CITY COUNCIL AGENDA
REGULAR MEETING
CITY OF HALF MOON BAY

TUESDAY, DECEMBER 7, 2021

REMOTE PARTICIPATION (SEE NEXT PAGE)

Robert Brownstone, Mayor
Debbie Ruddock, Vice Mayor
Joaquin Jimenez, Councilmember
Deborah Penrose, Councilmember
Harvey Rarback, Councilmember

7:00 PM

This agenda contains a brief description of each item to be considered. Those wishing to address the City Council on any matter not listed on the Agenda, but within the jurisdiction of the City Council to resolve, may come forward to the podium during the Public Forum portion of the Agenda and will have a maximum of three minutes to discuss their item. Those wishing to speak on a Public Hearing matter will be called forward at the appropriate time during the Public Hearing consideration.

Please Note: Anyone wishing to present materials to the City Council, please submit seven copies to the City Clerk.

Copies of written documentation relating to each item of business on the Agenda are on file in the Office of the City Clerk at City Hall and the Half Moon Bay Library where they are available for public inspection. If requested, the agenda shall be available in appropriate alternative formats to persons with a disability, as required by Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132.) Information may be obtained by calling 650-726-8271.

In compliance with the Americans with Disabilities Act, special assistance for participation in this meeting can be obtained by contacting the City Clerk's Office at 650-726-8271. A 48-hour notification will enable the City to make reasonable accommodations to ensure accessibility to this meeting (28 CFR 35.102-35.104 ADA Title II).

http://hmbcity.com/

SPECIAL REMOTE PARTICIPATION PROTOCOLS

This meeting will be held entirely by teleconference. All Councilmembers and staff will only participate via the Zoom platform using the process described below. The meeting is being conducted pursuant to recent amendments to the teleconference rules required by the Ralph M. Brown Act allowing teleconferencing during a proclaimed state of emergency when local officials have recommended social distancing (AB 361). The purpose of AB 361 is to provide the safest environment for the public, elected officials, and staff while allowing for continued operation of the government and public participation during the COVID-19 pandemic.

This meeting will be conducted via Zoom Webinar and live Spanish interpretation will be available within the Zoom platform. Members of the public are welcome to login into the webinar as Attendees. During any public comment portions, attendees may use the "raise your hand" feature and will be called upon and unmuted when it is their turn to speak. The meeting will also be streamed on Channel 27, on pacificcoast.tv, and on Facebook at www.facebook.com/cityofhalfmoonbay. Please click to join the webinar: https://us06web.zoom.us/j/99588947925 or join by phone at 669-900-9128, using Webinar ID 995-8894-7925.

CALL TO ORDER / ROLL CALL

PUBLIC FORUM

MAYOR'S ANNOUNCEMENTS OF COMMUNITY ACTIVITIES AND COMMUNITY SERVICE

REPORT OUT FROM RECENT CLOSED SESSION MEETINGS

1. CONSENT CALENDAR

1.A WAIVE READING OF RESOLUTIONS AND ORDINANCES

1.B RE-RATIFICATION OF RESOLUTION TO CONTINUE HOLDING PUBLIC MEETINGS REMOTELY (AB 361)

Staff Recommendation: By motion, in accordance with Assembly Bill 361, re-ratify the findings in Resolution No. 2021-80 to continue conducting the City's Council, Commission, and Committee meetings remotely due to health and safety concerns to the public due to COVID-19.

STAFF REPORT

1.C 2022 RESIDENTIAL DWELLING UNIT ALLOCATION PURSUANT TO HALF MOON BAY MUNICIPAL CODE CHAPTER 17.06 (MEASURE D)

Staff Recommendation: Adopt a resolution setting the 2022 Residential Dwelling Unit Allocation and Administration System pursuant to Half Moon Bay Municipal Code Chapter 17.06 for 69 residential dwelling units, 46 units for the Downtown and 23 units outside of the Downtown.

STAFF REPORT

RESOLUTION

ATTACHMENT 2

1.D SAN MATEO COUNTY LOCAL MULTIJURISDICTIONAL HAZARD MITIGATION PLAN 2021

Staff Recommendation: Adopt a resolution adopting Volume One and the City of Half Moon Bay's Annex in Volume Two of the San Mateo County Local Multijurisdictional Hazard Mitigation Plan of 2021.

STAFF REPORT

RESOLUTION

1.E FIRST AMENDMENT TO THE PROFESSIONAL SERVICES AGREEMENT WITH HDL COMPANIES FOR BUSINESS LICENSE AND TRANSIENT OCCUPANCY TAX ADMINISTRATION AND COLLECTION

Staff Recommendation: Adopt a resolution authorizing the City Manager to execute a First Amendment to the Professional Services Agreement with HdL Companies extending the term to August 30, 2022 and increasing the not-to-exceed annual amount to $60,000.

STAFF REPORT

RESOLUTION

ATTACHMENT 2

ATTACHMENT 3

1.F FINAL ACCEPTANCE OF THE OCEAN COLONY FORCE MAIN AND PUMP STATION PROJECT (CIP NO. 9025)

Staff Recommendation: By resolution, authorize the City Manager or his designee to file a Notice of Completion for the Ocean Colony Force Main and Pump Station Project (Project) and release the Project Retention Funds and Project Performance Bond and Labor and Materials Bond thirty (30) days after recordation of the Notice of Completion.

