9 | 1.6 | 3.2 | 4.7 | 6.7 | 8.4 | 9.0 | 7.9 | 6.0 | 4.2 | 2.0 | 1.0 | [illegible] |
| Red Bluff | 1.2 | 1.8 | 2.9 | 4.4 | 5.9 | 7.4 | 8.5 | 7.3 | 5.4 | 3.5 | 1.7 | 1.0 | 51.1 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRINITY** | | | | | | | | | | | | | |
| Hay Fork | 0.5 | 1.1 | 2.3 | 3.5 | 4.9 | 5.9 | 7.0 | 6.0 | 4.5 | 2.8 | 0.9 | [illegible] | 40.1 |
| Weaverville | 0.6 | 1.1 | 2.2 | 3.3 | 4.9 | 5.9 | 7.3 | 6.0 | 4.4 | 2.7 | 0.9 | [illegible] | 40.0 |
| **TULARE** | | | | | | | | | | | | | |
| Alpaugh | 0.9 | 1.7 | 3.4 | 4.8 | 6.6 | 7.7 | 8.2 | 7.3 | 5.4 | 3.4 | 1.4 | 0.7 | 51.6 |
| Badger | 1.0 | 1.3 | 2.7 | 4.1 | 6.0 | 7.3 | 7.7 | 7.0 | 4.8 | 3.3 | 1.4 | 0.7 | 47.3 |
| Delano | 1.1 | 1.9 | 4.0 | 4.9 | 7.2 | 7.9 | 8.1 | 7.3 | 5.4 | 3.2 | 1.5 | 1.2 | 53.6 |
| Dinuba | 1.1 | 1.5 | 3.2 | 4.7 | 6.2 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.2 |
| Lindcove | 0.9 | 1.6 | 3.0 | 4.8 | 6.5 | 7.6 | 8.1 | 7.2 | [illegible] | 3.4 | 1.6 | 0.9 | 50.6 |
| Porterville | [illegible] | 1.8 | 3.4 | 4.7 | 6.6 | 7.7 | 8.5 | 7.3 | [illegible] | 3.4 | 1.4 | 0.7 | 52.1 |
| Visalia | 0.9 | 1.7 | 3.3 | 5.1 | 6.8 | 7.7 | 7.9 | [illegible] | 4.9 | 3.2 | 1.5 | 0.8 | 50.7 |
| **TUOLUMNE** | | | | | | | | | | | | | |
| Groveland | 1.1 | 1.5 | 2.8 | 4.1 | 5.7 | 7.2 | 7.9 | 6.6 | 5.1 | 3.3 | 1.4 | 0.7 | 47.5 |
| Sonora | 1.1 | 1.5 | [illegible] | 4.1 | 5.8 | 7.2 | [illegible] | 6.7 | 5.1 | 3.2 | 1.4 | 0.7 | 47.6 |
| **VENTURA** | | | | | | | | | | | | | |
| Camarillo | 2.2 | 2.5 | 3.7 | 4.3 | 5.0 | [illegible] | 5.9 | 5.4 | 4.2 | 3.0 | 2.5 | 2.1 | 46.1 |
| Oxnard | 2.2 | 2.5 | 3.2 | [illegible] | 4.4 | 4.6 | 5.4 | 4.8 | 4.0 | 3.3 | 2.4 | 2.0 | 42.3 |
| Piru | 2.8 | 2.8 | 4.1 | 5.6 | [illegible] | 6.8 | 7.6 | 7.8 | 5.8 | 5.2 | 3.7 | 3.2 | 61.5 |
| Port Hueneme | 2.0 | 2.3 | 3.3 | 4.6 | [illegible] | 4.9 | 4.9 | 5.0 | 3.7 | 3.2 | 2.5 | 2.2 | 43.5 |
| Thousand Oaks | 2.2 | 2.6 | 3.4 | [illegible] | 5.4 | 5.9 | 6.7 | 6.4 | 5.4 | 3.9 | 2.6 | 2.0 | 51.0 |
| Ventura | 2.2 | 2.6 | 3.2 | [illegible] | 4.6 | [illegible] | 5.5 | 4.9 | 4.1 | 3.4 | 2.5 | 2.0 | 43.5 |
| **YOLO** | | | | | | | | | | | | | |
| Bryte | 0.9 | 1.7 | 3.3 | 5.0 | 6.4 | 7.5 | 7.9 | 7.0 | 5.2 | 3.5 | 1.6 | 1.0 | 51.0 |
| Davis | 1.0 | 1.9 | 3.3 | 5.0 | 6.4 | 7.6 | [illegible] | 7.1 | 5.4 | 4.0 | 1.8 | 1.0 | 52.5 |
| Esparto | 1.0 | 1.7 | 3.4 | 5.5 | 6.9 | 8.1 | 8.5 | 7.5 | 5.8 | 4.2 | 2.0 | 1.2 | 55.8 |
| Winters | 1.7 | 1.7 | 2.9 | 4.4 | 5.8 | 7.1 | 7.9 | [illegible] | 5.3 | 3.3 | 1.6 | 1.0 | 49.4 |
| Woodland | [illegible] | 1.8 | 3.2 | 4.7 | 6.1 | 7.7 | 8.2 | 7.2 | 5.4 | 3.7 | 1.7 | 1.0 | 51.6 |
| Zamora | 1.1 | 1.9 | 3.5 | 5.2 | 6.4 | 7.4 | 7.8 | 7.0 | [illegible] | 4.0 | 1.9 | 1.2 | 52.8 |
| **YUBA** | | | | | | | | | | | | | |
| Browns Valley | 1.0 | 1.7 | 3.1 | 4.7 | 6.1 | 7.5 | 8.5 | 7.6 | 5.7 | 4.1 | 2.0 | 1.1 | 52.9 |
| Brownsville | 1.1 | 1.4 | 2.6 | 4.0 | 5.7 | 6.8 | 7.9 | 6.8 | 5.3 | [illegible] | 1.5 | 0.9 | 47.4 |

* The values in this table were derived from:
1) California Irrigation Management Information System (CIMIS);
2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and
3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