STAFF REPORT

RESOLUTION

1.G ACKNOWLEDGING COMPLETION OF THE SANITARY SEWER IMPROVEMENTS AND ACCEPTANCE FOR THE CITY'S OWNERSHIP AND THE RESPONSIBILITY TO MAINTAIN THE SANITARY SEWER MAIN CONSTRUCTED WITHIN THE PUBLIC EASEMENT IN THE CARNOUSTIE PHASE 4 SUBDIVISION

Staff Recommendation: Acknowledge the completion of sanitary sewer improvements required by the Subdivision Improvement Agreement dated September 17, 2019, and by resolution, accept for the City's ownership and the responsibility to maintain the sanitary sewer main constructed within the public easement in the Carnoustie Phase 4 Subdivision, subject to one-year warranty period and release of securities for the faithful performance bond and labor and materials bond.

STAFF REPORT

RESOLUTION

ATTACHMENT 2

1.H HIGHWAY 1 SAFETY AND OPERATIONAL IMPROVEMENTS SOUTH PROJECT (CIP NO. 523)

Staff Recommendation: Adopt a resolution:
1) Authorizing the City Manager to amend the professional services agreement with Peninsula Municipal Engineering, Inc. for continuation of construction management services increasing the contract by $88,464 for a total not to exceed amount of $273,584;
2) Increasing the construction contingency for the Highway 1 South Project (No. 523) by $50,000; and
3) Transferring $138,464 from the Pavement Management and Traffic Safety Program (No. 0514) to the Highway 1 Safety - South Project (No. 0523).

STAFF REPORT

RESOLUTION

2. ORDINANCES AND PUBLIC HEARINGS

2.A MANDATORY ORGANICS WASTE DISPOSAL REDUCTION ORDINANCE

Staff Recommendation: Conduct a public hearing, waive first reading, and introduce an ordinance:

a. Confirming without re-enacting previous repeal of Chapter 7.20 entitled "Garbage and Rubbish Disposal" in its entirety effective July 1, 2011;
b. Repealing existing Chapter 7.21 entitled "Mandatory Solid Waste Collection Service";

c. Adopting a new Chapter 7.20 entitled “Solid Waste Collection, Recycling and Disposal”; and
d. Adopting a new Chapter 7.21 entitled, “Edible Food Recovery.”

STAFF REPORT

ORDINANCE

ATTACHMENT 2

2.B BUILDING ELECTRIFICATION ORDINANCE

Staff Recommendation: Conduct a public hearing, waive first reading, and introduce an ordinance adopting a new chapter 14.06 to the Half Moon Bay Municipal Code entitled “Electrification of Buildings."

STAFF REPORT

ORDINANCE

ATTACHMENT 2

ATTACHMENT 3

2.C ELECTRIC VEHICLE AND PHOTOVOLTAIC SYSTEM REACH CODES FOR 2019 ENERGY CODE

Staff Recommendation: Conduct a public hearing and introduce an ordinance repealing and replacing Chapter 14.04.040 and Chapter 14.04.120 of the Half Moon Bay Municipal Code to expand the requirements for photovoltaic systems in new non-residential buildings, require pre-wiring for back up battery storage and expand electric vehicle charging requirements in new residential buildings.

STAFF REPORT

ORDINANCE

ATTACHMENT 2

3. RESOLUTIONS AND STAFF REPORTS

3.A VACCINATIONS

Staff Recommendation: Receive an informational report on the status of vaccinations and provide further direction regarding mandating vaccinations for City employees and contractors.

STAFF REPORT

ATTACHMENT 1

COMMISSION / COMMITTEE UPDATES

CITY COUNCIL REPORTS / ITEMS

ADJOURNMENT

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: Jessica Blair, Communications Director / City Clerk

TITLE: **RE-RATIFICATION OF RESOLUTION TO CONTINUE HOLDING PUBLIC MEETINGS REMOTELY (AB 361)**

RECOMMENDATION:
By motion, in accordance with Assembly Bill 361, re-ratify the findings in Resolution No. 2021-80 to continue conducting the City's Council, Commission, and Committee meetings remotely due to health and safety concerns to the public due to COVID-19.

FISCAL IMPACT:
There is no fiscal impact associated with this item.

STRATEGIC ELEMENT:
This action supports the Inclusive Governance element of the Strategic Plan.

BACKGROUND:
On March 4, 2020, Governor Newsom declared a State of Emergency to make additional resources available, formalize emergency actions already underway across multiple state agencies and departments, and help the state prepare for a broader spread of COVID-19.

Thereafter, on March 17, 2020, the City Council adopted Resolution 2020-16 declaring a local emergency due to COVID-19. The same day, Governor Newsom issued Executive Order N-29-20, which suspended certain provisions of the Ralph M. Brown Act to allow local legislative bodies to conduct meetings telephonically or by other means. Additionally, the State implemented a shelter-in-place order, requiring all non-essential personnel to work from home.

Staff quickly worked to set up remote meetings via Zoom for all City Council and Planning Commission meetings. The Zoom meetings have allowed the Council, Commissions, and Committees to continue to conduct City business from the safety of members' homes. The City has been utilizing Zoom for the past 18 months to conduct nearly all public meetings. The usage of Zoom for public meetings has allowed the City to ensure the public's continued access to government meetings while also ensuring the public's safety.

On June 11, 2021, Governor Newsom issued Executive Order N-08-21, which extended the ability of agencies to hold remote meetings through September 30, 2021, after which agencies anticipated transitioning back to public meetings held in full compliance with the Brown Act. In preparation for the return to in-person meetings, staff has been working on acquiring audio and visual upgrades for City facilities to conduct hybrid meetings. Although hybrid meetings would help to keep the public safe by allowing them to continue accessing the meetings from their own home, Councilmembers, Commissioners, Committee members, and staff would need to meet in person.

Since the Governor issued Executive Order N-08-21, the Delta variant has emerged, causing a spike in cases throughout the state. As a result, the San Mateo County Health Department issued a Health Order requiring masks indoors in public places, regardless of vaccination status, starting August 3, 2021.

On September 16, 2021, Governor Newson signed Assembly Bill 361 (AB 361), which allows cities to continue to meet remotely during proclaimed states of emergency under modified Brown Act requirements that are similar but not identical to the rules and procedures established by the previous Executive Orders.

AB 361 authorizes local agencies to use teleconferencing without complying with the teleconferencing requirements imposed by the Ralph M. Brown Act during a declared state of emergency, when state or local health officials have imposed or recommended measures to promote social distancing during the proclaimed state of emergency, or when there is an imminent risk to the health or safety of attendees.

On October 5, 2021, the City Council adopted Resolution No. 2021-80 under the requirements of AB 361 to continue conducting meetings remotely. AB 361 requires the City Council to make the findings every 30 days, necessitating the need for this item.

DISCUSSION:
AB 361 will allow local legislative bodies to continue to meet remotely after the September 30, 2021 expiration of the Governor's executive orders. A local agency will be allowed to continue to meet remotely when:

- The local agency holds a meeting during a declared state of emergency
- State or local health officials have imposed or recommended measures to promote social distancing
- Legislative bodies declare the need to meet remotely due to present imminent risks to the health or safety of attendees

The City meets the requirements to continue holding meetings remotely to ensure the health and safety of the public due to the following:

- The City is still under a local state of emergency

- County health orders require that all individuals in public spaces maintain social distancing and wear masks
- The City can't maintain social distancing requirements for the public, staff, Councilmembers, Commissioners, and Committee Members in their meeting spaces

The City cannot ensure social distancing requirements are met inside City facilities where the City Council, Planning Commission, Parks and Recreation Commission, Redistricting Advisory Committee, Bicycle and Pedestrian Advisory Committee, and Main Street Bridge Advisory Committee meet.

Councilmembers, Commissioners, Committee Members, and staff sit well within six feet of each other. Moreover, the County's indoor mask order is still in effect, making it difficult to hear what Councilmembers, Commissioners, Committee Members, staff, and public speakers are saying. Furthermore, while speaking through masks may be understandable in person, picking up speech on microphones for those attending remotely and those watching any livestreams would be difficult.

Per AB 361, the City Council would need to declare every 30 days that the City's legislative bodies must continue to meet remotely to ensure the health and safety of the public. Staff recommends that the City Council declare these findings are true so these bodies can continue to meet remotely. Staff will return with this resolution for re-ratification at the Council's 1st Tuesday meeting each month, at which time the Council can reassess as various health orders and COVID-19 parameters change.

BUSINESS OF THE CITY OF HALF MOON BAY CITY COUNCIL

AGENDA REPORT

For the Meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Robert Nisbet, City Manager

FROM: Jill Ekas, Community Development Director
Brittney Cozzolino, Associate Planner

TITLE: **2022 RESIDENTIAL DWELLING UNIT ALLOCATION PURSUANT TO HALF MOON BAY MUNICIPAL CODE CHAPTER 17.06 (MEASURE D)**

RECOMMENDATION:
Adopt a resolution setting the 2022 Residential Dwelling Unit Allocation and Administration System pursuant to Half Moon Bay Municipal Code Chapter 17.06 for 69 residential dwelling units, 46 units for the Downtown and 23 units outside of the Downtown.

FISCAL IMPACT:
There is limited fiscal impact associated with the annual allocation of allowable residential building permits as the Measure D allocation application fees cover some of the costs of administering the program.

STRATEGIC ELEMENT:
This action supports all Elements of the Strategic Plan (Infrastructure and Environment, Healthy Communities and Public Safety, Fiscal Sustainability, and Inclusive Governance).

BACKGROUND:
In 1991, Measure A was adopted by City voters establishing a 3 percent annual growth limit. In 1999, Measure D amended the Residential Growth Limitation Ordinance reducing the allowable percentage increase of residential population from 3 percent to 1 percent, with an additional 0.5 percent for residential development in the "Downtown Area." On December 1, 2010, the City Council adopted an ordinance amending Chapter 17.06 of the Half Moon Bay Municipal Code entitled "Residential Dwelling Unit Allocation System." Measure D mandates that "the City shall allocate permissible dwelling units among applications on the basis of the existing allocation system or a subsequently modified system." Measure D allocations are reviewed and authorized annually by the City Council per the Municipal Code.

This report provides an update on the annual Measure D allocations and recommends 69 total allowable residential unit allocations for 2022.

DISCUSSION:

Chapter 17.06 of the Municipal Code establishes the methodology for determining the annual maximum number of residential dwelling unit allocations, or "Measure D Certificates." The ordinance specifies that the most recent U.S. Census data must be used for determining the average number of persons per household.

The 2020 U.S. Census provides the most recent Census data, replacing the 2010 U.S. Census data for a new baseline. The 2020 Census data indicates a total population of 11,795 and a total occupied housing unit count of 4,569, which equates to an average of 2.58 persons per household (PPH) in Half Moon Bay. Table 1 presents the methodology and calculations for determining the annual allocation.