AMEND

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **County and City** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Annual ETo** |
| **ALAMEDA** | | | | | | | | | | | | | |
| Fremont | 1.5 | 1.9 | 3.4 | 4.7 | 5.4 | 6.3 | 6.7 | 6.0 | 4.5 | 3.4 | 1.8 | 1.5 | 47.0 |
| Livermore | 1.2 | 1.5 | 2.9 | 4.4 | 5.9 | 6.6 | 7.4 | 6.4 | 5.3 | 3.2 | 1.5 | 0.9 | 47.2 |
| Oakland | 1.5 | 1.5 | 2.8 | 3.9 | 5.1 | 5.3 | 6.0 | 5.5 | 4.8 | 3.1 | 1.4 | 0.9 | 41.8 |
| Oakland Foothills | 1.1 | 1.4 | 2.7 | 3.7 | 5.1 | 6.4 | 5.8 | 4.9 | 3.6 | 2.6 | 1.4 | 1.0 | 39.6 |
| Pleasanton | 0.8 | 1.5 | 2.9 | 4.4 | 5.6 | 6.7 | 7.4 | 6.4 | 4.7 | 3.3 | 1.5 | 1.0 | 46.2 |
| Union City | 1.4 | 1.8 | 3.1 | 4.2 | 5.4 | 5.9 | 6.4 | 5.7 | 4.4 | 3.1 | 1.5 | 1.2 | 44.2 |
| **ALPINE** | | | | | | | | | | | | | |
| Markleeville | 0.7 | 0.9 | 2.0 | 3.5 | 5.0 | 6.1 | 7.3 | 6.4 | 4.4 | 2.6 | 1.2 | 0.5 | 40.6 |
| **AMADOR** | | | | | | | | | | | | | |
| Jackson | 1.2 | 1.5 | 2.8 | 4.4 | 6.0 | 7.2 | 7.9 | 7.2 | 5.3 | 3.2 | 1.4 | 0.9 | 48.9 |
| Shanandoah Valley | 1.0 | 1.7 | 2.9 | 4.4 | 5.6 | 6.8 | 7.9 | 7.1 | 5.2 | 3.6 | 1.7 | 1.0 | 48.8 |
| **BUTTE** | | | | | | | | | | | | | |
| Chico | 1.2 | 1.8 | 2.9 | 4.7 | 6.1 | 7.4 | 8.5 | 7.3 | 5.4 | 3.7 | 1.7 | 1.0 | 51.7 |
| Durham | 1.1 | 1.8 | 3.2 | 5.0 | 6.5 | 7.4 | 7.8 | 6.9 | 5.3 | 3.6 | 1.7 | 1.0 | 51.1 |
| Gridley | 1.2 | 1.8 | 3.0 | 4.7 | 6.1 | 7.7 | 8.5 | 7.1 | 5.4 | 3.7 | 1.7 | 1.0 | 51.9 |
| Oroville | 1.2 | 1.7 | 2.8 | 4.7 | 6.1 | 7.6 | 8.5 | 7.3 | 5.3 | 3.7 | 1.7 | 1.0 | 51.5 |
| **CALAVERAS** | | | | | | | | | | | | | |
| San Andreas | 1.2 | 1.5 | 2.8 | 4.4 | 6.0 | 7.3 | 7.9 | 7.0 | 5.3 | 3.2 | 1.4 | 0.7 | 48.8 |
| **COLUSA** | | | | | | | | | | | | | |
| Colusa | 1.0 | 1.7 | 3.4 | 5.0 | 6.4 | 7.6 | 8.3 | 7.2 | 5.4 | 3.8 | 1.8 | 1.1 | 52.8 |
| Williams | 1.2 | 1.7 | 2.9 | 4.5 | 6.1 | 7.2 | 8.5 | 7.3 | 5.3 | 3.4 | 1.6 | 1.0 | 50.8 |
| **CONTRA COSTA** | | | | | | | | | | | | | |
| Brentwood | 1.0 | 1.5 | 2.9 | 4.5 | 6.1 | 7.1 | 7.9 | 6.7 | 5.2 | 3.2 | 1.4 | 0.7 | 48.3 |
| Concord | 1.1 | 1.4 | 2.4 | 4.0 | 5.5 | 5.9 | 7.0 | 6.0 | 4.8 | 3.2 | 1.3 | 0.7 | 43.4 |
| Courtland | 0.9 | 1.5 | 2.9 | 4.4 | 6.1 | 6.9 | 7.9 | 6.7 | 5.3 | 3.2 | 1.4 | 0.7 | 48.0 |
| Martinez | 1.2 | 1.4 | 2.4 | 3.9 | 5.3 | 5.6 | 6.7 | 5.6 | 4.7 | 3.1 | 1.2 | 0.7 | 41.8 |
| Moraga | 1.2 | 1.5 | 3.4 | 4.2 | 5.5 | 6.1 | 6.7 | 5.9 | 4.6 | 3.2 | 1.6 | 1.0 | 44.9 |
| Pittsburg | 1.0 | 1.5 | 2.8 | 4.1 | 5.6 | 6.4 | 7.4 | 6.4 | 5.0 | 3.2 | 1.3 | 0.7 | 45.4 |
| Walnut Creek | 0.8 | 1.5 | 2.9 | 4.4 | 5.6 | 6.7 | 7.4 | 6.4 | 4.7 | 3.3 | 1.5 | 1.0 | 46.2 |
| **DEL NORTE** | | | | | | | | | | | | | |
| Crescent City | 0.5 | 0.9 | 2.0 | 3.0 | 3.7 | 3.5 | 4.3 | 3.7 | 3.0 | 2.0 | 0.9 | 0.5 | 27.7 |
| **EL DORADO** | | | | | | | | | | | | | |
| Camino | 0.9 | 1.7 | 2.5 | 3.9 | 5.9 | 7.2 | 7.8 | 6.8 | 5.1 | 3.1 | 1.5 | 0.9 | 47.3 |
| **FRESNO** | | | | | | | | | | | | | |
| Clovis | 1.0 | 1.5 | 3.2 | 4.8 | 6.4 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.4 |
| Coalinga | 1.2 | 1.7 | 3.1 | 4.6 | 6.2 | 7.2 | 8.5 | 7.3 | 5.3 | 3.4 | 1.6 | 0.7 | 50.9 |
| Firebaugh | 1.0 | 1.8 | 3.7 | 5.7 | 7.3 | 8.1 | 8.2 | 7.2 | 5.5 | 3.9 | 2.0 | 1.1 | 55.4 |
| FivePoints | 1.3 | 2.0 | 4.0 | 6.1 | 7.7 | 8.5 | 8.7 | 8.0 | 6.2 | 4.5 | 2.4 | 1.2 | 60.4 |
| Fresno | 0.9 | 1.7 | 3.3 | 4.8 | 6.7 | 7.8 | 8.4 | 7.1 | 5.2 | 3.2 | 1.4 | 0.6 | 51.1 |
| Fresno State | 0.9 | 1.6 | 3.2 | 5.2 | 7.0 | 8.0 | 8.7 | 7.6 | 5.4 | 3.6 | 1.7 | 0.9 | 53.7 |
| Friant | 1.2 | 1.5 | 3.1 | 4.7 | 6.4 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.3 |
| Kerman | 0.9 | 1.5 | 3.2 | 4.8 | 6.6 | 7.7 | 8.4 | 7.2 | 5.3 | 3.4 | 1.4 | 0.7 | 51.2 |
| Kingsburg | 1.0 | 1.5 | 3.4 | 4.8 | 6.6 | 7.7 | 8.4 | 7.2 | 5.3 | 3.4 | 1.4 | 0.7 | 51.6 |
| Mendota | 1.5 | 2.5 | 4.6 | 6.2 | 7.9 | 8.6 | 8.8 | 7.5 | 5.9 | 4.5 | 2.4 | 1.5 | 61.7 |
| Orange Cove | 1.2 | 1.9 | 3.5 | 4.7 | 7.4 | 8.5 | 8.9 | 7.9 | 5.9 | 3.7 | 1.8 | 1.2 | 56.7 |
| Panoche | 1.1 | 2.0 | 4.0 | 5.6 | 7.8 | 8.5 | 8.3 | 7.3 | 5.6 | 3.9 | 1.8 | 1.2 | 57.2 |
| Parlier | 1.0 | 1.9 | 3.6 | 5.2 | 6.8 | 7.6 | 8.1 | 7.0 | 5.1 | 3.4 | 1.7 | 0.9 | 52.0 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FRESNO** | | | | | | | | | | | | | |
| Reedley | 1.1 | 1.5 | 3.2 | 4.7 | 6.4 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.3 |
| Westlands | 0.9 | 1.7 | 3.8 | 6.3 | 8.0 | 8.6 | 8.6 | 7.8 | 5.9 | 4.3 | 2.1 | 1.1 | 58.8 |
| **GLENN** | | | | | | | | | | | | | |
| Orland | 1.1 | 1.8 | 3.4 | 5.0 | 6.4 | 7.5 | 7.9 | 6.7 | 5.3 | 3.9 | 1.8 | 1.4 | 52.1 |
| Willows | 1.2 | 1.7 | 2.9 | 4.7 | 6.1 | 7.2 | 8.5 | 7.3 | 5.3 | 3.6 | 1.7 | 1.0 | 51.3 |
| **HUMBOLDT** | | | | | | | | | | | | | |
| Eureka | 0.5 | 1.1 | 2.0 | 3.0 | 3.7 | 3.7 | 3.7 | 3.7 | 3.0 | 2.0 | 0.9 | 0.5 | 27.5 |
| Ferndale | 0.5 | 1.1 | 2.0 | 3.0 | 3.7 | 3.7 | 3.7 | 3.7 | 3.0 | 2.0 | 0.9 | 0.5 | 27.5 |
| Garberville | 0.6 | 1.2 | 2.2 | 3.1 | 4.5 | 5.0 | 5.5 | 4.9 | 3.8 | 2.4 | 1.0 | 0.7 | 34.9 |
| Hoopa | 0.5 | 1.1 | 2.1 | 3.0 | 4.4 | 5.4 | 6.1 | 5.1 | 3.8 | 2.4 | 0.9 | 0.7 | 35.6 |
| **IMPERIAL** | | | | | | | | | | | | | |
| Brawley | 2.8 | 3.8 | 5.9 | 8.0 | 10.4 | 11.5 | 11.7 | 10.0 | 8.4 | 6.2 | 3.5 | 2.1 | 84.2 |
| Calipatria/Mulberry | 2.4 | 3.2 | 5.1 | 6.8 | 8.6 | 9.2 | 9.2 | 8.6 | 7.0 | 5.2 | 3.1 | 2.3 | 70.7 |
| El Centro | 2.7 | 3.5 | 5.6 | 7.9 | 10.1 | 11.1 | 11.6 | 9.5 | 8.3 | 6.1 | 3.3 | 2.0 | 81.7 |
| Holtville | 2.8 | 3.8 | 5.9 | 7.9 | 10.4 | 11.6 | 12.0 | 10.0 | 8.6 | 6.2 | 3.5 | 2.1 | 84.7 |
| Meloland | 2.5 | 3.2 | 5.5 | 7.5 | 8.9 | 9.2 | 9.0 | 8.5 | 6.8 | 5.3 | 3.1 | 2.2 | 71.6 |
| Palo Verde II | 2.5 | 3.3 | 5.7 | 6.9 | 8.5 | 8.9 | 8.6 | 7.9 | 6.2 | 4.5 | 2.9 | 2.3 | 68.2 |
| Seeley | 2.7 | 3.5 | 5.9 | 7.7 | 9.7 | 10.1 | 9.3 | 8.3 | 6.9 | 5.5 | 3.4 | 2.2 | 75.4 |
| Westmoreland | 2.4 | 3.3 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.4 |
| Yuma | 2.5 | 3.4 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.6 |
| **INYO** | | | | | | | | | | | | | |
| Bishop | 1.7 | 2.7 | 4.8 | 6.7 | 8.2 | 10.9 | 7.4 | 9.6 | 7.4 | 4.8 | 2.5 | 1.6 | 68.3 |
| Death Valley Jct | 2.2 | 3.3 | 5.4 | 7.7 | 9.8 | 11.1 | 11.4 | 10.1 | 8.3 | 5.4 | 2.9 | 1.7 | 79.1 |
| Independence | 1.7 | 2.7 | 3.4 | 6.6 | 8.5 | 9.5 | 9.8 | 8.5 | 7.1 | 3.9 | 2.0 | 1.5 | 65.2 |
| Lower Haiwee Res. | 1.8 | 2.7 | 4.4 | 7.1 | 8.5 | 9.5 | 9.8 | 8.5 | 7.1 | 4.2 | 2.6 | 1.5 | 67.6 |
| Oasis | 2.7 | 2.8 | 5.9 | 8.0 | 10.4 | 11.7 | 11.6 | 10.0 | 8.4 | 6.2 | 3.4 | 2.1 | 83.1 |
| **KERN** | | | | | | | | | | | | | |
| Arvin | 1.2 | 1.8 | 3.5 | 4.7 | 6.6 | 7.4 | 8.1 | 7.3 | 5.3 | 3.4 | 1.7 | 1.0 | 51.9 |
| Bakersfield | 1.0 | 1.8 | 3.5 | 4.7 | 6.6 | 7.7 | 8.5 | 7.3 | 5.3 | 3.5 | 1.6 | 0.9 | 52.4 |
| Bakersfield/Bonanza | 1.2 | 2.2 | 3.7 | 5.7 | 7.4 | 8.2 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.2 | 57.9 |
| Bakersfield/Greenlee | 1.2 | 2.2 | 3.7 | 5.7 | 7.4 | 8.2 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.2 | 57.9 |
| Belridge | 1.4 | 2.2 | 4.1 | 5.5 | 7.7 | 8.5 | 8.6 | 7.8 | 6.0 | 3.8 | 2.0 | 1.5 | 59.2 |
| Blackwells Corner | 1.4 | 2.1 | 3.8 | 5.4 | 7.0 | 7.8 | 8.5 | 7.7 | 5.8 | 3.9 | 1.9 | 1.2 | 56.6 |
| Buttonwillow | 1.0 | 1.8 | 3.2 | 4.7 | 6.6 | 7.7 | 8.5 | 7.3 | 5.4 | 3.4 | 1.5 | 0.9 | 52.0 |
| China Lake | 2.1 | 3.2 | 5.3 | 7.7 | 9.2 | 10.0 | 11.0 | 9.8 | 7.3 | 4.9 | 2.7 | 1.7 | 74.8 |
| Delano | 0.9 | 1.8 | 3.4 | 4.7 | 6.6 | 7.7 | 8.5 | 7.3 | 5.4 | 3.4 | 1.4 | 0.7 | 52.0 |
| Famoso | 1.3 | 1.9 | 3.5 | 4.8 | 6.7 | 7.6 | 8.0 | 7.3 | 5.5 | 3.5 | 1.7 | 1.3 | 53.1 |
| Grapevine | 1.3 | 1.8 | 3.1 | 4.4 | 5.6 | 6.8 | 7.6 | 6.8 | 5.9 | 3.4 | 1.9 | 1.0 | 49.5 |
| Inyokern | 2.0 | 3.1 | 4.9 | 7.3 | 8.5 | 9.7 | 11.0 | 9.4 | 7.1 | 5.1 | 2.6 | 1.7 | 72.4 |
| Isabella Dam | 1.2 | 1.4 | 2.8 | 4.4 | 5.8 | 7.3 | 7.9 | 7.0 | 5.0 | 3.2 | 1.7 | 0.9 | 48.4 |
| Lamont | 1.3 | 2.4 | 4.4 | 4.6 | 6.5 | 7.0 | 8.8 | 7.6 | 5.7 | 3.7 | 1.6 | 0.8 | 54.4 |
| Lost Hills | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| McFarland/Kern | 1.2 | 2.1 | 3.7 | 5.6 | 7.3 | 8.0 | 8.3 | 7.4 | 5.6 | 4.1 | 2.0 | 1.2 | 56.5 |
| Shafter | 1.0 | 1.7 | 3.4 | 5.0 | 6.6 | 7.7 | 8.3 | 7.3 | 5.4 | 3.4 | 1.5 | 0.9 | 52.1 |
| Taft | 1.3 | 1.8 | 3.1 | 4.3 | 6.2 | 7.3 | 8.5 | 7.3 | 5.4 | 3.4 | 1.7 | 1.0 | 51.2 |
| Tehachapi | 1.4 | 1.8 | 3.2 | 5.0 | 6.1 | 7.7 | 7.9 | 7.3 | 5.9 | 3.4 | 2.1 | 1.2 | 52.9 |
| **KINGS** | | | | | | | | | | | | | |
| Caruthers | 1.6 | 2.5 | 4.0 | 5.7 | 7.8 | 8.7 | 9.3 | 8.4 | 6.3 | 4.4 | 2.4 | 1.6 | 62.7 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **KINGS** | | | | | | | | | | | | | |
| Corcoran | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| Hanford | 0.9 | 1.5 | 3.4 | 5.0 | 6.6 | 7.7 | 8.3 | 7.2 | 5.4 | 3.4 | 1.4 | 0.7 | 51.5 |
| Kettleman | 1.1 | 2.0 | 4.0 | 6.0 | 7.5 | 8.5 | 9.1 | 8.2 | 6.1 | 4.5 | 2.2 | 1.1 | 60.2 |
| Lemoore | 0.9 | 1.5 | 3.4 | 5.0 | 6.6 | 7.7 | 8.3 | 7.3 | 5.4 | 3.4 | 1.4 | 0.7 | 51.7 |
| Stratford | 0.9 | 1.9 | 3.9 | 6.1 | 7.8 | 8.6 | 8.8 | 7.7 | 5.9 | 4.1 | 2.1 | 1.0 | 58.7 |
| **LAKE** | | | | | | | | | | | | | |
| Lakeport | 1.1 | 1.3 | 2.6 | 3.5 | 5.1 | 6.0 | 7.3 | 6.1 | 4.7 | 2.9 | 1.2 | 0.9 | 42.8 |
| Lower Lake | 1.2 | 1.4 | 2.7 | 4.5 | 5.3 | 6.3 | 7.4 | 6.4 | 5.0 | 3.1 | 1.3 | 0.9 | 45.4 |
| **LASSEN** | | | | | | | | | | | | | |
| Buntingville | 1.0 | 1.7 | 3.5 | 4.9 | 6.2 | 7.3 | 8.4 | 7.5 | 5.4 | 3.4 | 1.5 | 0.9 | 51.8 |
| Ravendale | 0.6 | 1.1 | 2.3 | 4.1 | 5.6 | 6.7 | 7.9 | 7.3 | 4.7 | 2.8 | 1.2 | 0.5 | 44.9 |
| Susanville | 0.7 | 1.0 | 2.2 | 4.1 | 5.6 | 6.5 | 7.8 | 7.0 | 4.6 | 2.8 | 1.2 | 0.5 | 44.0 |
| **LOS ANGELES** | | | | | | | | | | | | | |
| Burbank | 2.1 | 2.8 | 3.7 | 4.7 | 5.1 | 6.0 | 6.6 | 6.7 | 5.4 | 4.0 | 2.6 | 2.0 | 51.7 |
| Claremont | 2.0 | 2.3 | 3.4 | 4.6 | 5.0 | 6.0 | 7.0 | 7.0 | 5.3 | 4.0 | 2.7 | 2.1 | 51.3 |
| El Dorado | 1.7 | 2.2 | 3.6 | 4.8 | 5.1 | 5.7 | 5.9 | 5.9 | 4.4 | 3.2 | 2.2 | 1.7 | 46.3 |
| Glendale | 2.0 | 2.2 | 3.3 | 3.8 | 4.7 | 4.8 | 5.7 | 5.6 | 4.3 | 3.3 | 2.2 | 1.8 | 43.7 |
| Glendora | 2.0 | 2.5 | 3.6 | 4.9 | 5.4 | 6.1 | 7.3 | 6.8 | 5.7 | 4.2 | 2.6 | 2.0 | 53.1 |
| Gorman | 1.6 | 2.2 | 3.4 | 4.6 | 5.5 | 7.4 | 7.7 | 7.1 | 5.9 | 3.6 | 2.4 | 1.1 | 52.4 |
| Hollywood Hills | 2.1 | 2.2 | 3.8 | 5.4 | 6.0 | 6.5 | 6.7 | 6.4 | 5.2 | 3.7 | 2.8 | 2.1 | 52.8 |
| Lancaster | 2.1 | 3.0 | 4.6 | 5.9 | 8.5 | 9.7 | 11.0 | 9.8 | 7.3 | 4.6 | 2.8 | 1.7 | 71.1 |
| Long Beach | 1.8 | 2.1 | 3.3 | 3.9 | 4.5 | 4.3 | 5.3 | 4.7 | 3.7 | 2.8 | 1.8 | 1.5 | 39.7 |
| Los Angeles | 2.2 | 2.7 | 3.7 | 4.7 | 5.5 | 5.8 | 6.2 | 5.9 | 5.0 | 3.9 | 2.6 | 1.9 | 50.1 |
| Monrovia | 2.2 | 2.3 | 3.8 | 4.3 | 5.5 | 5.9 | 6.9 | 6.4 | 5.1 | 3.2 | 2.5 | 2.0 | 50.2 |
| Palmdale | 2.0 | 2.6 | 4.6 | 6.2 | 7.3 | 8.9 | 9.8 | 9.0 | 6.5 | 4.7 | 2.7 | 2.1 | 66.2 |
| Pasadena | 2.1 | 2.7 | 3.7 | 4.7 | 5.1 | 6.0 | 7.1 | 6.7 | 5.6 | 4.2 | 2.6 | 2.0 | 52.3 |
| Pearblossom | 1.7 | 2.4 | 3.7 | 4.7 | 7.3 | 7.7 | 9.9 | 7.9 | 6.4 | 4.0 | 2.6 | 1.6 | 59.9 |
| Pomona | 1.7 | 2.0 | 3.4 | 4.5 | 5.0 | 5.8 | 6.5 | 6.4 | 4.7 | 3.5 | 2.3 | 1.7 | 47.5 |
| Redondo Beach | 2.2 | 2.4 | 3.3 | 3.8 | 4.5 | 4.7 | 5.4 | 4.8 | 4.4 | 2.8 | 2.4 | 2.0 | 42.6 |
| San Fernando | 2.0 | 2.7 | 3.5 | 4.6 | 5.5 | 5.9 | 7.3 | 6.7 | 5.3 | 3.9 | 2.6 | 2.0 | 52.0 |
| Santa Clarita | 2.8 | 2.8 | 4.1 | 5.6 | 6.0 | 6.8 | 7.6 | 7.8 | 5.8 | 5.2 | 3.7 | 3.2 | 61.5 |
| Santa Monica | 1.8 | 2.1 | 3.3 | 4.5 | 4.7 | 5.0 | 5.4 | 5.4 | 3.9 | 3.4 | 2.4 | 2.2 | 44.2 |
| **MADERA** | | | | | | | | | | | | | |
| Chowchilla | 1.0 | 1.4 | 3.2 | 4.7 | 6.6 | 7.8 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.4 |
| Madera | 0.9 | 1.4 | 3.2 | 4.8 | 6.6 | 7.8 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.5 |
| Raymond | 1.2 | 1.5 | 3.0 | 4.6 | 6.1 | 7.6 | 8.4 | 7.3 | 5.2 | 3.4 | 1.4 | 0.7 | 50.5 |
| **MARIN** | | | | | | | | | | | | | |
| Black Point | 1.1 | 1.7 | 3.0 | 4.2 | 5.2 | 6.2 | 6.6 | 5.8 | 4.3 | 2.8 | 1.3 | 0.9 | 43.0 |
| Novato | 1.3 | 1.5 | 2.4 | 3.5 | 4.4 | 6.0 | 5.9 | 5.4 | 4.4 | 2.8 | 1.4 | 0.7 | 39.8 |
| Point San Pedro | 1.1 | 1.7 | 3.0 | 4.2 | 5.2 | 6.2 | 6.6 | 5.8 | 4.3 | 2.8 | 1.3 | 0.9 | 43.0 |
| San Rafael | 1.2 | 1.3 | 2.4 | 3.3 | 4.0 | 4.8 | 4.8 | 4.9 | 4.3 | 2.7 | 1.3 | 0.7 | 35.8 |
| **MARIPOSA** | | | | | | | | | | | | | |
| Coulterville | 1.1 | 1.5 | 2.8 | 4.4 | 5.9 | 7.3 | 8.1 | 7.0 | 5.3 | 3.4 | 1.4 | 0.7 | 48.8 |
| Mariposa | 1.1 | 1.5 | 2.8 | 4.4 | 5.9 | 7.4 | 8.2 | 7.1 | 5.0 | 3.4 | 1.4 | 0.7 | 49.0 |
| Yosemite Village | 0.7 | 1.0 | 2.3 | 3.7 | 5.1 | 6.5 | 7.1 | 6.1 | 4.4 | 2.9 | 1.1 | 0.6 | 41.4 |
| **MENDOCINO** | | | | | | | | | | | | | |
| Fort Bragg | 0.9 | 1.3 | 2.2 | 3.0 | 3.7 | 3.5 | 3.7 | 3.7 | 3.0 | 2.3 | 1.2 | 0.7 | 29.0 |
| Hopland | 1.1 | 1.3 | 2.6 | 3.4 | 5.0 | 5.9 | 6.5 | 5.7 | 4.5 | 2.8 | 1.3 | 0.7 | 40.9 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MENDOCINO** | | | | | | | | | | | | | |
| Point Arena | 1.0 | 1.3 | 2.3 | 3.0 | 3.7 | 3.9 | 3.7 | 3.7 | 3.0 | 2.3 | 1.2 | 0.7 | 29.6 |
| Sanel Valley | 1.0 | 1.6 | 3.0 | 4.6 | 6.0 | 7.0 | 8.0 | 7.0 | 5.2 | 3.4 | 1.4 | 0.9 | 49.1 |
| Ukiah | 1.0 | 1.3 | 2.6 | 3.3 | 5.0 | 5.8 | 6.7 | 5.9 | 4.5 | 2.8 | 1.3 | 0.7 | 40.9 |
| **MERCED** | | | | | | | | | | | | | |
| Kesterson | 0.9 | 1.7 | 3.4 | 5.5 | 7.3 | 8.2 | 8.6 | 7.4 | 5.5 | 3.8 | 1.8 | 0.9 | 55.1 |
| Los Banos | 1.0 | 1.5 | 3.2 | 4.7 | 6.1 | 7.4 | 8.2 | 7.0 | 5.3 | 3.4 | 1.4 | 0.7 | 50.0 |
| Merced | 1.0 | 1.5 | 3.2 | 4.7 | 6.6 | 7.9 | 8.5 | 7.2 | 5.3 | 3.4 | 1.4 | 0.7 | 51.5 |
| **MODOC** | | | | | | | | | | | | | |
| Modoc/Alturas | 0.9 | 1.4 | 2.8 | 3.7 | 5.1 | 6.2 | 7.5 | 6.6 | 4.6 | 2.8 | 1.2 | 0.7 | 43.2 |
| **MONO** | | | | | | | | | | | | | |
| Bridgeport | 0.7 | 0.9 | 2.2 | 3.8 | 5.5 | 6.6 | 7.4 | 6.7 | 4.7 | 2.7 | 1.2 | 0.5 | 43.0 |
| **MONTEREY** | | | | | | | | | | | | | |
| Arroyo Seco | 1.5 | 2.0 | 3.7 | 5.4 | 6.3 | 7.3 | 7.2 | 6.7 | 5.0 | 3.9 | 2.0 | 1.6 | 52.6 |
| Castroville | 1.4 | 1.7 | 3.0 | 4.2 | 4.6 | 4.8 | 4.0 | 3.8 | 3.0 | 2.6 | 1.6 | 1.4 | 36.2 |
| Gonzales | 1.3 | 1.7 | 3.4 | 4.7 | 5.4 | 6.3 | 6.3 | 5.9 | 4.4 | 3.4 | 1.9 | 1.3 | 45.7 |
| Greenfield | 1.8 | 2.2 | 3.4 | 4.8 | 5.6 | 6.3 | 6.5 | 6.2 | 4.8 | 3.7 | 2.4 | 1.8 | 49.5 |
| King City | 1.7 | 2.0 | 3.4 | 4.4 | 4.4 | 5.6 | 6.1 | 6.7 | 6.5 | 5.2 | 2.2 | 1.3 | 49.6 |
| King City-Oasis Rd. | 1.4 | 1.9 | 3.6 | 5.3 | 6.5 | 7.3 | 7.4 | 6.8 | 5.1 | 4.0 | 2.0 | 1.5 | 52.7 |
| Long Valley | 1.5 | 1.9 | 3.2 | 4.1 | 5.8 | 6.5 | 7.3 | 6.7 | 5.3 | 3.6 | 2.0 | 1.2 | 49.1 |
| Monterey | 1.7 | 1.8 | 2.7 | 3.5 | 4.0 | 4.1 | 4.3 | 4.2 | 3.5 | 2.8 | 1.9 | 1.5 | 36.0 |
| Pajaro | 1.8 | 2.2 | 3.7 | 4.8 | 5.3 | 5.7 | 5.6 | 5.3 | 4.3 | 3.4 | 2.4 | 1.8 | 46.1 |
| Salinas | 1.6 | 1.9 | 2.7 | 3.8 | 4.8 | 4.7 | 5.0 | 4.5 | 4.0 | 2.9 | 1.9 | 1.3 | 39.1 |
| Salinas North | 1.2 | 1.5 | 2.9 | 4.1 | 4.6 | 5.2 | 4.5 | 4.3 | 3.2 | 2.8 | 1.5 | 1.2 | 36.9 |
| San Ardo | 1.0 | 1.7 | 3.1 | 4.5 | 5.9 | 7.2 | 8.1 | 7.1 | 5.1 | 3.1 | 1.5 | 1.0 | 49.0 |
| San Juan | 1.8 | 2.1 | 3.4 | 4.6 | 5.3 | 5.7 | 5.5 | 4.9 | 3.8 | 3.2 | 2.2 | 1.9 | 44.2 |
| Soledad | 1.7 | 2.0 | 3.4 | 4.4 | 5.5 | 5.4 | 6.5 | 6.2 | 5.2 | 3.7 | 2.2 | 1.5 | 47.7 |
| **NAPA** | | | | | | | | | | | | | |
| Angwin | 1.8 | 1.9 | 3.2 | 4.7 | 5.8 | 7.3 | 8.1 | 7.1 | 5.5 | 4.5 | 2.9 | 2.1 | 54.9 |
| Carneros | 0.8 | 1.5 | 3.1 | 4.6 | 5.5 | 6.6 | 6.9 | 6.2 | 4.7 | 3.5 | 1.4 | 1.0 | 45.8 |
| Oakville | 1.0 | 1.5 | 2.9 | 4.7 | 5.8 | 6.9 | 7.2 | 6.4 | 4.9 | 3.5 | 1.6 | 1.2 | 47.7 |
| St Helena | 1.2 | 1.5 | 2.8 | 3.9 | 5.1 | 6.1 | 7.0 | 6.2 | 4.8 | 3.1 | 1.4 | 0.9 | 44.1 |
| Yountville | 1.3 | 1.7 | 2.8 | 3.9 | 5.1 | 6.0 | 7.1 | 6.1 | 4.8 | 3.1 | 1.5 | 0.9 | 44.3 |
| **NEVADA** | | | | | | | | | | | | | |
| Grass Valley | 1.1 | 1.5 | 2.6 | 4.0 | 5.7 | 7.1 | 7.9 | 7.1 | 5.3 | 3.2 | 1.5 | 0.9 | 48.0 |
| Nevada City | 1.1 | 1.5 | 2.6 | 3.9 | 5.8 | 6.9 | 7.9 | 7.0 | 5.3 | 3.2 | 1.4 | 0.9 | 47.4 |
| **ORANGE** | | | | | | | | | | | | | |
| Irvine | 2.2 | 2.5 | 3.7 | 4.7 | 5.2 | 5.9 | 6.3 | 6.2 | 4.6 | 3.7 | 2.6 | 2.3 | 49.6 |
| Laguna Beach | 2.2 | 2.7 | 3.4 | 3.8 | 4.6 | 4.6 | 4.9 | 4.9 | 4.4 | 3.4 | 2.4 | 2.0 | 43.2 |
| Santa Ana | 2.2 | 2.7 | 3.7 | 4.5 | 4.6 | 5.4 | 6.2 | 6.1 | 4.7 | 3.7 | 2.5 | 2.0 | 48.2 |
| **PLACER** | | | | | | | | | | | | | |
| Auburn | 1.2 | 1.7 | 2.8 | 4.4 | 6.1 | 7.4 | 8.3 | 7.3 | 5.4 | 3.4 | 1.6 | 1.0 | 50.6 |
| Blue Canyon | 0.7 | 1.1 | 2.1 | 3.4 | 4.8 | 6.0 | 7.2 | 6.1 | 4.6 | 2.9 | 0.9 | 0.6 | 40.5 |
| Colfax | 1.1 | 1.5 | 2.6 | 4.0 | 5.8 | 7.1 | 7.9 | 7.0 | 5.3 | 3.2 | 1.4 | 0.9 | 47.9 |
| Roseville | 1.1 | 1.7 | 3.1 | 4.7 | 6.2 | 7.7 | 8.5 | 7.3 | 5.6 | 3.7 | 1.7 | 1.0 | 52.2 |
| Soda Springs | 0.7 | 0.7 | 1.8 | 3.0 | 4.3 | 5.3 | 6.2 | 5.5 | 4.1 | 2.5 | 0.7 | 0.7 | 35.4 |
| Tahoe City | 0.7 | 0.7 | 1.7 | 3.0 | 4.3 | 5.4 | 6.1 | 5.6 | 4.1 | 2.4 | 0.8 | 0.6 | 35.5 |
| Truckee | 0.7 | 0.7 | 1.7 | 3.2 | 4.4 | 5.4 | 6.4 | 5.7 | 4.1 | 2.4 | 0.8 | 0.6 | 36.2 |