Table 1 – Allocation Calculations

Year	Base Population[1]	New Units[2]	Persons Per House-hold	Calculated Additional Population[3]	New Projected Population[1]	Base Allocation[4]	Allocation Distribution		Total Annual Allocation
							Downtown[5]	Outside Downtown	
2021	11,795	35	2.58	90	11,885	46	46	23	69

[1]2020 U.S. Census Population was utilized for the 2021 baseline from which the calculated additional population is added to each year.
[2]Number of new units that were issued building permits during the prior calendar year.
[3]Most current US Census PPH data (2.58) multiplied by the number of new units that were issued building permits during the calendar year.
[4]1% of New Projected Population divided by average PPH.
[5]Includes an additional 0.5% in the downtown area per Section 17.06.020(B).

The "new projected population" estimate is used to calculate the total number of units within the City at year-end. The equation for establishing the "new projected population" involves multiplying the number of new units issued building permits during the calendar year by the average PPH (2.58 from the 2020 Census data, used for the 2021 baseline), then adding the result to the projected population from the previous year. In this case, the 2020 Census data can be used as the base population count for the previous year instead of a projected population.

With the actual population count and occupied households count from the 2020 Census data, an updated persons per household count was calculated at 2.58 as compared to 2.69 that was calculated for last year's allocation adoption based on 2013-2018 American Community Survey data. The decrease in persons per households results in a modest increase in the number of new dwelling units allowed for 2022 compared to the number of new dwelling units allowed in 2021.

The base allocation of 1% is split evenly between Downtown and outside of the Downtown. As discussed earlier in "Background," Measure D includes a 0.5% increase in residential allocations for Downtown, which consists of the City's former Redevelopment Area. As summarized in Table 2,

this provides for a maximum of 69 new dwelling unit allocations for 2022, reserving 46 dwelling unit allocations for the Downtown Area, and 23 dwelling unit allocations outside Downtown.

Table 2: Dwelling Unit Allocations – 2022

Total Allocations	Downtown Allocations	Outside Downtown Allocations
69	46 (1.0%) (23 base and 23 bonus)	23 (0.5%)

Municipal Code Section 17.06.020 – "Establishment of number of residential dwelling unit allocations to be authorized annually" sets forth the procedures for establishing the residential allocations. In particular, Section 17.06.020.G specifies that the City Council shall consider the following when establishing the number of Dwelling Unit Allocations in the upcoming year:

1. The number of residential dwelling units allocated in the current year;
2. The number of residential dwelling units allocated in the preceding year, but not necessarily issued building permits;
3. The number of future residential dwelling unit allocations awarded in accordance with a development phasing plan and agreement as provided for in Section 17.06.055;
4. The information and data contained in the annual fiscal impact analysis as provided for in Section 17.06.045 Fiscal Impact Analysis Required.

The following discussion presents information pertinent to the above four considerations.

Residential Dwelling Units Allocated in Current and Proceeding Year: Table 3 presents the number of Measure D certificates and building permits issued each year from 2017 through 2021. Since amending the Measure D allocation system in 2010, new residential development from 2010 through 2013 was especially slow as the City recovered from the great recession. From 2014 on, growth has increased modestly, but remains low due to a lack of larger-scale developments other than phase one of Pacific Ridge. Recent years (2019 and on) have seen a distinct increase in applications for both Measure D certificates and building permits. Accessory Dwelling Units (ADUs) account for much of this increase due to recent State law amendments that further relaxed ADU development requirements and amplified local interest in ADU construction. In 2021, all allocations were issued, including within and outside Downtown.

Table 3: Residential Building Permits Issued

Year	Available Allocations	Measure D Certificates Issued	Residential Building Permits Issued
2017	66	22	28
2018	66	25	16
2019	71	34	24
2020	69	48	26
2021	66	66	35
Average	**68**	**39**	**26**

Development Phasing Plans and Unit Prioritization: The City has not received applications for development phasing plans for Measure D allocations for several years. Phasing plans are applicable to subdivisions.

Before applying for a Coastal Development Permit (CDP) for new residential development, an applicant is required to obtain one Measure D allocation for each unit (per Section 17.06.010.B – Applicability). Measure D certificates are valid for one year (per Section 17.06.050.A. - Timing of building permits issued pursuant to this chapter), but may be extended if other approvals such as a CDP, are required (per Section 17.06.050.F). There is a more detailed comparative process for evaluating and ranking subdivisions (Section 17.06.215 – Evaluation procedures for subdivisions for residential development based upon design and amenity criteria and contribution to public facilities), but that process has not been triggered for phased development of subdivisions.

In the case that there is an increase in residential development activity beyond available allocations, Sections 17.06.120 and 17.06.275 – "Review of Points awarded and residential units allocated" establishes the criteria to evaluate applications and distribute residential dwelling unit allocations. The Measure D Allocation System is structured to prioritize projects in January of each year to evaluate and prioritize applications based upon competitive rating criteria (Sections 17.06.120 and 17.06.275). A detailed staff report to the Planning Commission in March 2020 outlined this process and presented that certain aspects of the rating system, as codified in 2010, are no longer especially relevant. Staff prepared an interpretation document for Planning Commission concurrence that will guide rating if there are more applications received during the annual January application window than available allocations, as occurred in January 2021. At a joint work session with the Planning Commission on November 9, 2021, City Council provided direction and guidance for updating the Measure D ranking and administration procedures to better reflect current Council priorities and community housing needs.

Fiscal Impact Analysis: Section 17.06.045 requires the City to prepare an annual report identifying the effects of new residential development on City finances and the City's ability to provide services to the residents. The fiscal impact analysis for 2021 was prepared by Applied Development Economics and the summary of the analysis is included as Attachment 2. The fiscal impact analysis indicates the new units and residents would generate about $48,229 per year in General Fund revenues and require about $55,687 in General Fund expenditures, for an annual deficit of $7,458. Notably, the 2021 fiscal impact analysis indicated an estimated net surplus of $21,118. Both of these amounts are considered close to breaking even for this type of fiscal impact analysis.

ATTACHMENTS:

1. Resolution Establishing the Residential Dwelling Unit Allocation for 2022
2. Fiscal Impact Analysis Spreadsheet of New Residential Development, prepared by Applied Development Economics, November 2021

RESOLUTION NO. C-21-___

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HALF MOON BAY ESTABLISHING THE RESIDENTIAL DWELLING UNIT ALLOCATIONS FOR 2022

WHEREAS, in November of 1999, the electorate of the City of Half Moon Bay adopted a new Residential Growth Initiative (Measure D) establishing that the number of residential dwelling units for which the City may authorize allocations each calendar year shall not exceed the number of units that would result in a growth of 1% of the City's population, plus an additional 0.5% for additional dwelling units in the area defined by Measure D as the "Downtown Area;" and

WHEREAS, Measure D has been adopted into the Local Coastal Program and certified by the California Coastal Commission; and

WHEREAS, in December of 2010, to implement Measure D, the City Council adopted the Residential Dwelling Unit Permit Allocation System Ordinance, Chapter 17.06 of the Half Moon Bay Municipal Code; and

WHEREAS, Section 17.06.020 of the Municipal Code requires the City Council to adopt the annual residential dwelling unit allocation for the upcoming year by December 31st of each year; and

WHEREAS, Section 17.06.020.G of the Municipal Code describes factors the Council may take into account in establishing the annual allocation, including the number of Residential Dwelling Units allocated in the current year; the number of Residential Dwelling Units allocated in the preceding year but not necessarily issued, the number of future Residential Dwelling Unit allocations awarded in accordance with a Development Phasing Plan and Agreement, and the information and data contained in the Annual Fiscal Impact analysis as provided for in Section 17.06.045.

NOW, THEREFORE BE IT RESOLVED THAT the City Council of the City of Half Moon Bay hereby finds and determines as follows:

Section 1: Findings

In accordance with HMBMC Section 17.06.020.G:

A. **Current Year Allocations**: In the current year (2021), a total of 66 Measure D allocations were issued; while 35 new residential Building Permits were issued.

B. **Preceding Year Allocations:** In the preceding year (2020), a total of 48 Measure D allocations were issued; while 26 new residential Building Permit units were issued.

C. **Future Residential Dwelling Unit Allocations:** There are no future residential unit allocations awarded in previous years from this year's allocation as the result of a Development Phasing Plan and Agreement provided for in Section 17.06.055.

D. **Annual Fiscal Impact Analysis:** Costs for administering the Measure D program are substantially covered by Measure D application fees. Development Impact Fees, Residential Impact Fees for Affordable Housing, and Measure D application fees have been evaluated in an updated Fiscal Impact Analysis prepared by Applied Development Economics.

Section 2: Total Allocation for Calendar Year 2022

Based on the methodology established in Chapter 17.06 of the Half Moon Bay Municipal Code and the findings set forth in Section 1 above, and in order to ensure that the annual population growth in the City does not exceed 1%, plus an additional 0.5% in the Downtown Area, the total allocations for residential dwelling units for the 2022 calendar year shall be 69 units**.**

A. **Assignment of Allocation to "Downtown" and "Outside Downtown" Areas**: The total allocation of 69 residential units shall be distributed as follows: twenty-three (23) units to the projects outside the Downtown area, and forty-six (46) units to projects within the Downtown area.

****

I, the undersigned, hereby certify that the foregoing Resolution was duly passed and adopted on the 7th day of December, 2021 by the City Council of Half Moon Bay by the following vote:

AYES, Councilmembers:

NOES, Councilmembers:

ABSTAIN, Councilmembers:

ABSENT, Councilmembers

ATTEST: APPROVED:

_____ _____

Jessica Blair, City Clerk Robert Brownstone, Mayor

Fiscal Impact of New Residential Units (2021)	
GENERAL FUND REVENUES	**2021 Project Residents**
Property Tax (City Share)	$12,016
VLF Prop Tax Swap	$10,765
Real Prop Transfer tax	$0
Sales & Use Tax	$8,936
Transient Occupancy Tax	$0
Franchise Taxes	$3,129
Other Taxes	$0
Permits	$0
Intergovernmental Subventions	$4,567
Planning and Engineering Fees	$0
Fines and Police Services	$540
Recreations Services Fees	$705
Other Revenues	$7,572
SUBTOTAL	**$48,229**
GENERAL FUND EXPENDITURES	
General Government	$10,250
Police	$16,748
Public Works	$12,145
Recreation	$3,013
Community Development	$3,499
Subtotal Direct General Fund Expenditures	$45,654
Capital Improvements	$10,032
TOTAL	**$55,687**
Net Surplus/(Deficit)	**($7,458)**
Source: ADE, Inc., based on City of Half Moon Bay, Fiscal year 2021-22 Budget	

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: Matthew Chidester, Deputy City Manager
Corie Stocker, Management Analyst

TITLE: **SAN MATEO COUNTY LOCAL MULTIJURISDICTIONAL HAZARD MITIGATION PLAN**

RECOMMENDATION:
Adopt a resolution adopting Volume One and the City of Half Moon Bay's Annex in Volume Two of the San Mateo County Local Multijurisdictional Hazard Mitigation Plan of 2021.