| Appendix A - Reference Evapotranspiration (ETo) Table* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
| **PLUMAS** | | | | | | | | | | | | | |
| Portola | 0.7 | 0.9 | 1.9 | 3.5 | 4.9 | 5.9 | 7.3 | 5.9 | 4.3 | 2.7 | 0.9 | 0.5 | 39.4 |
| Quincy | 0.7 | 0.9 | 2.2 | 3.5 | 4.9 | 5.9 | 7.3 | 5.9 | 4.4 | 2.8 | 1.2 | 0.5 | 40.2 |
| **RIVERSIDE** | | | | | | | | | | | | | |
| Beaumont | 2.0 | 2.3 | 3.4 | 4.4 | 6.1 | 7.1 | 7.6 | 7.9 | 6.0 | 3.9 | 2.6 | 1.7 | 55.0 |
| Blythe | 2.4 | 3.3 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.4 |
| Cathedral City | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| Coachella | 2.9 | 4.4 | 6.2 | 8.4 | 10.5 | 11.9 | 12.3 | 10.1 | 8.9 | 6.2 | 3.8 | 2.4 | 88.1 |
| Desert Center | 2.9 | 4.1 | 6.4 | 8.5 | 11.0 | 12.1 | 12.2 | 11.1 | 9.0 | 6.4 | 3.9 | 2.6 | 90.0 |
| Elsinore | 2.1 | 2.8 | 3.9 | 4.4 | 5.9 | 7.1 | 7.6 | 7.0 | 5.8 | 3.9 | 2.6 | 1.9 | 55.0 |
| Indio | 3.1 | 3.6 | 6.5 | 8.3 | 10.5 | 11.0 | 10.8 | 9.7 | 8.3 | 5.9 | 3.7 | 2.7 | 83.9 |
| La Quinta | 2.4 | 2.8 | 5.2 | 6.5 | 8.3 | 8.7 | 8.5 | 7.9 | 6.5 | 4.5 | 2.7 | 2.2 | 66.2 |
| Mecca | 2.6 | 3.3 | 5.7 | 7.2 | 8.6 | 9.0 | 8.8 | 8.2 | 6.8 | 5.0 | 3.2 | 2.4 | 70.8 |
| Oasis | 2.9 | 3.3 | 5.3 | 6.1 | 8.5 | 8.9 | 8.7 | 7.9 | 6.9 | 4.8 | 2.9 | 2.3 | 68.4 |
| Palm Desert | 2.5 | 3.4 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.6 |
| Palm Springs | 2.0 | 2.9 | 4.9 | 7.2 | 8.3 | 8.5 | 11.6 | 8.3 | 7.2 | 5.9 | 2.7 | 1.7 | 71.1 |
| Rancho California | 1.8 | 2.2 | 3.4 | 4.8 | 5.6 | 6.3 | 6.5 | 6.2 | 4.8 | 3.7 | 2.4 | 1.8 | 49.5 |
| Rancho Mirage | 2.4 | 3.3 | 5.3 | 6.9 | 8.7 | 9.6 | 9.6 | 8.7 | 6.9 | 5.0 | 3.0 | 2.2 | 71.4 |
| Ripley | 2.7 | 3.3 | 5.6 | 7.2 | 8.7 | 8.7 | 8.4 | 7.6 | 6.2 | 4.6 | 2.8 | 2.2 | 67.8 |
| Salton Sea North | 2.5 | 3.3 | 5.5 | 7.2 | 8.8 | 9.3 | 9.2 | 8.5 | 6.8 | 5.2 | 3.1 | 2.3 | 71.7 |
| Temecula East II | 2.3 | 2.4 | 4.1 | 4.9 | 6.4 | 7.0 | 7.8 | 7.4 | 5.7 | 4.1 | 2.6 | 2.2 | 56.7 |
| Thermal | 2.4 | 3.3 | 5.5 | 7.6 | 9.1 | 9.6 | 9.3 | 8.6 | 7.1 | 5.2 | 3.1 | 2.1 | 72.8 |
| Riverside UC | 2.5 | 2.9 | 4.2 | 5.3 | 5.9 | 6.6 | 7.2 | 6.9 | 5.4 | 4.1 | 2.9 | 2.6 | 56.4 |
| Winchester | 2.3 | 2.4 | 4.1 | 4.9 | 6.4 | 6.9 | 7.7 | 7.5 | 6.0 | 3.9 | 2.6 | 2.1 | 56.8 |
| **SACRAMENTO** | | | | | | | | | | | | | |
| Fair Oaks | 1.0 | 1.6 | 3.4 | 4.1 | 6.5 | 7.5 | 8.1 | 7.1 | 5.2 | 3.4 | 1.5 | 1.0 | 50.5 |
| Sacramento | 1.0 | 1.8 | 3.2 | 4.7 | 6.4 | 7.7 | 8.4 | 7.2 | 5.4 | 3.7 | 1.7 | 0.9 | 51.9 |
| Twitchell Island | 1.2 | 1.8 | 3.9 | 5.3 | 7.4 | 8.8 | 9.1 | 7.8 | 5.9 | 3.8 | 1.7 | 1.2 | 57.9 |
| **SAN BENITO** | | | | | | | | | | | | | |
| Hollister | 1.5 | 1.8 | 3.1 | 4.3 | 5.5 | 5.7 | 6.4 | 5.9 | 5.0 | 3.5 | 1.7 | 1.1 | 45.1 |
| San Benito | 1.2 | 1.6 | 3.1 | 4.6 | 5.6 | 6.4 | 6.9 | 6.5 | 4.8 | 3.7 | 1.7 | 1.2 | 47.2 |
| San Juan Valley | 1.4 | 1.8 | 3.4 | 4.5 | 6.0 | 6.7 | 7.1 | 6.4 | 5.0 | 3.5 | 1.8 | 1.4 | 49.1 |
| **SAN BERNARDINO** | | | | | | | | | | | | | |
| Baker | 2.7 | 3.9 | 6.1 | 8.3 | 10.4 | 11.8 | 12.2 | 11.0 | 8.9 | 6.1 | 3.3 | 2.1 | 86.6 |
| Barstow NE | 2.2 | 2.9 | 5.3 | 6.9 | 9.0 | 10.1 | 9.9 | 8.9 | 6.8 | 4.8 | 2.7 | 2.1 | 71.7 |
| Big Bear Lake | 1.8 | 2.6 | 4.6 | 6.0 | 7.0 | 7.6 | 8.1 | 7.4 | 5.4 | 4.1 | 2.4 | 1.8 | 58.6 |
| Chino | 2.1 | 2.9 | 3.9 | 4.5 | 5.7 | 6.5 | 7.3 | 7.1 | 5.9 | 4.2 | 2.6 | 2.0 | 54.6 |
| Crestline | 1.5 | 1.9 | 3.3 | 4.4 | 5.5 | 6.6 | 7.8 | 7.1 | 5.4 | 3.5 | 2.2 | 1.6 | 50.8 |
| Lake Arrowhead | 1.8 | 2.6 | 4.6 | 6.0 | 7.0 | 7.6 | 8.1 | 7.4 | 5.4 | 4.1 | 2.4 | 1.8 | 58.6 |
| Lucerne Valley | 2.2 | 2.9 | 5.1 | 6.5 | 9.1 | 11.0 | 11.4 | 9.9 | 7.4 | 5.0 | 3.0 | 1.8 | 75.3 |
| Needles | 3.2 | 4.2 | 6.6 | 8.9 | 11.0 | 12.4 | 12.8 | 11.0 | 8.9 | 6.6 | 4.0 | 2.7 | 92.1 |
| Newberry Springs | 2.1 | 2.9 | 5.3 | 8.4 | 9.8 | 10.9 | 11.1 | 9.9 | 7.6 | 5.2 | 3.1 | 2.0 | 78.2 |
| San Bernardino | 2.0 | 2.7 | 3.8 | 4.6 | 5.7 | 6.9 | 7.9 | 7.4 | 5.9 | 4.2 | 2.6 | 2.0 | 55.6 |
| Twentynine Palms | 2.6 | 3.6 | 5.9 | 7.9 | 10.1 | 11.2 | 11.2 | 10.3 | 8.6 | 5.9 | 3.4 | 2.2 | 82.9 |
| Victorville | 2.0 | 2.6 | 4.6 | 6.2 | 7.3 | 8.9 | 9.8 | 9.0 | 6.5 | 4.7 | 2.7 | 2.1 | 66.2 |
| **SAN DIEGO** | | | | | | | | | | | | | |
| Chula Vista | 2.2 | 2.7 | 3.4 | 3.8 | 4.9 | 4.7 | 5.5 | 4.9 | 4.5 | 3.4 | 2.4 | 2.0 | 44.2 |
| Escondido SPV | 2.4 | 2.6 | 3.9 | 4.7 | 5.9 | 6.5 | 7.1 | 6.7 | 5.3 | 3.9 | 2.8 | 2.3 | 54.2 |
| Miramar | 2.3 | 2.5 | 3.7 | 4.1 | 5.1 | 5.4 | 6.1 | 5.8 | 4.5 | 3.3 | 2.4 | 2.1 | 47.1 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SAN DIEGO** | | | | | | | | | | | | | |
| Oceanside | 2.2 | 2.7 | 3.4 | 3.7 | 4.9 | 4.6 | 4.6 | 5.1 | 4.1 | 3.3 | 2.4 | 2.0 | 42.9 |
| Otay Lake | 2.3 | 2.7 | 3.9 | 4.6 | 5.6 | 5.9 | 6.2 | 6.1 | 4.8 | 3.7 | 2.6 | 2.2 | 50.4 |
| Pine Valley | 1.5 | 2.4 | 3.8 | 5.1 | 6.0 | 7.0 | 7.8 | 7.3 | 6.0 | 4.0 | 2.2 | 1.7 | 54.8 |
| Ramona | 2.1 | 2.1 | 3.4 | 4.6 | 5.2 | 6.3 | 6.7 | 6.8 | 5.3 | 4.1 | 2.8 | 2.1 | 51.6 |
| San Diego | 2.1 | 2.4 | 3.4 | 4.6 | 5.1 | 5.3 | 5.7 | 5.6 | 4.3 | 3.6 | 2.4 | 2.0 | 46.5 |
| Santee | 2.1 | 2.7 | 3.7 | 4.5 | 5.5 | 6.1 | 6.6 | 6.2 | 5.4 | 3.8 | 2.6 | 2.0 | 51.1 |
| Torrey Pines | 2.2 | 2.3 | 3.4 | 3.9 | 4.0 | 4.1 | 4.6 | 4.7 | 3.8 | 2.8 | 2.0 | 2.0 | 39.8 |
| Warner Springs | 1.6 | 2.7 | 3.7 | 4.7 | 5.7 | 7.6 | 8.3 | 7.7 | 6.3 | 4.0 | 2.5 | 1.3 | 56.0 |
| **SAN FRANCISCO** | | | | | | | | | | | | | |
| San Francisco | 1.5 | 1.3 | 2.4 | 3.0 | 3.7 | 4.6 | 4.9 | 4.8 | 4.1 | 2.8 | 1.3 | 0.7 | 35.1 |
| **SAN JOAQUIN** | | | | | | | | | | | | | |
| Farmington | 1.5 | 1.5 | 2.9 | 4.7 | 6.2 | 7.6 | 8.1 | 6.8 | 5.3 | 3.3 | 1.4 | 0.7 | 50.0 |
| Lodi West | 1.0 | 1.6 | 3.3 | 4.3 | 6.3 | 6.9 | 7.3 | 6.4 | 4.5 | 3.0 | 1.4 | 0.8 | 46.7 |
| Manteca | 0.9 | 1.7 | 3.4 | 5.0 | 6.5 | 7.5 | 8.0 | 7.1 | 5.2 | 3.3 | 1.6 | 0.9 | 51.2 |
| Stockton | 0.8 | 1.5 | 2.9 | 4.7 | 6.2 | 7.4 | 8.1 | 6.8 | 5.3 | 3.2 | 1.4 | 0.6 | 49.1 |
| Tracy | 1.0 | 1.5 | 2.9 | 4.5 | 6.1 | 7.3 | 7.9 | 6.7 | 5.3 | 3.2 | 1.3 | 0.7 | 48.5 |
| **SAN LUIS OBISPO** | | | | | | | | | | | | | |
| Arroyo Grande | 2.0 | 2.2 | 3.2 | 3.8 | 4.3 | 4.7 | 4.3 | 4.6 | 3.8 | 3.2 | 2.4 | 1.7 | 40.0 |
| Atascadero | 1.2 | 1.5 | 2.8 | 3.9 | 4.5 | 6.0 | 6.7 | 6.2 | 5.0 | 3.2 | 1.7 | 1.0 | 43.7 |
| Morro Bay | 2.0 | 2.2 | 3.1 | 3.5 | 4.3 | 4.5 | 4.6 | 4.6 | 3.8 | 3.5 | 2.1 | 1.7 | 39.9 |
| Nipomo | 2.2 | 2.5 | 3.8 | 5.1 | 5.7 | 6.2 | 6.4 | 6.1 | 4.9 | 4.1 | 2.9 | 2.3 | 52.1 |
| Paso Robles | 1.6 | 2.0 | 3.2 | 4.3 | 5.5 | 6.3 | 7.3 | 6.7 | 5.1 | 3.7 | 2.1 | 1.4 | 49.0 |
| San Luis Obispo | 2.0 | 2.2 | 3.2 | 4.1 | 4.9 | 5.3 | 4.6 | 5.5 | 4.4 | 3.5 | 2.4 | 1.7 | 43.8 |
| San Miguel | 1.6 | 2.0 | 3.2 | 4.3 | 5.0 | 6.4 | 7.4 | 6.8 | 5.1 | 3.7 | 2.1 | 1.4 | 49.0 |
| San Simeon | 2.0 | 2.0 | 2.9 | 3.5 | 4.2 | 4.4 | 4.6 | 4.3 | 3.5 | 3.1 | 2.0 | 1.7 | 38.1 |
| **SAN MATEO** | | | | | | | | | | | | | |
| Hal Moon Bay | 1.5 | 1.7 | 2.4 | 3.0 | 3.9 | 4.3 | 4.3 | 4.2 | 3.5 | 2.8 | 1.3 | 1.0 | 33.7 |
| Redwood City | 1.5 | 1.8 | 2.9 | 3.8 | 5.2 | 5.3 | 6.2 | 5.6 | 4.8 | 3.1 | 1.7 | 1.0 | 42.8 |
| Woodside | 1.8 | 2.2 | 3.4 | 4.8 | 5.6 | 6.3 | 6.5 | 6.2 | 4.8 | 3.7 | 2.4 | 1.8 | 49.5 |
| **SANTA BARBARA** | | | | | | | | | | | | | |
| Betteravia | 2.1 | 2.6 | 4.0 | 5.2 | 6.0 | 5.9 | 5.8 | 5.4 | 4.1 | 3.3 | 2.7 | 2.1 | 49.1 |
| Carpenteria | 2.0 | 2.4 | 3.2 | 3.9 | 4.8 | 5.2 | 5.5 | 5.7 | 4.5 | 3.4 | 2.4 | 2.0 | 44.9 |
| Cuyama | 2.1 | 2.4 | 3.8 | 5.4 | 6.9 | 7.9 | 8.5 | 7.7 | 5.9 | 4.5 | 2.6 | 2.0 | 59.7 |
| Goleta | 2.1 | 2.5 | 3.9 | 5.1 | 5.7 | 5.7 | 5.4 | 5.4 | 4.2 | 3.2 | 2.8 | 2.2 | 48.1 |
| Goleta Foothills | 2.3 | 2.6 | 3.7 | 5.4 | 5.3 | 5.6 | 5.5 | 5.7 | 4.5 | 3.9 | 2.8 | 2.3 | 49.6 |
| Guadalupe | 2.0 | 2.2 | 3.2 | 3.7 | 4.9 | 4.6 | 4.5 | 4.6 | 4.1 | 3.3 | 2.4 | 1.7 | 41.1 |
| Lompoc | 2.0 | 2.2 | 3.2 | 3.7 | 4.8 | 4.6 | 4.9 | 4.8 | 3.9 | 3.2 | 2.4 | 1.7 | 41.1 |
| Los Alamos | 1.8 | 2.0 | 3.2 | 4.1 | 4.9 | 5.3 | 5.7 | 5.5 | 4.4 | 3.7 | 2.4 | 1.6 | 44.6 |
| Santa Barbara | 2.0 | 2.5 | 3.2 | 3.8 | 4.6 | 5.1 | 5.5 | 4.5 | 3.4 | 2.4 | 1.8 | 1.8 | 40.6 |
| Santa Maria | 1.8 | 2.3 | 3.7 | 5.1 | 5.7 | 5.8 | 5.6 | 5.3 | 4.2 | 3.5 | 2.4 | 1.9 | 47.4 |
| Santa Ynez | 1.7 | 2.2 | 3.5 | 5.0 | 5.8 | 6.2 | 6.4 | 6.0 | 4.5 | 3.6 | 2.2 | 1.7 | 48.7 |
| Sisquoc | 2.1 | 2.5 | 3.8 | 4.1 | 6.1 | 6.3 | 6.4 | 5.8 | 4.7 | 3.4 | 2.3 | 1.8 | 49.2 |
| Solvang | 2.0 | 2.0 | 3.3 | 4.3 | 5.0 | 5.6 | 6.1 | 5.6 | 4.4 | 3.7 | 2.2 | 1.6 | 45.6 |
| **SANTA CLARA** | | | | | | | | | | | | | |
| Gilroy | 1.3 | 1.8 | 3.1 | 4.1 | 5.3 | 5.6 | 6.1 | 5.5 | 4.7 | 3.4 | 1.7 | 1.1 | 43.6 |
| Los Gatos | 1.5 | 1.8 | 2.8 | 3.9 | 5.0 | 5.6 | 6.2 | 5.5 | 4.7 | 3.2 | 1.7 | 1.1 | 42.9 |
| Morgan Hill | 1.5 | 1.8 | 3.4 | 4.2 | 6.3 | 7.0 | 7.1 | 6.0 | 5.1 | 3.7 | 1.9 | 1.4 | 49.5 |
| Palo Alto | 1.5 | 1.8 | 2.8 | 3.8 | 5.2 | 5.3 | 6.2 | 5.6 | 5.0 | 3.2 | 1.7 | 1.0 | 43.0 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SANTA CLARA** | | | | | | | | | | | | | |
| San Jose | 1.5 | 1.8 | 3.1 | 4.1 | 5.5 | 5.8 | 6.5 | 5.9 | 5.2 | 3.3 | 1.8 | 1.0 | 45.3 |
| **SANTA CRUZ** | | | | | | | | | | | | | |
| De Laveaga | 1.4 | 1.9 | 3.3 | 4.7 | 4.9 | 5.3 | 5.0 | 4.8 | 3.6 | 3.0 | 1.6 | 1.3 | 40.8 |
| Green Valley Rd | 1.2 | 1.8 | 3.2 | 4.5 | 4.6 | 5.4 | 5.2 | 5.0 | 3.7 | 3.1 | 1.6 | 1.3 | 40.6 |
| Santa Cruz | 1.5 | 1.8 | 2.6 | 3.5 | 4.3 | 4.4 | 4.8 | 4.4 | 3.8 | 2.8 | 1.7 | 1.2 | 36.6 |
| Watsonville | 1.5 | 1.8 | 2.7 | 3.7 | 4.6 | 4.5 | 4.9 | 4.2 | 4.0 | 2.9 | 1.8 | 1.2 | 37.7 |
| Webb | 1.8 | 2.2 | 3.7 | 4.8 | 5.3 | 5.7 | 5.6 | 5.3 | 4.3 | 3.4 | 2.4 | 1.8 | 46.2 |
| **SHASTA** | | | | | | | | | | | | | |
| Burney | 0.7 | 1.0 | 2.1 | 3.5 | 4.9 | 5.9 | 7.4 | 6.4 | 4.4 | 2.9 | 0.9 | 0.6 | 40.9 |
| Fall River Mills | 0.6 | 1.0 | 2.1 | 3.7 | 5.0 | 6.1 | 7.8 | 6.7 | 4.6 | 2.8 | 0.9 | 0.5 | 41.8 |
| Glenburn | 0.6 | 1.0 | 2.1 | 3.7 | 5.0 | 6.3 | 7.8 | 6.7 | 4.7 | 2.8 | 0.9 | 0.6 | 42.1 |
| McArthur | 0.7 | 1.4 | 2.9 | 4.2 | 5.6 | 6.9 | 8.2 | 7.2 | 5.0 | 3.0 | 1.1 | 0.6 | 46.8 |
| Redding | 1.2 | 1.4 | 2.6 | 4.1 | 5.6 | 7.1 | 8.5 | 7.3 | 5.3 | 3.2 | 1.4 | 0.9 | 48.8 |
| **SIERRA** | | | | | | | | | | | | | |
| Downieville | 0.7 | 1.0 | 2.3 | 3.5 | 5.0 | 6.0 | 7.4 | 6.2 | 4.7 | 2.8 | 0.9 | 0.6 | 41.3 |
| Sierraville | 0.7 | 1.1 | 2.2 | 3.2 | 4.5 | 5.9 | 7.3 | 6.4 | 4.3 | 2.6 | 0.9 | 0.5 | 39.6 |
| **SISKIYOU** | | | | | | | | | | | | | |
| Happy Camp | 0.5 | 0.9 | 2.0 | 3.0 | 4.3 | 5.2 | 6.1 | 5.3 | 4.1 | 2.4 | 0.9 | 0.5 | 35.1 |
| MacDoel | 1.0 | 1.7 | 3.1 | 4.5 | 5.9 | 7.2 | 8.1 | 7.1 | 5.1 | 3.1 | 1.5 | 1.0 | 49.0 |
| Mt Shasta | 0.5 | 0.9 | 2.0 | 3.0 | 4.5 | 5.3 | 6.7 | 5.7 | 4.0 | 2.2 | 0.7 | 0.5 | 36.0 |
| Tule lake FS | 0.7 | 1.3 | 2.7 | 4.0 | 5.4 | 6.3 | 7.1 | 6.4 | 4.7 | 2.8 | 1.0 | 0.6 | 42.9 |
| Weed | 0.5 | 0.9 | 2.0 | 2.5 | 4.5 | 5.3 | 6.7 | 5.5 | 3.7 | 2.0 | 0.9 | 0.5 | 34.9 |
| Yreka | 0.6 | 0.9 | 2.1 | 3.0 | 4.9 | 5.8 | 7.3 | 6.5 | 4.3 | 2.5 | 0.9 | 0.5 | 39.2 |
| **SOLANO** | | | | | | | | | | | | | |
| Benicia | 1.3 | 1.4 | 2.7 | 3.8 | 4.9 | 5.0 | 6.4 | 5.5 | 4.4 | 2.9 | 1.2 | 0.7 | 40.3 |
| Dixon | 0.7 | 1.4 | 3.2 | 5.2 | 6.3 | 7.6 | 8.2 | 7.2 | 5.5 | 4.3 | 1.6 | 1.1 | 52.1 |
| Fairfield | 1.1 | 1.7 | 2.8 | 4.0 | 5.5 | 6.1 | 7.8 | 6.0 | 4.8 | 3.1 | 1.4 | 0.9 | 45.2 |
| Hastings Tract | 1.6 | 2.2 | 3.7 | 5.1 | 6.8 | 7.8 | 8.7 | 7.8 | 5.7 | 4.0 | 2.1 | 1.6 | 57.1 |
| Putah Creek | 1.0 | 1.6 | 3.2 | 4.9 | 6.1 | 7.3 | 7.9 | 7.0 | 5.3 | 3.8 | 1.8 | 1.2 | 51.0 |
| Rio Vista | 0.9 | 1.7 | 2.8 | 4.4 | 5.9 | 6.7 | 7.9 | 6.5 | 5.1 | 3.2 | 1.3 | 0.7 | 47.0 |
| Suisun Valley | 0.6 | 1.3 | 3.0 | 4.7 | 5.8 | 7.0 | 7.7 | 6.8 | 5.3 | 3.8 | 1.4 | 0.9 | 48.3 |
| Winters | 0.9 | 1.7 | 3.3 | 5.0 | 6.4 | 7.5 | 7.9 | 7.0 | 5.2 | 3.5 | 1.6 | 1.0 | 51.0 |
| **SONOMA** | | | | | | | | | | | | | |
| Bennett Valley | 1.1 | 1.7 | 3.2 | 4.1 | 5.5 | 6.5 | 6.6 | 5.7 | 4.5 | 3.1 | 1.5 | 0.9 | 44.4 |
| Cloverdale | 1.1 | 1.4 | 2.6 | 3.4 | 5.0 | 5.9 | 6.2 | 5.6 | 4.5 | 2.8 | 1.4 | 0.7 | 40.7 |
| Fort Ross | 1.2 | 1.4 | 2.2 | 3.0 | 3.7 | 4.5 | 4.2 | 4.3 | 3.4 | 2.4 | 1.2 | 0.5 | 31.9 |
| Healdsburg | 1.2 | 1.5 | 2.4 | 3.5 | 5.0 | 5.9 | 6.1 | 5.6 | 4.5 | 2.8 | 1.4 | 0.7 | 40.8 |
| Lincoln | 1.2 | 1.7 | 2.8 | 4.7 | 6.1 | 7.4 | 8.4 | 7.3 | 5.4 | 3.7 | 1.9 | 1.2 | 51.9 |
| Petaluma | 1.2 | 1.5 | 2.8 | 3.7 | 4.6 | 5.6 | 4.6 | 5.7 | 4.5 | 2.9 | 1.4 | 0.9 | 39.6 |
| Santa Rosa | 1.2 | 1.7 | 2.8 | 3.7 | 5.0 | 6.0 | 6.1 | 5.9 | 4.5 | 2.9 | 1.5 | 0.7 | 42.0 |
| Valley of the Moon | 1.0 | 1.6 | 3.0 | 4.5 | 5.6 | 6.6 | 7.1 | 6.3 | 4.7 | 3.3 | 1.5 | 1.0 | 46.1 |
| Windsor | 0.9 | 1.6 | 3.0 | 4.5 | 5.5 | 6.5 | 6.5 | 5.9 | 4.4 | 3.2 | 1.4 | 1.0 | 44.2 |
| **STANISLAUS** | | | | | | | | | | | | | |
| Denair | 1.0 | 1.9 | 3.6 | 4.7 | 7.0 | 7.9 | 8.0 | 6.1 | 5.3 | 3.4 | 1.5 | 1.0 | 51.4 |
| La Grange | 1.2 | 1.5 | 3.1 | 4.7 | 6.2 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.2 |
| Modesto | 0.9 | 1.4 | 3.2 | 4.7 | 6.4 | 7.7 | 8.1 | 6.8 | 5.0 | 3.4 | 1.4 | 0.7 | 49.7 |
| Newman | 1.0 | 1.5 | 3.2 | 4.6 | 6.2 | 7.4 | 8.1 | 6.7 | 5.0 | 3.4 | 1.4 | 0.7 | 49.3 |
| Oakdale | 1.2 | 1.5 | 3.2 | 4.7 | 6.2 | 7.7 | 8.1 | 7.1 | 5.1 | 3.4 | 1.4 | 0.7 | 50.3 |