FISCAL IMPACT:
There is no estimated cost associated with this recommendation. If accepted, the Plan may make the City eligible for Federal and State funding and certain grant opportunities.

STRATEGIC ELEMENT:
This action supports all elements of the Strategic Plan.

BACKGROUND:
Hazard Mitigation Planning for the San Mateo County Planning Area:
In January 2021, a coalition of San Mateo County planning partners embarked on a process to prepare for and lessen the impacts of specified natural hazards. Responding to federal mandates in the Disaster Mitigation Act of 2000 (Public Law 106-390), the partnership was formed to pool resources and create a uniform hazard mitigation strategy that can be consistently applied to the defined planning area and used to ensure eligibility for specified grant funding sources.

The 37-member partnership that completed this plan update process includes:

- San Mateo County
- Town of Atherton
- City of Belmont
- City of Brisbane
- City of Burlingame
- Town of Colma
- City of Daly City
- City of East Palo Alto
- City of Foster City
- City of Half Moon Bay
- Town of Hillsborough
- City of Menlo Park
- City of Millbrae
- City of Pacifica

- Town of Portola Valley
- City of Redwood City
- City of San Bruno
- City of San Carlos
- City of San Mateo
- City of South San Francisco
- Town of Woodside
- Coastside Water District
- Colma Fire Protection District
- Highlands Recreational District
- Jefferson Union High School District
- Menlo Park Fire Protection District
- Mid-Peninsula Regional Open Space District
- Mid-Peninsula Water District
- Montara Water and Sewer District
- North Coast Water District
- San Mateo Community College District
- San Mateo County Flood and Seal Level Rise Resiliency District
- San Mateo County Harbor District
- San Mateo County Office of Education
- San Mateo Resource Conservation District
- Westborough Water District
- Woodside Fire Protection District

The planning area for the hazard mitigation plan encompasses all of San Mateo County. The result of the organizational efforts has been to produce a Federal Emergency Management Agency (FEMA) and the California Governor's Office of Emergency Services (Cal OES) approved multi-agency multi-hazard mitigation plan.

Mitigation is defined in this context as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. Mitigation planning is the systematic process of learning about the hazards that can affect the community, setting clear goals, identifying appropriate actions, and following through with an effective mitigation strategy. Mitigation encourages long-term reduction of hazard vulnerability and can reduce the enormous cost of disasters to property owners and all levels of government. Mitigation can also protect critical community facilities, reduce exposure to liability, and minimize post-disaster community disruption.

The hazard identification and profiling in the hazard mitigation plan addresses the following natural hazards considered to be of significant importance within the San Mateo County planning area:

- Climate Change
- Dam Failure
- Drought
- Earthquake
- Flood
- Wildfire
- Landslides and Other Mass Movements
- Sea Level Rise
- Severe Weather / Extreme Weather
- Tsunami

The San Mateo County Department of Emergency Management secured funding for developing the hazard mitigation plan and was the lead coordinating agency for this multi-jurisdictional effort. All participating local jurisdictions have been responsible for assisting in the development

of the hazard and vulnerability assessments and the mitigation action strategies for their respective jurisdictions and organizations. The Plan presents the accumulated information in a unified framework to ensure a comprehensive and coordinated plan covering all planning partners within the San Mateo County Planning Area. Each jurisdiction has been responsible for the review and approval of their individual sections of the Plan.

The Plan was prepared in accordance with the Cal OES Local Hazard Mitigation Plan and FEMA preparation guidelines**.**

The Plan update process was overseen by a 13-member, stakeholder Steering Committee, which was composed of representative stakeholders from within the planning area and was an existing committee that was leveraged for this planning process. In addition, residents were asked to contribute by sharing local knowledge of their individual area's vulnerability to natural hazards based on past occurrences. Public involvement was solicited via a multi-media campaign that included public meetings, web-based information, questionnaires, and progress updates via the news media.

The finalized plan can be viewed online at cmo.smcgov.org/2021-multijurisdictional-lhmp.

DISCUSSION:
On August 30, 2021, San Mateo County submitted the draft Multijurisdictional Hazard Mitigation Plan to Cal OES and FEMA for concurrent review. On October 13, 2021, FEMA notified the County of its approval of the Plan, pending adoption by the San Mateo County Board of Supervisors and approval by the planning partners' governing bodies. The Board of Supervisors adopted the Plan on November 16, 2021, and San Mateo County aims to have all planning partners' governing bodies adopt the plan by the end of 2021.

Why adopt this Plan?
The hazard mitigation plan has received final approval by Cal OES and FEMA, and once it has been adopted by all the jurisdictional partners, the partnership will collectively and individually become eligible to apply for hazard mitigation project funding from the suite of grant programs under FEMA's Hazard Mitigation Assistance (HMA) program.

Where do we go from here?
Now that Cal OES and FEMA have adopted the Plan, each jurisdiction will need to adopt Volume 1 and their respective annex by governing body resolution to be eligible to apply for funding sources including grants.