## Appendix A - Reference Evapotranspiration (ETo) Table*

| County and City | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual ETo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **STANISLAUS** | | | | | | | | | | | | | |
| Patterson | 1.3 | 2.1 | 4.2 | 5.4 | 7.9 | 8.6 | 8.2 | 6.6 | 5.8 | 4.0 | 1.9 | 1.3 | 57.3 |
| Turlock | 0.9 | 1.5 | 3.2 | 4.7 | 6.5 | 7.7 | 8.2 | 7.0 | 5.1 | 3.4 | 1.4 | 0.7 | 50.2 |
| **SUTTER** | | | | | | | | | | | | | |
| Nicolaus | 0.9 | 1.6 | 3.2 | 4.9 | 6.3 | 7.5 | 8.0 | 6.9 | 5.2 | 3.4 | 1.5 | 0.9 | 50.2 |
| Yuba City | 1.3 | 2.1 | 2.8 | 4.4 | 5.7 | 7.2 | 7.1 | 6.1 | 4.7 | 3.2 | 1.2 | 0.9 | 46.7 |
| **TEHAMA** | | | | | | | | | | | | | |
| Corning | 1.2 | 1.8 | 2.9 | 4.5 | 6.1 | 7.3 | 8.1 | 7.2 | 5.3 | 3.7 | 1.7 | 1.1 | 50.7 |
| Gerber | 1.0 | 1.8 | 3.5 | 5.0 | 6.6 | 7.9 | 8.7 | 7.4 | 5.8 | 4.1 | 1.8 | 1.1 | 54.7 |
| Gerber Dryland | 0.9 | 1.6 | 3.2 | 4.7 | 6.7 | 8.4 | 9.0 | 7.9 | 6.0 | 4.2 | 2.0 | 1.0 | 55.5 |
| Red Bluff | 1.2 | 1.8 | 2.9 | 4.4 | 5.9 | 7.4 | 8.5 | 7.3 | 5.4 | 3.5 | 1.7 | 1.0 | 51.1 |
| **TRINITY** | | | | | | | | | | | | | |
| Hay Fork | 0.5 | 1.1 | 2.3 | 3.5 | 4.9 | 5.9 | 7.0 | 6.0 | 4.5 | 2.8 | 0.9 | 0.7 | 40.1 |
| Weaverville | 0.6 | 1.1 | 2.2 | 3.3 | 4.9 | 5.9 | 7.3 | 6.0 | 4.4 | 2.7 | 0.9 | 0.7 | 40.0 |
| **TULARE** | | | | | | | | | | | | | |
| Alpaugh | 0.9 | 1.7 | 3.4 | 4.8 | 6.6 | 7.7 | 8.2 | 7.3 | 5.4 | 3.4 | 1.4 | 0.7 | 51.6 |
| Badger | 1.0 | 1.3 | 2.7 | 4.1 | 6.0 | 7.3 | 7.7 | 7.0 | 4.8 | 3.3 | 1.4 | 0.7 | 47.3 |
| Delano | 1.1 | 1.9 | 4.0 | 4.9 | 7.2 | 7.9 | 8.1 | 7.3 | 5.4 | 3.2 | 1.5 | 1.2 | 53.6 |
| Dinuba | 1.1 | 1.5 | 3.2 | 4.7 | 6.2 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 51.2 |
| Lindcove | 0.9 | 1.6 | 3.0 | 4.8 | 6.5 | 7.6 | 8.1 | 7.2 | 5.2 | 3.4 | 1.6 | 0.9 | 50.6 |
| Porterville | 1.2 | 1.8 | 3.4 | 4.7 | 6.6 | 7.7 | 8.5 | 7.3 | 5.3 | 3.4 | 1.4 | 0.7 | 52.1 |
| Visalia | 0.9 | 1.7 | 3.3 | 5.1 | 6.8 | 7.7 | 7.9 | 6.9 | 4.9 | 3.2 | 1.5 | 0.8 | 50.7 |
| **TUOLUMNE** | | | | | | | | | | | | | |
| Groveland | 1.1 | 1.5 | 2.8 | 4.1 | 5.7 | 7.2 | 7.9 | 6.6 | 5.1 | 3.3 | 1.4 | 0.7 | 47.5 |
| Sonora | 1.1 | 1.5 | 2.8 | 4.1 | 5.8 | 7.2 | 7.9 | 6.7 | 5.1 | 3.2 | 1.4 | 0.7 | 47.6 |
| **VENTURA** | | | | | | | | | | | | | |
| Camarillo | 2.2 | 2.5 | 3.7 | 4.3 | 5.0 | 5.2 | 5.9 | 5.4 | 4.2 | 3.0 | 2.5 | 2.1 | 46.1 |
| Oxnard | 2.2 | 2.5 | 3.2 | 3.7 | 4.4 | 4.6 | 5.4 | 4.8 | 4.0 | 3.3 | 2.4 | 2.0 | 42.3 |
| Piru | 2.8 | 2.8 | 4.1 | 5.6 | 6.0 | 6.8 | 7.6 | 7.8 | 5.8 | 5.2 | 3.7 | 3.2 | 61.5 |
| Port Hueneme | 2.0 | 2.3 | 3.3 | 4.6 | 4.9 | 4.9 | 4.9 | 5.0 | 3.7 | 3.2 | 2.5 | 2.2 | 43.5 |
| Thousand Oaks | 2.2 | 2.6 | 3.4 | 4.5 | 5.4 | 5.9 | 6.7 | 6.4 | 5.4 | 3.9 | 2.6 | 2.0 | 51.0 |
| Ventura | 2.2 | 2.6 | 3.2 | 3.8 | 4.6 | 4.7 | 5.5 | 4.9 | 4.1 | 3.4 | 2.5 | 2.0 | 43.5 |
| **YOLO** | | | | | | | | | | | | | |
| Bryte | 0.9 | 1.7 | 3.3 | 5.0 | 6.4 | 7.5 | 7.9 | 7.0 | 5.2 | 3.5 | 1.6 | 1.0 | 51.0 |
| Davis | 1.0 | 1.9 | 3.3 | 5.0 | 6.4 | 7.6 | 8.2 | 7.1 | 5.4 | 4.0 | 1.8 | 1.0 | 52.5 |
| Esparto | 1.0 | 1.7 | 3.4 | 5.5 | 6.9 | 8.1 | 8.5 | 7.5 | 5.8 | 4.2 | 2.0 | 1.2 | 55.8 |
| Winters | 1.7 | 1.7 | 2.9 | 4.4 | 5.8 | 7.1 | 7.9 | 6.7 | 5.3 | 3.3 | 1.6 | 1.0 | 49.4 |
| Woodland | 1.0 | 1.8 | 3.2 | 4.7 | 6.1 | 7.7 | 8.2 | 7.2 | 5.4 | 3.7 | 1.7 | 1.0 | 51.6 |
| Zamora | 1.1 | 1.9 | 3.5 | 5.2 | 6.4 | 7.4 | 7.8 | 7.0 | 5.5 | 4.0 | 1.9 | 1.2 | 52.8 |
| **YUBA** | | | | | | | | | | | | | |
| Browns Valley | 1.0 | 1.7 | 3.1 | 4.7 | 6.1 | 7.5 | 8.5 | 7.6 | 5.7 | 4.1 | 2.0 | 1.1 | 52.9 |
| Brownsville | 1.1 | 1.4 | 2.6 | 4.0 | 5.7 | 6.8 | 7.9 | 6.8 | 5.3 | 3.4 | 1.5 | 0.9 | 47.4 |

* The values in this table were derived from:

1) California Irrigation Management Information System (CIMIS);
2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and
3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922;
4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

Appendix B — Sample Water Efficient Landscape Worksheet.

## WATER EFFICIENT LANDSCAPE WORKSHEET

*This worksheet is filled out by the project applicant and it is a required element of the Landscape Documentation Package. Please complete all sections (A and B) of the worksheet.*

### SECTION A. HYDROZONE INFORMATION TABLE

*Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.*

| Hydrozone* | Zone or Valve | Irrigation Method** | Area (Sq. Ft.) | % of Landscape Area |
|---|---|---|---|---|
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | Total | | | 100% |

*** Hydrozone**
*HW = High Water Use Plants*
*MW = Moderate Water Use Plants*
*LW = Low Water Use Plants*

****Irrigation Method**
*MS = Micro-spray*
*S = Spray*
*R = Rotor*
*B= Bubbler*
*D= Drip*
*O = Other*

## SECTION B. WATER BUDGET CALCULATIONS

### Section B1. Maximum Applied Water Allowance (MAWA)

*The project's Maximum Applied Water Allowance shall be calculated using this equation:*

*MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]*

*where:*

*MAWA = Maximum Applied Water Allowance (gallons per year)*
*ETo = Reference Evapotranspiration from Appendix A (inches per year)*
*0.7 = ET Adjustment Factor (ETAF)*
*LA = Landscaped Area includes Special Landscape Area (square feet)*
*0.62 = Conversion factor (to gallons per square foot)*
*SLA = Portion of the landscape area identified as Special Landscape Area (square feet)*
*0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)*

***Maximum Applied Water Allowance = ________________ gallons per year***

*Show calculations.*

| |
|---|
| |

### Effective Precipitation (Eppt)

*If considering Effective Precipitation, use 25% of annual precipitation. Use the following equation to calculate Maximum Applied Water Allowance:*

*MAWA= (ETo – Eppt) (0.62) [(0.7 x LA) +(0.3 x SLA)]*

***Maximum Applied Water Allowance = ________________ gallons per year***

*Show calculations.*

| |
|---|
| |

## Section B2. Estimated Total Water Use (ETWU)

*The project's Estimated Total Water Use is calculated using the following formula:*

$$ETWU = (ETo)(0.62)\left(\frac{PF\,x\,HA}{IE} + SLA\right)$$

*where:*

*ETWU = Estimated total water use per year (gallons per year)*
*ETo = Reference Evapotranspiration (inches per year)*
*PF = Plant Factor from WUCOLS (see Definitions)*
*HA = Hydrozone Area [high, medium, and low water use areas] (square feet)*
*SLA = Special Landscape Area (square feet)*
*0.62 = Conversion Factor (to gallons per square foot)*
*IE = Irrigation Efficiency (minimum 0.71)*

***Hydrozone Table for Calculating ETWU***

*Please complete the hydrozone table(s). Use as many tables as necessary.*

| Hydrozone | Plant Water Use Type(s) | Plant Factor (PF) | Area (HA) (square feet) | PF x HA (square feet) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Sum | |
| | SLA | | | |

***Estimated Total Water Use = ______________________ gallons***

*Show calculations.*

| |
|---|
| |

AMEND

## Appendix B – Sample Water Efficient Landscape Worksheet.

### WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the project applicant and it is a required element of the Landscape Documentation Package.

Reference Evapotranspiration (ETo) ________

| Hydrozone # /Planting Description[a] | Plant Factor (PF) | Irrigation Method[b] | Irrigation Efficiency (IE)[c] | ETAF (PF/IE) | Landscape Area (sq, ft,) | ETAF x Area | Estimated Total Water Use (ETWU)[e] |
|---|---|---|---|---|---|---|---|
| **Regular Landscape Areas** | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | Totals | (A) | (B) | |
| **Special Landscape Areas** | | | | | | | |
| | | | | 1 | | | |
| | | | | 1 | | | |
| | | | | 1 | | | |
| | | | | Totals | (C) | (D) | |
| | | | **ETWU Total** | | | | |
| | | | **Maximum Allowed Water Allowance (MAWA)[e]** | | | | |

[a]*Hydrozone #/Planting Description*
*E.g*
*1.) front lawn*
*2.) low water use plantings*
*3.) medium water use planting*

[b]*Irrigation Method*
*overhead spray*
*or drip*

[c]*Irrigation Efficiency*
*0.75 for spray head*
*0.81 for drip*

[d]*ETWU* (Annual Gallons Required) = *Eto x 0.62 x ETAF x Area*
where 0.62 is a conversion factor that converts acre-inches per acre per year to gallons per square foot per year.

[e]*MAWA (Annual Gallons Allowed) = (Eto) ( 0.62) [ (ETAF x LA) + ((1-ETAF) x SLA)]*
where 0.62 is a conversion factor that converts acre-inches per acre per year to gallons per square foot per year, LA is the total landscape area in square feet, SLA is the total special landscape area in square feet, and ETAF is .55 for residential areas and 0.45 for non-residential areas.

### ETAF Calculations

Regular Landscape Areas

| | |
|---|---|
| Total ETAF x Area | (B) |
| Total Area | (A) |
| **Average ETAF** | **B ÷ A** |

**Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for non-residential areas.**

All Landscape Areas

| | |
|---|---|
| Total ETAF x Area | (B+D) |
| Total Area | (A+C) |
| **Sitewide ETAF** | **(B+D) ÷ (A+C)** |

Appendix C — Sample Certificate of Completion.

## CERTIFICATE OF COMPLETION

*This certificate is filled out by the project applicant upon completion of the landscape project.*

### PART 1. PROJECT INFORMATION SHEET

| | | |
|---|---|---|
| Date | | |
| Project Name | | |
| Name of Project Applicant | Telephone No. | |
| | Fax No. | |
| Title | Email Address | |
| Company | Street Address | |
| City | State | Zip Code |

### Project Address and Location:

| | |
|---|---|
| Street Address | Parcel, tract or lot number, if available. |
| City | Latitude/Longitude (optional) |
| State / Zip Code | |

### Property Owner or his/her designee:

| | | |
|---|---|---|
| Name | Telephone No. | |
| | Fax No. | |
| Title | Email Address | |
| Company | Street Address | |
| City | State | Zip Code |

### Property Owner

*"I/we certify that I/we have received copies of all the documents within the Landscape Documentation Package and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule."*

_______________________________________________

Property Owner Signature                                        Date

**Please answer the questions below:**

1. Date the Landscape Documentation Package was submitted to the local agency____________
2. Date the Landscape Documentation Package was approved by the local agency____________
3. Date that a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the local water purveyor____________

***PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE LANDSCAPE DOCUMENTATION PACKAGE***

*"I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the approved Landscape Documentation Package."*

| | | |
|---|---|---|
| Signature* | Date | |
| Name (print) | Telephone No. | |
| | Fax No. | |
| Title | Email Address | |
| License No. or Certification No. | | |
| Company | Street Address | |
| City | State | Zip Code |

**Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor.*

***PART 3. IRRIGATION SCHEDULING***

*Attach parameters for setting the irrigation schedule on controller per ordinance Section 492.10.*

***PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE***

*Attach schedule of Landscape and Irrigation Maintenance per ordinance Section 492.11.*

***PART 5. LANDSCAPE IRRIGATION AUDIT REPORT***

*Attach Landscape Irrigation Audit Report per ordinance Section 492.12.*

***PART 6. SOIL MANAGEMENT REPORT***

*Attach soil analysis report, if not previously submitted with the Landscape Documentation Package per ordinance Section 492.5.*

*Attach documentation verifying implementation of recommendations from soil analysis report per ordinance Section 492.5.*

AMEND

Appendix C – Sample Certificate of Completion.

## CERTIFICATE OF COMPLETION

This certificate is filled out by the project applicant upon completion of the landscape project.

### PART 1. PROJECT INFORMATION SHEET

| | | |
|---|---|---|
| Date | | |
| Project Name | | |
| Name of Project Applicant | Telephone No. | |
| | Fax No. | |
| Title | Email Address | |
| Company | Street Address | |
| City | State | Zip Code |

### Project Address and Location:

| | | |
|---|---|---|
| Street Address | | Parcel, tract or lot number, if available. |
| City | | Latitude/Longitude (optional) |
| State | Zip Code | |

### Property Owner or his/her designee:

| | | |
|---|---|---|
| Name | Telephone No. | |
| | Fax No. | |
| Title | Email Address | |
| Company | Street Address | |
| City | State | Zip Code |

**Property Owner**

"I/we certify that I/we have received copies of all the documents within the Landscape Documentation Package and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule."

_______________________________________________

Property Owner Signature Date

**Please answer the questions below:**

1. Date the Landscape Documentation Package was submitted to the local agency____________
2. Date the Landscape Documentation Package was approved by the local agency____________
3. Date that a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the local water purveyor____________

## PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE LANDSCAPE DOCUMENTATION PACKAGE

"I/we certify that based upon periodic site observations, the work has been completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the approved Landscape Documentation Package."

| | | |
|---|---|---|
| Signature* | Date | |
| Name (print) | Telephone No. | |
| | Fax No. | |
| Title | Email Address | |
| License No. or Certification No. | | |
| Company | Street Address | |
| City | State | Zip Code |

*Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor.

## PART 3. IRRIGATION SCHEDULING

Attach parameters for setting the irrigation schedule on controller per ordinance Section 492.10.

## PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance per ordinance Section 492.11.

## PART 5. LANDSCAPE IRRIGATION AUDIT REPORT

Attach Landscape Irrigation Audit Report per ordinance Section 492.12.

## PART 6. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the Landscape Documentation Package per ordinance Section 492.6.

Attach documentation verifying implementation of recommendations from soil analysis report per ordinance Section 492.6.

## Appendix D – Prescriptive Compliance Option

(a) This appendix contains prescriptive requirements which may be used as a compliance option to the Model Water Efficient Landscape Ordinance.

(b)Compliance with the following items is mandatory and must be documented on a landscape plan in order to use the prescriptive compliance option:

(1) Submit a Landscape Documentation Package which includes the following elements:

(A) date

(B) project applicant

(C) project address (if available, parcel and/or lot number(s))

(D) total landscape area (square feet), including a breakdown of turf and plant material

(E) project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed)

(F) water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well

(G) contact information for the project applicant and property owner

(H) applicant signature and date with statement, "I agree to comply with the requirements of the prescriptive compliance option to the MWELO".

(2) Incorporate compost at a rate of at least four cubic yards per 1,000 square feet to a depth of six inches into landscape area (unless contra-indicated by a soil test);

(3) Plant material shall comply with all of the following;

(A) For residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for 75% of the plant area excluding edibles and areas using recycled water; For non-residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for 100% of the plant area excluding edibles and areas using recycled water;

(B) A minimum three inch (3") layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.

(4) Turf shall comply with all of the following:

(A) Turf shall not exceed 25% of the landscape area in residential areas, and there shall be no turf in non-residential areas;

(B) Turf shall not be planted on sloped areas which exceed a slope of 1 foot vertical elevation change for every 4 feet of horizontal length;

(C) Turf is prohibited in parkways less than 10 feet wide, unless the parkway is adjacent to a parking strip and used to enter and exit vehicles. Any turf in parkways must be irrigated by sub-surface irrigation or by other technology that creates no overspray or runoff.

(5) Irrigation systems shall comply with the following:

(A) Automatic irrigation controllers are required and must use evapotranspiration or soil moisture sensor data and utilize a rain sensor.

(B) Irrigation controllers shall be of a type which does not lose programming data in the event the primary power source is interrupted.

(C) Pressure regulators shall be installed on the irrigation system to ensure the dynamic pressure of the system is within the manufacturers recommended pressure range.

(D) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be installed as close as possible to the point of connection of the water supply.

(E) All irrigation emission devices must meet the requirements set in the ANSI standard, ASABE/ICC 802-2014. "Landscape Irrigation Sprinkler and Emitter Standard," All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.

(F) Areas less than ten (10) feet in width in any direction shall be irrigated with subsurface irrigation or other means that produces no runoff or overspray.

(6) For non-residential projects with landscape areas of 1,000 sq. ft. or more, a private submeter(s) to measure landscape water use shall be installed.

(c) At the time of final inspection, the permit applicant must provide the owner of the property with a certificate of completion, certificate of installation, irrigation schedule and a schedule of landscape and irrigation maintenance.

ATTACHMENT B

# Bay Area Water Supply and Conservation Agency

"A multicounty agency authorized to plan for and acquire supplemental water supplies, encourage water conservation and use of recycled water on a regional basis."
*[Bay Area Water Supply and Conservation Agency Act, AB2058(Papan-2002)]*

## Water Management Representatives

August 5, 2015

BAWSCA
Bay Area Water Supply & Conservation Agency

# Updated Model Water Efficient Landscape Ordinance Adopted

- Governor's Executive Order called for revised MWELO to increase efficiency standards
- Key revisions to the MWELO include:
  - Reduced landscape size threshold
  - Dedicated landscape meter requirements
  - Incentives for graywater usage
  - Stricter irrigation system efficiency standards
  - Limits on the percentage of turf planted
  - Required reporting by local agencies

# Landscape Size Threshold Reduced to 500 Sq. Ft.

- Landscape size threshold reduced to 500 sq. ft. for <u>new projects</u>
  - Prescriptive checklist approach is a compliance option for landscapes under 2,500 sq. ft.
- Landscape size threshold remains at 2,500 sq. ft. for rehabilitated landscapes
- Threshold in existing BAWSCA Model Ordinance is 1,000 sq. ft. for new or rehabilitated landscapes

BAWSCA
Bay Area Water Supply & Conservation Agency

# Limits on Turf Areas

- Maximum applied water allowance reduced to:
  - 55% of reference ETo for residential projects
  - 45% of reference ETo for CII projects
- New limits reduce landscape area that can be planted with turf to 25% in residential landscapes
- 45% adjustment factor does not provide enough water for any turf in CII landscapes
  - Turf installations still be permitted when used for specific functions
- Turf not allowed in median strips or parkways

BAWSCA
Bay Area Water Supply & Conservation Agency

# Irrigation System Efficiency Standards Increased

- Dedicated landscape water meters or submeters for:
  - Residential landscapes over 5,000 sq. ft.
  - Non-residential landscapes over 1,000 sq. ft.
- Pressure regulators and master shut-off valves required
- Flow sensors to detect high flow conditions required for landscape over 5,000 sq. ft.
- Landscapes under 2,500 sq. ft. and irrigated entirely with graywater only subject to irrigation checklist

BAWSCA
Bay Area Water Supply & Conservation Agency

# Local Agencies Must Report to DWR on Implementation

- Local agency reporting on implementation and enforcement must be submitted:
  - By December 31, 2015
  - By January 31st in subsequent years
- Existing regional ordinances (like BAWSCA's) may remain in effect until February 1, 2016
  - Must report to DWR by December 31st and state that they are revising regional ordinance.
  - Must report to DWR by March 1, 2016 on adopted regional ordinance

BAWSCA
Bay Area Water Supply & Conservation Agency

# BAWSCA to Consider New MWELO

- Original BAWSCA MWELO differed from the DWR ordinance in the following:
  - Size threshold
  - Documentation requirements
- Size threshold is still a concern for landscape rehabilitations projects
  - BAWSCA ordinance: >1,000 sq. ft.
  - DWR ordinance: >2,500 sq. ft.
- New BAWSCA ordinance would need to prove just as effective as DWR MWELO
- BAWSCA will work with Water Resources Committee to make final determination by Fall 2015

BAWSCA
Bay Area Water Supply & Conservation Agency

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**STAFF REPORT**

**City Council**
**Meeting Date:** **10/20/2015**
**Staff Report Number:** **15-156-CC**

**Informational Item:** **Update on the City of Menlo Park's Climate Action Plan Update and Status Report for 2015**

## Recommendation

This is an informational item and does not require City Council action.

## Policy Issues

Annual review of the Greenhouse Gas (GHG) Inventory and Climate Action Plan (CAP) assists the City of Menlo Park in tracking and planning the community's climate impact.

## Background

The City has chosen to update its community-wide GHG inventory and CAP annually, which allows for frequent updates and adjustments if needed. Many cities in California are currently working on their first CAP, and those that have adopted a CAP have generally planned to update them every five years.

The purpose of the CAP is to provide strategies that reduce local GHG emissions and assist the City in meeting or exceeding the GHG emission reduction targets established by AB 32 (California's Global Warming Solutions Act of 2006).

In 2011, the City Council adopted a target of reducing community-wide GHG emissions by 27% by 2020 from 2005 levels. On October 7, 2015, Governor Brown signed SB 350 into law, which will increase California's use of renewable power to 50% and establishes a statewide goal of making existing buildings twice as efficient as they currently are by the year 2030. A link to SB 350 is as follows:

http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350

## Analysis

On August 26, 2015, the Environmental Quality Commission (EQC) reviewed and commented on the City's GHG Inventory and CAP. At the EQC meeting, the commissioners expressed support for the enclosed report and recommendations; however, there was insufficient time for a comprehensive presentation.

From the base year 2005 to 2013 (the most current GHG emission data available):

- The City's GHG emissions have alternately increased and decreased slightly each year, resulting in essentially a flat line (shown in Figure 2 of the attached report).
- The City's 2013 community-wide GHG emissions include (shown in Figure 3 of the attached report):
  - Transportation representing 40%,
  - Built environment representing 55% of the GHG emissions, or specifically:
    - Commercial energy use representing 30%
    - Larger commercial that direct purchases energy representing 9%
    - Residential energy use representing 16%
  - Solid Waste and the closed landfill at Bayfront Park representing 5%

The City has been recognized as a sustainability leader, through the award of four Beacon Spotlight Awards for sustainability, and presentations at the California Climate Action Planning conference; however, the City has experienced significant growth in residential and commercial construction within the City. Although new buildings and new vehicles are more efficient, in effect, the growth has canceled out the increased efficiencies as new larger homes replace smaller homes, and new commercial spaces serve greater numbers of employees. If the current trends continue, the City will not meet its GHG emissions targets set for 2020. Menlo Park will need to significantly increase our efforts to achieve our goals, as described below.

The attached report entitled "Climate Action Plan Update and Status Report" (Attachment A) and the presentation (Attachment B) provides the following information:

- History of the CAP process in Menlo Park to date
- Update of Menlo Park GHG emissions through 2013, which is the most current data available
- Analysis of the GHG trends
- Status update on each project selected in the previous year's CAP update
- Plan for major CAP projects for the coming five years (FY 2015-2020)

The attached documents detail the projects that will help the City reach its 27% GHG reduction target. Highlights from the CAP include recommendations to implement:

- A Community Choice Energy program (CCE, which is further discussed in a separate informational item to City Council during this meeting) (Staff Report #15-163-CC)
- Zero Net Energy Ready building codes for new construction
- Retrofit of existing buildings to increase energy efficiency
- Improvements in active transportation

Additional actions to ensure achievement of the City's GHG reduction goals may include strategies in the building, transportation, and energy sectors:

- 100% renewable electrical power, through a CCE
- Requiring energy audits and upgrades at the time of property title transfer
- Requiring energy audits at the time of business license renewal
- Significant improvements in public transportation infrastructure serving Menlo Park
- Significant increases in density and height encouraged in land use documents to increase viability of transit, active transportation, and live/work balance
- Parking restrictions, fees and disincentives to driving which will increase demand for active and public transportation options

Staff is planning a City Council Study Session for early 2016 to further discuss these strategies and gain direction from the City Council on project priorities and implementation goals.

**Attachments**

A. October 2015 Climate Action Plan Update and Status Report
B. Climate Action Plan Update and Status Report Presentation

Report prepared by:
Vanessa A Marcadejas, Environmental Services Specialist

Heather Abrams, Environmental Services Manager

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ATTACHMENT A

# October 2015

# Climate Action Plan Update and Status Report

## Table of Contents

# Introduction

## *Background*

For approximately 1,000 years before the Industrial Revolution, the amount of Greenhouse Gas (GHG) emissions in the atmosphere remained relatively constant. During the 20th century, however, scientists observed a rapid change in the climate change GHG emissions that are attributable to human activities, such as use of fossil fuels to power vehicles and buildings, and disposing of waste in landfills that release GHG emissions.

The Intergovernmental Panel on Climate Change (IPCC) has identified four major GHG emissions—water vapor, carbon dioxide ($CO_2$), methane (CH4), and ozone (O3)—that are the likely cause of an increase in global average temperatures observed within the 20th and 21st centuries. $CO_2$ is one the most prevalent GHG emissions resulting from human activity. According to the IPCC, the amount of $CO_2$ has increased by more than 35 percent since preindustrial times and has increased at an average rate of 1.4 parts per million (ppm) per year since 1960, mainly due to combustion of fossil fuels and deforestation.

Climate-change impacts are affected by varying degrees of uncertainty. IPCC's 2007 Fourth Assessment Report projects that the global mean temperature increase from 1990 to 2100, under different climate-change scenarios, will range from 1.4 to 5.8 degrees Celsius (°C) (2.5 to 10.4 degrees Fahrenheit (°F)). In the past, gradual changes in the earth's temperature changed the distribution of species, availability of water, etc. In California potential impacts resulting from climate change are:

- Poor air quality made worse due to more severe heat waves
- Decreasing Sierra Nevada snow pack, affecting adequate water supplies
- Reduction in available renewable hydropower
- Declined productivity in agriculture due to irregular blooms and harvest and increased pests and pathogens.
- Accelerated sea level rise, impacting beaches and infrastructure
- Increased and more severe wildfire seasons
- Increasing threats from pests and pathogens from warmer weather
- Altered timing for wild life migrations and loss of species, impacting food chain and ecosystems.

With this understanding, many local, state, and federal governments around the world are taking action to reduce global GHG emissions. The purpose of Menlo Park's Climate Action Plan (CAP) is to provide strategies that reduce local greenhouse gas (GHG) emissions and assist Menlo Park to meet or exceed the emission reduction targets of AB 32 (California's Global Warming Solutions Act of 2006). AB 32 sets a goal for the state to reduce greenhouse gas emissions to 1990 levels by 2020, and 80% below 1990 levels by 2050. In April 2015, the Governor of California issued an executive order to establish a GHG reduction target of 40% below 1990 levels by 2030.

Menlo Park's first Climate Action Plan was approved by the City Council in 2009 and the Council stated that the Climate Action Plan was intended to be a 'living document' to be updated periodically as current strategies are implemented and as new emission reduction strategies and technologies emerge that effectively reduce emissions. On an annual basis, the Council reviews and approves a report on Menlo

Park's Greenhouse Gas Inventory trend and five year Climate Action Plan strategies and implementation status.

## *Menlo Park City Council Actions*

The City of Menlo Park has taken a number of actions in recent years to address climate change. To provide context and facilitate retrieval of that history, Figure 1 below provides an overview of Menlo Park's climate action planning to date. Appendix A provides a history of the Climate Action Planning reports which have been presented to the City Council.

In addition to the milestones and City Council actions shown below, the City's Environmental Quality Commission meets monthly to discuss a variety of climate action planning related topics, and the City's environmental staff provides leadership in completing climate action planning projects, along with other compliance and regulatory duties. A number of Menlo Park non-profit organizations support these efforts as well.