Grant funds are made available to local governments and states and can be used to implement the various hazard mitigation measures specified in the respective annexes. The Hazard Mitigation Plan is considered a living document, such that as awareness of additional hazards develop and new strategies and projects are conceived to offset or prevent loss due to natural hazards, the Plan will be evaluated and revised on an annual basis during the 5-year plan timeframe.

As a living document, the hazard mitigation plan information can be integrated and used in conjunction with other emergency and related plans, such as Emergency Operations Plans (EOPs).

ATTACHMENTS:

1. Resolution adopting Volume One and City of Half Moon Bay's Annex in Volume Two of the San Mateo County Local Multijurisdictional Hazard Mitigation Plan of 2021
2. Volume 2b, Section 10-Half Moon Bay Annex
3. Volume One-Planning-Area-Wide Elements – (Volume One LHMP)

RESOLUTION NO. C-2021-_____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HALF MOON BAY ADOPTING VOLUME ONE AND THE CITY OF HALF MOON BAY'S ANNEX IN VOLUME TWO OF THE SAN MATEO COUNTY LOCAL MULTIJURISDICTIONAL HAZARD MITIGATION PLAN OF 2021

WHEREAS, all of San Mateo County has exposure to natural hazards that increase the risk to life, property, environment, and the County's economy; and

WHEREAS, pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre-and post-disaster hazard mitigation programs; and

WHEREAS, a coalition of San Mateo County stakeholders with like planning objectives has been formed to pool resources and create consistent mitigation strategies to be implemented within each partners identified capabilities, within the San Mateo County Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating, and revising this strategy.

NOW, THEREFORE, BE IT RESOLVED THAT the City Council of the City of Half Moon Bay:

1) Adopts in its entirety, Volume I and the City of Half Moon Bay annex in Volume II of the San Mateo County Local Multijurisdictional Hazard Mitigation Plan.
2) Will use the adopted and approved portions of the Hazard Mitigation Plan to guide pre- and post-disaster mitigation of the hazards identified.
3) Will coordinate the strategies identified in the Hazard Mitigation Plan with other planning programs and mechanisms under its jurisdictional authority.
4) Will continue its support of the on-going countywide mitigation efforts and continue to participate in the Planning Partnership as described by the Hazard Mitigation Plan.
5) Will help to promote and support the mitigation successes of all Planning Partners.

****

I, the undersigned, hereby certify that the foregoing Resolution was duly passed and adopted on the 7th day of December 2021 by the City Council of Half Moon Bay by the following vote:

AYES, Councilmembers:

NOES, Councilmembers:
ABSENT, Councilmembers:
ABSTAIN, Councilmembers:

ATTEST:

_____
Jessica Blair, City Clerk

APPROVED:

_____
Robert Brownstone, Mayor

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: Lisa Lopez Rossi, Administrative Services Director

TITLE: **FIRST AMENDMENT TO THE PROFESSIONAL SERVICES AGREEMENT WITH HDL COMPANIES FOR BUSINESS LICENSE AND TRANSIENT OCCUPANCY TAX ADMINISTRATION AND COLLECTION**

RECOMMENDATION:
Adopt a resolution authorizing the City Manager to execute a First Amendment to the Professional Services Agreement with HdL Companies extending the term to August 30, 2022 and increasing the not-to-exceed annual amount to $60,000.

FISCAL IMPACT:
If approved, there is sufficient funding in the Administrative Services department FY 2020-21 Amended Budget to cover any charges through July 31, 2021. Any remaining funding needed will be included in the FY 2022-2023 Recommended Budget.

STRATEGIC ELEMENT:
This recommendation supports the Infrastructure and Environment, Healthy Communities and Public Safety, Fiscal Sustainability, and Inclusive Governance Elements of the Strategic Plan.

BACKGROUND:
HdL Companies has provided services to the City since September 2015 when the City made the decision to move business licenses to a third-party administrator. Initially hired to maintain and process business licenses, HdL was then tapped to assist with the collection and management of Transient Occupancy Tax (TOT). Under this contract, HdL would also handle collection of TOT from short-term rental operators.

Both business license and TOT contracts were each five-year terms ending in September 2020. These contracts have not been renewed in light of the pandemic and staffing constraints.

DISCUSSION:
Staff is recommending a two-year contract amendment, retroactive to September 8, 2020. Given the passage of time and expansion of scope, staff plans to evaluate options for delivery of services in the coming year. The two-year extension will provide adequate time to develop and circulate an RFP for specific services, including business license administration, transient occupancy tax and sales tax administration.

ATTACHMENTS:
1. Resolution
2. HdL Scope of Work – Business License
3. HdL Scope of Work – Transient Occupancy Tax

Resolution No. C-2021-____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HALF MOON BAY AUTHORIZING THE CITY MANAGER TO EXECUTE FIRST AMENDMENT TO THE PROFESSIONAL SERVICES AGREEMENT WITH HDL COMPANIES

WHEREAS, in 2015, the City of Half Moon Bay entered into an agreement with HDL Companies to provide business license and transient occupancy tax administration and collection for the City; and

WHEREAS, the Agreement had an original expiration date of August 7, 2020; and

WHEREAS, both contracts have not been renewed in light of the pandemic and staffing constraints; and

WHEREAS, the scope of work will continue to include business license and transient tax occupancy administration and collection.