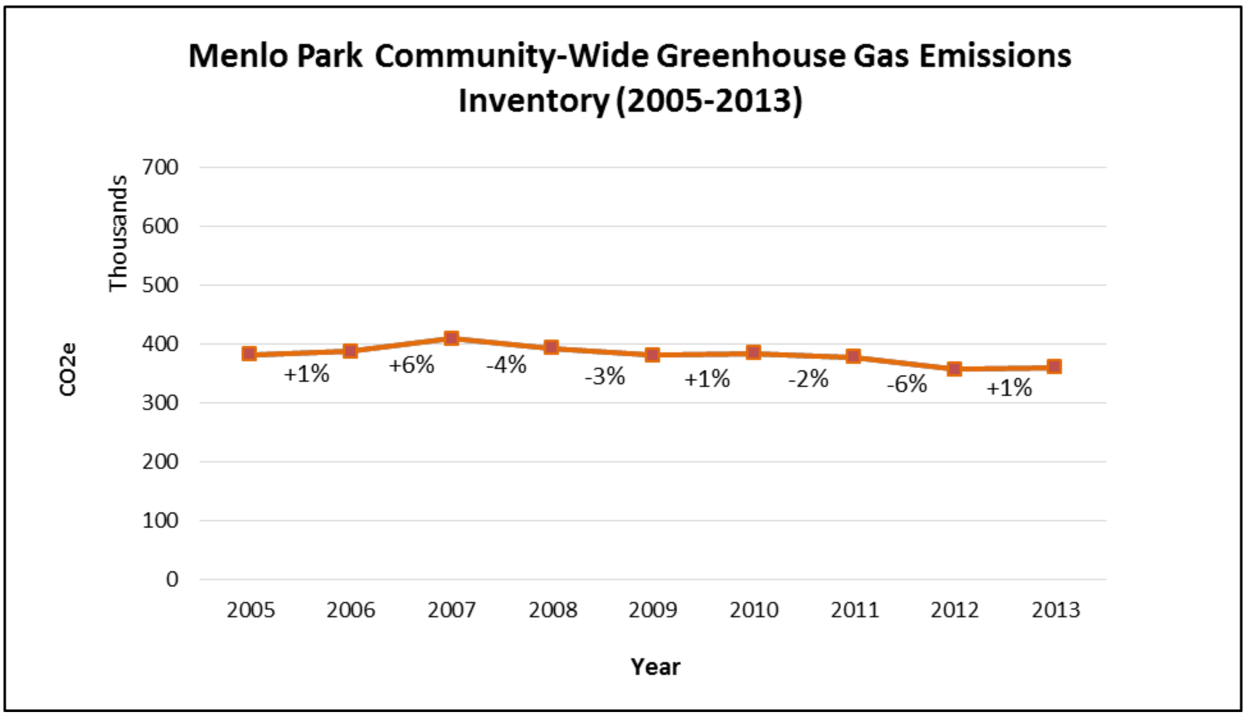
### Figure 1 – Previous Menlo Park Climate Action Planning Milestones

| Year | Milestone |
|---|---|
| 2005 | Green Ribbon Panel – 100+ participants |
| 2005 | 1st Greenhouse Gas (GHG) Inventory |
| 2008 | Approval to develop a Climate Action Plan (CAP) |
| 2009 | 1st CAP drafted and approved |
| 2011 | CAP update |
| 2013 | CAP update and adoption of 27% GHG reduction goal from 2005 levels by 2020 |
| 2014 | CAP update |

## Community-Wide Greenhouse Gas Inventory Results Between 2005 and 2013

Using ICLEI's (Local Governments for Sustainability) updated Clean Air and Climate Protection (CACP) Software, Menlo Park was able to complete greenhouse gas inventories between 2005 and the current inventory using the most current available data for 2013. GHG emissions were measured from building energy usage, solid waste sent to the landfill, estimated fuel consumption, and methane produced from a closed landfill (Bedwell Bayfront Park) in Menlo Park.[1] Figure 2 shows the annual trend in community-wide greenhouse gas emissions from all sources combined, while Figure 3 shows Menlo Park's inventory for 2013 broken down by source.

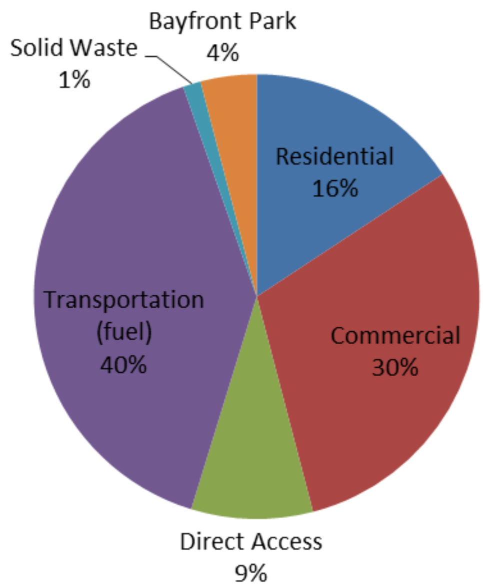
### Figure 2 – Community-Wide Greenhouse Gas Emission Inventory 2005-2013




For reference, GHG emission can also be expressed as carbon dioxide equivalents ($CO_2e$). The trends show GHG emissions going up or down slightly each year, based on factors such as the PG&E energy emissions factors, economic growth or decline.

[1] Energy data obtained from PG&E. Transportation calculated using total gasoline sales data provided by Menlo Park's Finance Department with an assumption that 95% of sales are fuel sales, and applying the average cost per gallon of gasoline in California from the California Energy Almanac produced by the California Energy Commission. Solid Waste Data obtained CalRecycle, and Bayfront Park data was provided by Fortistar, contracted operator of the landfill. **Final $CO_2e$ count being verified by staff, direct access figures are under review as of 7/15/15.*

## Figure 3 – 2013 Menlo Park Community-Wide Greenhouse Gas Emissions by Source




In 2013, the City of Menlo Park's community-wide emissions totaled 360,427 tons of $CO_2e$. Appendix B shows the GHG emissions attributed directly to City of Menlo Park operations, which are a small portion of Menlo Park's overall GHG emissions.

Emissions from electricity and natural gas use in the residential sector totaled 16%, followed by commercial customers at 30%, and Direct Access energy users at 9%. Emissions from transportation (fuel purchases) totaled 40%, followed by the closed Bayfront Park landfill at 4% and solid waste at 1%.

When compared to Menlo Park's 2012 community-wide inventory (356,521 tons) there is a 1% increase in emissions. This one percent increase can be attributed to the following community trends:

- Increase in energy consumption in both the residential and commercial sectors. For example, there was a 3.4% increase in residential energy use and 5.5% increase in commercial energy use from 2012-2013.
- Increase in development projects occurring in Menlo Park, which can be seen in the differences in finalized building permits for new construction that went from 78 building permits in 2012 to 117 in 2013, a 50% increase over 2012.
- In 2012, the former Sun Microsystems corporate campus was not occupied by Facebook as re-modeling was occurring at the site. In 2013, Facebook moved 6,500 employees to the former Sun Microsystems campus. Facebook has submitted plans for campus expansion which will

roughly triple its current size by 2020. Rebuilding and infill new construction in the residential and commercial sector are expected to result in continued rise in energy demand in Menlo Park for several years to come.

- PG&E emission factors slightly increased from 0.4440 lbs. $CO_2$/kWh to 0.4990 lbs. $CO_2$/kWh between 2012 and 2013

The current trend will not meet State AB 32 goals to reduce emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050, unless significant local policies and programs are implemented to achieve this statewide goal. The next section provides an overview of strategies that Menlo Park will review and potentially implement over the next five years.

# Recommendations for Greenhouse Gas Reduction Strategies Between 2015 and 2020

The following list of measures, in Figure 4, are recommended community and municipal strategies to aid in meeting Menlo Park's GHG emissions reduction targets. Additional measures may be needed at the international, national, statewide, and local level in order to fully reach Menlo Park's climate action goals.

## Figure 4 – Menlo Park Five Year Community GHG Reduction Strategies 2015-2020

### *Fiscal Year 2015-16*

- Complete installation of Solar PV on four City buildings
- Complete installation of four Electric Vehicle (EV) Charging stations at City public parking locations
- Incorporate CAP strategies and GHG emission reductions into General Plan update
- Complete energy efficient upgrades and renewable energy installation at city facilities
- Consider Community Choice Energy (CCE) options to gain additional renewable power in MenloPark's portfolio
- Complete evaluation of methane capture and treatment at Bedwell Bayfront Park (Closed Landfill)

### *Fiscal Year 2016-17*

- Incorporate Zero Net Energy and LEED Silver requirements into Planning requirements and Building Codes to increase efficiency in new buildings
- Implement Energy Star ratings requirement, or other performance tracking methodology, into Planning requirements for new buildings
- Consider changes to City's solid waste, recycling, and organics collection franchise that encourage zero waste and decrease waste to landfill
- Consider developing an energy efficient/renewable energy plan for commercial and residential sector to re-invigorate energy upgrades for existing buildings
- Re-invigorate a social marketing program to increase biking, public transit, and walking in the community
- Implement CCE, if selected as an option

## Figure 4 – Continued

### *Fiscal Year 2017-18*

- Support Transportation Commission's car sharing program
- Support Bicycle Commission's bike sharing program
- Consider program to increase Caltrain ridership by downtown employees
- Encourage local food production through social marketing, education, and community garden programs
- Consider large scale renewable energy generation within Menlo Park (such as solar farm on a portion of open space, or large number of solar roof-top installations)

### *Fiscal Year 2018-19*

- Revisit City Environmental Purchasing Program (EPP) to consider requiring new City buildings, facilities, and vehicles meet certain minimum environmental attributes
- Revise 2004 City Street Tree Master Plan, with the support of the City Arborist, to increase urban tree canopy
- Consider fuel switching strategies to move residential and commercial energy from natural gas and other fuels to renewable electricity portfolio
- Consider consumption based community engagement program to reduce GHG impacts of plug load, food and consumer goods purchased in Menlo Park

### *Fiscal Year 2019-20*

- Consider replacement of all remaining City non-LED street lights with LED fixtures
- Consider height and density limit adjustments to promote active and public transportation
- Consider resiliency strategies for protecting Menlo Park land in the projected Sea Level Rise (SLR) zone
- Robust Climate Action Plan update community engagement program to craft Menlo Park's strategy looking forward to 2040

### *For All Years 2015-2020:*

- Continue implementation of City EPP, residential and commercial water, waste and energy efficiency programs

The above is a recommended timeline only. New policies and programs related to GHG reductions may require a comprehensive cost-benefit analysis. Nearly all policies and programs would require City Council approval prior to implementation. In addition, the five year strategy also reflects what can be accomplished with current staff resources.

## Status on Projects Approved by Council from 2014 Update

In April 2014, Council approved of a five-year CAP strategy. The following is the status of projects previously discussed. The projects are listed roughly in the order in which they were originally planned to be implemented. The progress highlights the varied speed in which projects can move forward within the context of the larger City effort.

**Planned Implementation FY 2011-12**

| | |
|---|---|
| **Participation in Energy Upgrade California**<br><br>**Status**<br><br>Current, On-Going, with Program Changes | In April 2015, the City, San Mateo County, and Bay Area Regional Energy Network (BayREN) cosponsored a homeowner energy efficiency workshop at the Belle Haven neighborhood center. The workshop was attended by 30 residents. The City continues to conduct outreach regarding energy efficiency opportunities for both residents and businesses, through bill inserts, Facebook, Twitter and NextDoor social media campaigns. The State Energy Watch program provides up to $4,500 in rebates to homeowners and $750 per unit to multi-family dwelling owners that complete energy efficient upgrades. City Council approved a rebate program in 2011 that provided partial payment to residents for completing a home energy audit, and full rebate if any recommended energy efficient upgrades are made. According to San Mateo County Energy Watch reports, Menlo Park had the third highest participation rate in the program for the county behind San Mateo and San Bruno. Approximately 25 projects were completed in Menlo Park. The City maintains a small fund for energy audit rebates; however, the nearby non-profit agency that offered audits to residents has experienced program changes which have resulted in a reduced number of requests for the funds. |

| | |
|---|---|
| **Establish Climate Action Plan Greenhouse Gas Reduction Target**<br><br>**Status**<br><br>Completed in 2013 | A GHG reduction target of 27% by 2020 from 2005 level was adopted by Council in March 2013. |

| | |
|---|---|
| **Mandatory Commercial Recycling Ordinance**<br><br>**Status**<br><br>Removed | State-wide mandatory commercial recycling was enacted in 2013 via AB 341 and State-wide mandatory commercial organics recovery was enacted in 2014 via AB 1826, thus removing the perceived need for local ordinances. The South Bay Waste Management Authority (also referred to as SBWMA or RethinkWaste) is taking the lead in publicizing and implementing these laws on behalf of its member agencies, including Menlo Park. |

| | |
|---|---|
| **Energy Performance Contracting and Solar Power Purchase Agreements**<br><br>**Status**<br><br>Nearing Completion in 2015 | Environmental Programs worked with San Mateo County Energy Watch to provide a free energy audit of the City's administration building, and an Energy Management System (EMS) was recommended. The City Council appropriated over $1M in the Capital Improvement Program (CIP) for FY 2014-15, and FY 2015-16 for the energy efficiency projects at City facilities, these include variable frequency drives, Energy Monitoring Systems (EMS) and new chillers, which are estimated to save 578 tons of CO2e. On October 6, 2015 the City Council accepted the chillers and variable frequency drives as completed by the contractor. The EMS implementation is underway, thus the project is halfway completed relative to its budget.<br><br>In 2013, Council also approved participating in the regional renewable energy procurement project (R-REP) to install solar on four city facilities (Arrillaga Gymnasium, Arrillaga Gymnastics Center, Onetta Harris Center, and Corporation Yard). Construction of the solar power facilities is underway and is expected to be completed in November 2015.<br><br>• The combined solar system sizes equal 390.4 kW<br>• The annual solar output is estimated to be 580,889 kWh<br>• Over the course of the 20 year Power Purchase Agreement (PPA), the City is expected to save over $461,000 in energy costs (when compared to PG&E), with minimal capital outlay by the City<br>• The installations are estimated to reduce the City's Municipal GHG emissions by 419 metric tons annually, which is equivalent to removing eighty-eight passenger cars from the road every year. |

| | |
|---|---|
| **Adopt Environmental Purchasing Policy for City Operations**<br><br>**Status**<br><br>Completed in 2014 | Implementation and reporting on the results of the policy are still in progress. The City established an Environmental Purchasing Policy (EPP) working group consisting of members from all departments that helped craft the policy, which was adopted in 2014. The committee has not met since adoption due to other city priorities and limited staff resources. Reporting is expected to begin in FY 2015-16. |

| | |
|---|---|
| **Improve Methane Capture at Bedwell Bayfront Park**<br><br>**Status**<br><br>In Progress | Delays are due to expected changes in methane production due to the age of the landfill and unexpected changes in regulatory standards for operating the closed landfill. A consultant was hired to study this issue in FY 2013-14 and a revised plan is expected in 2016. |

| | |
|---|---|
| **Phase II Sustainable Building Standards Development**<br><br>**Status**<br><br>In Progress, projected completion FY2016-17 | Staff anticipates bringing changes to the building code to City Council along with required updates required under the California universal building code, which is updated every three years. Expected completion FY2016-17. |

**Planned Implementation FY2012-13**

| | |
|---|---|
| **Expand Green Business Certification Program**<br><br>**Status**<br><br>Implemented in FY2014-15 | San Mateo County revived the program using a one-year Climate Fellow staff person in FY2014-15. Menlo Park businesses were certified. City staff helped to publicize the program and the businesses in 2015. Follow up is needed to ensure the County continues the program on an on-going basis. |

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| **Maximize Recycling and Composting at all City facilities to a 75% measured diversion rate**<br><br>**Status**<br><br>Current, On-Going | Staff has provided outreach on how to properly use the programs to City staff, reporting and follow up are pending additional staff time availability. |

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| **Consider Adopting Zero Waste Policy**<br><br>**Status**<br><br>Moved to FY2016-17 | This project is currently planned for the FY2016-17 CIP and would need to coincide with possible Collection Franchise negotiations. |

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| **Implement Civic Green Building Policy for New City facilities or major renovations**<br><br>**Status**<br><br>On Hold | Due to limited staff resources, this project is on hold until the Environmental Purchasing Policy is fully implemented. In 2014 the City's Environmental Purchasing Policy was adopted, additional staff time is needed to complete department level follow up, training and reporting. Environmental staff is planning to assist the City Hall remodeling team in choosing green building materials whenever possible. If the project qualifies, the City may certify the project under the LEED O+M (Operations and Management) framework. |

**Planned Implementation FY2012-13**

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|---|---|
| **Car Sharing and Public Transportation Marketing**<br><br>**Status**<br><br>Implemented FY 2014-15 | These projects were de-emphasized in the CAP to reflect the Transportation and Bicycle Commissions as main drivers of these projects, and reduce duplication of effort. |

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|---|---|
| **Social Marketing Program for Alternative Transportation**<br><br>**Status**<br><br>Implemented FY 2014-15 | City staff and volunteers implemented a social media campaign for active transportation in 2014 via the transportation division's Facebook and Twitter accounts.<br><br>Bicycle infrastructure improvements and campaigns to promote active transportation and commute alternatives to single occupancy vehicles were completed by the Bicycle and Transportation commissions and staff in 2014. |

**Planned Implementation FY2014-15**

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|---|---|
| **Consider Electric Vehicle Charging Stations**<br><br>**Status**<br><br>In Progress | In 2014 the City won a grant, as part of a regional effort, for EV chargers. Appropriate accessible parking locations for the chargers have been identified and the City is working on estimates for the costs to run electrical conduit and enhanced electrical service to the selected locations. Although the cost of the chargers and the installation of the chargers are covered by the grant, the City will need to contribute approximately $30,000 to provide the conduit and electrical service upgrades required, and a small number of parking spaces will be lost as a result of accessibility requirements. |

# Recommended Next Steps of GHG Emission Reduction Strategies

This annual update and status report is intended to complete a high level analysis of the City's current GHG emissions and five year reduction strategies and identify new strategies for consideration over the next five years.

For FY2015-16 the City Council Approved $100,000 in the Capital Improvement Plan (CIP) for Climate Action Plan activities. These funds will be used to pursue the strategies listed in Figure $ for FY2015-16.

The next recommended steps include:

- City Council review the community and municipal GHG inventories for 2013 (above, accomplished at this meeting).
- Staff to continue to consider and implement strategies identified in the report through the annual Capital Improvement Plan and/or city budget process.
- EQC to advise staff and City Council regarding updates to the General Plan, which will facilitate GHG reductions in the near and long term.
- Staff to track statewide changes, such as Governor's Executive Orders, which impact the City's Climate Action Planning.

## *Appendix A – Previous Menlo Park Climate Action Planning City Council Reports*

| Council Report | Date | Action |
|---|---|---|
| 07-075 | 5/1/2007 | Adoption of a resolution appropriating $35,000 from the General Fund Reserve for consultant and staff costs to conduct a Greenhouse Gas Emissions Inventory and authorizing the City Manager to enter into a contract for $24,100 with ICLEI – Local Governments for Sustainability to conduct the inventory, and adoption of a resolution endorsing the U.S. Mayors Climate Protection Agreement, as modified. (Staff Report #07-075) |
| 08-031 | 3/4/2008 | Receipt of updates to the Menlo Park Greenhouse Gas Emissions Inventory Analysis; approval of a resolution authorizing the City Manager to execute a grant agreement in the amount of $25,000 with the Bay Area Air Quality Management District for developing a Climate Action Plan and to execute a contract in the amount of $30,600 with ICLEI-Local Governments for Sustainability to develop a Climate Action Plan; and appointment of a Council Member to the Core Team for planning. (Staff Report #08-031) |
| 08-039 | 3/25/2008 | Consideration of purchasing offset credit for Greenhouse Gas Emissions from City operations through the PG&E Climate Smart Program (Staff Report #08-039) |
| 08-040 | 3/25/2008 | Core Team for drafting the Climate Action Plan (Staff Report #08-040) |
| 08-048 | 4/22/2008 | Adopt the Climate Action Assessment Plan Report and authorize use of remaining funds from the Green@Home contract with Acterra to provide additional energy efficiency incentives that would increase Menlo Park's participation in the regional Energy Upgrade California Program (Staff report #11-128) |
| 13-051 | 4/2/2013 | Provide direction on the Climate Action Plan Update and Status Report, new measuring methodology for transportation greenhouse gas emissions, and a community greenhouse reduction target, and provide direction on funding in order to achieve target. (Staff report #13-051) |
| 14-113 | 06/17/2014 | Receive annual community greenhouse gas inventory information and approve updated five year Climate Action Plan strategy (Staff report #14-113) |
| 14-115 | 06/17/2014 | Approve a resolution authorizing the City Manager to execute an agreement with the Bay Area Climate Collaborative, ABM, and ChargePoint to install four electric vehicle charging stations in Menlo Park with grant funds from the California Energy Commission (Staff report #14-115) |
| 14-178 | 10/07/2014 | Approve a resolution making findings necessary to authorize an energy services contract for Power Purchase Agreements (PPA) at the Arrillaga Gymnasium, Arrillaga Gymnastics Center, Onetta Harris Center, and City Corporation Yard; authorize the City Attorney to finalize the agreement and authorize the City Manager to execute the agreement; and amend the existing consulting contract with Optony, Inc. to include construction management services (Staff report #14-178 |

## *Appendix B - City of Menlo Park Municipal Operations GHG Emissions*

The City of Menlo Park conducted the following Municipal GHG Inventory in 2009, which showed an increase in GHG of 594 tons due to expansion of City infrastructure/facilities and changes in emissions factors. The 2009 Municipal Inventory has not been officially updated; however, the City has tracked information reflecting the municipal energy saving projects conducted with the support of PG&E. The projects which were completed in 2010 through 2013 provide a GHG savings of 100 tons (a number of additional projects were conducted; however, they were not counted in this calculation, because the year of completion has not been established).

In addition, the City Council has approved the following municipal energy-efficiency related projects, which are in progress, and are expected to save an additional amount of more than 578 tons of GHG:

October 2014:

- Project: Approved $64,272 in funding to install variable frequency drive systems at the Burgess Park and Belle Haven Park pools.

  Estimated annual CO2e reduction: 38 tons    Status: in progress

- Project: Approved four Power Purchase Agreements (PPA) with Cupertino Electric as part of the Regional Renewable Energy Procurement Project (R-REP) with Alameda County to install solar PV systems on municipal buildings (rooftop and solar carport). Solar will be installed on the Arrillaga Family Gymnasium, Arrillaga Family Gymnastics Center, City Corporation Yard, and Onetta Harris Community Center.

  Estimated annual CO2e reduction: 419 tons   Status: completion November 2015.

April 2015 (For the City's Administrative Building and Library):

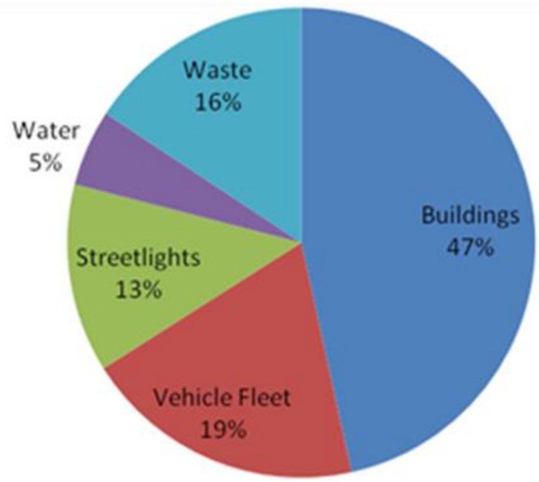
- Project: Approved $375,000 in funding to purchase a new Energy Monitoring System

  Estimated annual CO2e reduction: 120 lbs      Status: in progress

- Project: Approved $606,160 in funding to purchase new chillers and variable frequency drives.

  Estimated annual CO2e reduction: 121 tons    Status: Completed October 6, 2015

### *Municipal Operations Greenhouse Gas Emissions Inventory 2009 By Source (2,889 tons $CO_2e$)*




Emissions from the City are embedded within the community-wide totals. Government operations are therefore a subset of total community emissions. In the year 2009, the City of Menlo Park's municipal operations generated 2,889 tons of $CO_2e$, which constitutes 0.004% of the community's total greenhouse gas emissions. This is a 25% increase compared to 2005 total emissions (2,305 tons).

Electricity and natural gas use in the City's buildings contributed to 47%, the vehicle fleet contributed 19% of this total, and the remainder of $CO_2e$ came from streetlights, waste, and the electricity for pumping water and storm water.

**Municipal Buildings** - Electricity and natural gas use in the City's buildings contributed to 47% of CO2e from municipal operations. This is up 14% compared to City buildings contributing 33% of CO2e toward municipal operations in 2005. This increase can be attributed to a couple reasons; PG&E's greenhouse gas CO2 emission rates for electricity increased from KWh x (0.489 lbs/kWh / 2,204.6 lbs/metric ton) in 2005 to KWh x (0.641 lbs/kWh / 2,204.6 lbs/metric ton) in 2009. The increase in emissions rates means that each kWh consumed in 2009 contributed approximately 31.1% more CO2 than in 2005. Another reason for the increase in fuel and electricity consumption from municipal buildings is the construction of new buildings from 2005-2009.

**Vehicle Fleet** - In 2009, Menlo Park's municipal vehicle fleet is responsible for the second largest share of overall municipal emissions at 19%. Compared to 2005's 28.4%, this is a 9.4% reduction. Menlo Park's vehicle fleet consists of analyzing the fuel consumed by City vehicles and equipment, such as police vehicles, and the tractors used for landscaping

**Streetlights** - The energy consumed by the City's street lights accounted for 13% of municipal operations greenhouse gas emissions in 2009. This analysis included the energy consumed by streetlights, traffic signals, park lighting, decorative lights, and parking lot lights. Compared to 2005's 11.9%, this is a 1.1%

increase. This increase can be attributed to the addition of more streetlights, including signal cameras added throughout the city in 2008.

**Water/Sewage** - The emissions resulting from the energy used to pump water and waste water remained the same at 5% in 2005 and 2009. This analysis excludes pumping and treatment of wastewater that is carried out by the West Bay Sanitary District (WBSD), East Palo Alto Sanitary District (EPASD), and the South Bayside System Authority (SBSA).

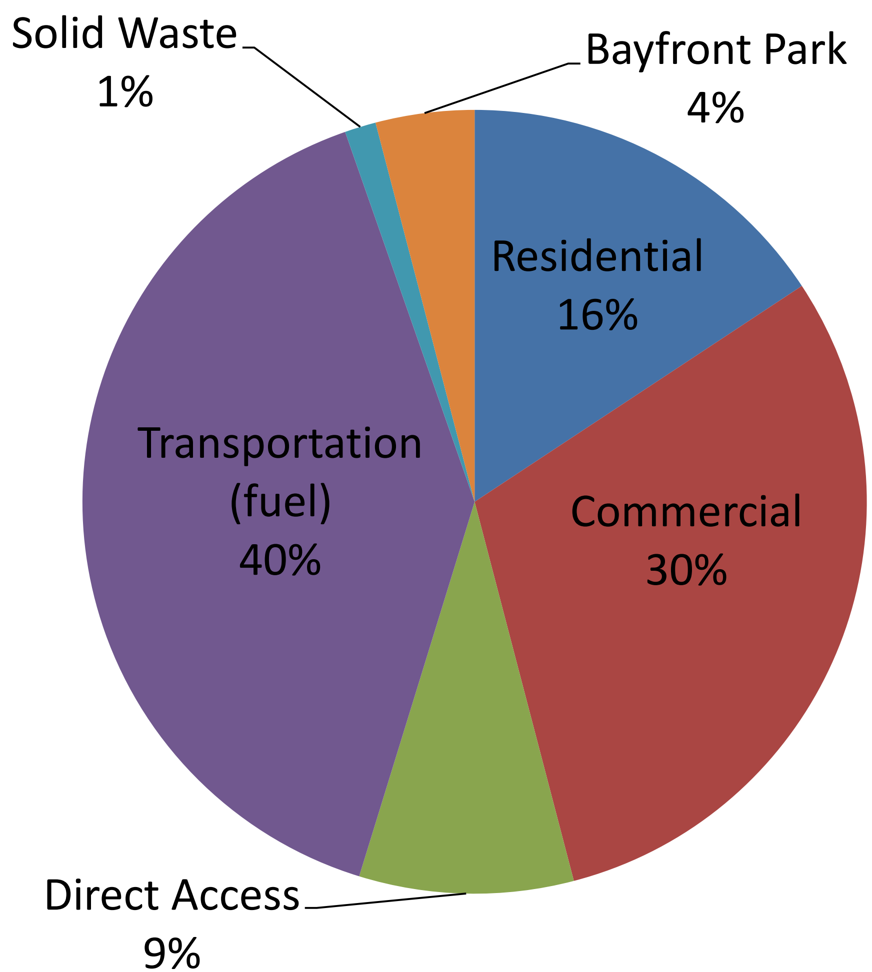
**Waste** - In 2009, the relative contribution of landfilled waste from municipal operations to greenhouse gas emissions is 16%. Compared to landfilled waste contributing 20.8% to municipal operations in 2005, there is a 4.8% decrease. This decrease can be attributed to the reduction of solid waste sent to the landfill from year to year.

ATTACHMENT B

# CLIMATE ACTION PLAN UPDATE AND STATUS REPORT

City Council Meeting October 20, 2015

# 2013 Menlo Park Community-Wide Greenhouse Gas Emissions by Source



# Improvements from 2012 to 2013

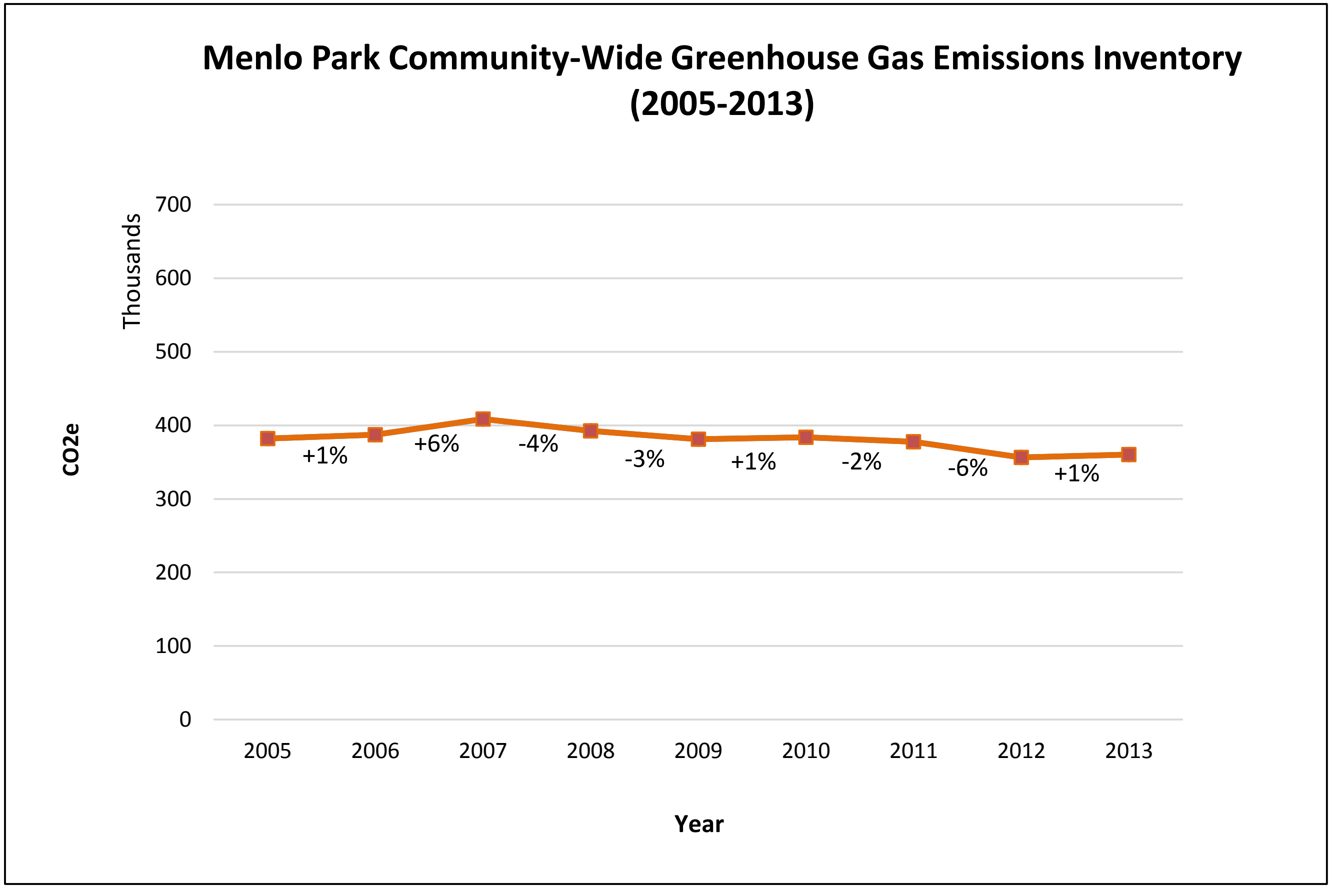
- Transportation Sector ↓0.6%
  - Reduction of 104,552 gallons fuel consumed
- Solid Waste Sector ↓1.2%
  - Reduction of 10,321 tons solid waste landfilled
- Methane at Bedwell Bayfront Park ↓15.5%
  - Gas reduces over time (closed landfill)
  - New burner technology installed in 2013

# Changes from 2012 to 2013

- Energy Sector
  - Residential energy use ↑3.4%
  - Commercial energy use ↑5.5%
  - New construction ↑50%
  - Facebook + 6,500 employees
  - PG&E emission factor ↑

    (from 0.4440 lbs. to 0.4990 lbs. $CO_2$/kWh)

# Greenhouse Gas Emissions



# Planned Strategies **FY2015-16**

- Complete City Solar Project
- Install four EV Charging stations
- Incorporate CAP strategies and GHG emission reductions into General Plan
- Complete energy efficient upgrades at city facilities
- Consider CCE options
- Methane capture and treatment at Bedwell Bayfront Park

# Planned Strategies **FY2016-17**

- Zero Net Energy, LEED Silver, Energy Star Planning requirements or Building Codes
- Update City Franchise Agreement with Recology
- Develop an energy efficient/renewable energy plan for existing buildings
- Re-invigorate social marketing to increase biking, public transit, and walking in the community
- Implement CCE, if selected as an option

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