NOW, THEREFORE, BE IT RESOLVED THAT the City Council of the City of Half Moon Bay hereby authorizes the City Manager to execute a first Amendment to the Professional Services Agreement for an annual amount of $60,000 through August 8, 2022 between HDL Companies and the City of Half Moon Bay.

****

I, the undersigned, hereby certify that the foregoing Resolution was duly passed and adopted on the 7th day of December, 2021 by the City Council of Half Moon Bay by the following vote:

AYES, Councilmembers:

NOES, Councilmembers:

ABSENT, Councilmembers:

ABSTAIN, Councilmembers:

ATTEST:

_____
Jessica Blair, City Clerk

APPROVED:

_____
Robert Brownstone, Mayor

SCOPE OF SERVICES

Consultant will provide the following Services relative to Client's business license tax administration.

1. **Operations Management Services**
   - 1.1. Establish and maintain database of Client businesses.
   - 1.2. Receive and process applications, renewals and payments in a timely fashion.
   - 1.3. Send renewal notices to active businesses within 30 days of the renewal period end date or at another interval specified by Client.
   - 1.4. Provide businesses multiple options for submitting applications, renewals, payments, or support requests (including via website, email, mail, phone, and fax. Consultant license specialists will be available for live interactions Monday through Friday, 8:00am to 5:00pm Pacific).
   - 1.5. Remit revenue to Client no less than monthly.
   - 1.6. Provide Client staff access to website portal offering business registry inquiry, reporting, and electronic department approval capabilities.
2. **Compliance Services:** 1) Identify and register businesses which are subject to licensure or taxation, 2) collect known debt as pertains to business license or tax, and 3) identify under-reported tax liability.
   - 2.1. **Discovery Services**
     - 2.1.1. Develop a list of businesses subject to Client licensure or taxation.
     - 2.1.2. Notify non-compliant businesses of their options to comply or dispute their non-compliant status. Notification and support to businesses will be facilitated through the website, mail, email, phone and fax.
     - 2.1.3. Review information and forms submitted by the business for completion and accuracy, inclusive of any additional required documentation (i.e. home occupation permit). All submissions are filed and stored electronically and made available to Client upon request.
     - 2.1.4. Provide businesses with detailed invoicing and options to pay via website, mail, and phone.
     - 2.1.5. Remit revenue to Client no less than monthly, along with all business applications and any additional documentation.
   - 2.2. **Collection Services**
     - 2.2.1. Identify businesses subject to Client licensure or taxation which have known debt to Client and have failed to pay within an appropriate time frame.
     - 2.2.2. Notify businesses of their options to comply or dispute their non-compliant status.
     - 2.2.3. Provide businesses with detailed invoicing and options to pay via website, mail and phone.
     - 2.2.4. Remit revenue to Client no less than monthly.
   - 2.3. **Audit Services**
     - 2.3.1. Identify potential under-reporting and/or misclassified businesses.
     - 2.3.2. Audit businesses mutually agreed to by Client and Consultant that are identified as potential under-reporting businesses.
     - 2.3.3. Submit audit summaries to Client and discuss further actions.
     - 2.3.4. Educate businesses on proper reporting practices.
     - 2.3.5. Invoice and collect identified delinquencies.

FEES

3. **Operations Management Services**
   - 3.1. Fees for performing operations management Services shall be $13.58 for each processed account, which is any account for which an application or renewal/return was processed, or active account which was sent a renewal notice.
   - 3.2. Fees will be increased as of January 1st of each calendar year with reference to the 12-month percent change in the most recently published annual Consumer Price Index for All Urban Consumers (CPI-

U), West Region, as reported by the U.S. Bureau of Labor Statistics (the "CPI Change"). Each annual increase in the Fees will be equal to the greater of two percent (2%) or the actual CPI Change and the lesser of ten percent (10%) or the actual CPI Change. For example, if the actual CPI Change is 1.5%, then the annual increase will be 2%, if the actual CPI Change is 3.5%, then the annual increase will be 3.5%, and if the actual CPI Change is 12%, then the annual increase will be 10%.

3.3. Fees related to travel and lodging expenses are billed at cost and apply to all meetings (including implementation, training, operations and support). Travel expenses only apply to out of scope travel and must therefore be pre-approved by Client.

3.4. Fees will be invoiced monthly to Client for Services performed during the prior month. Fees will be netted out of Client's monthly revenue disbursement. Client will submit payment for any balance due to Consultant within 30 days of receiving the invoice.

4. Compliance Services

4.1. Fees for performing compliance Services apply to all monies received for the current tax/license period and any other prior period collected (including monies received for taxes, penalties, interest, and fees).

4.1.1. Fees for performing discovery Services shall be a contingency Fee of 35% of the revenues received as a result of the Services.

4.1.2. In the event that Client discovers a non-compliant business and reports the business to Consultant (including a calculation of all taxes/fees due), Consultant will categorize the business as a collection service effort and thus apply the lower collection Services contingency Fee rate.

4.1.3. Fees for performing collection Services shall be a contingency Fee of 25% of the revenues received as a result of the Services.

4.1.4. Fees for performing audit Services shall be a contingency Fee of 35% of the revenues received as a result of the Services.

4.2. Consultant recognizes Client's authority to waive or reduce the tax/fee debt of a business. Should Client decide to do so for a business whose deficiency was identified by Consultant, Consultant shall be entitled to compensation in the amount of one half (1/2) of the Fees Consultant would have otherwise earned. Deficiencies which are uncollectable due to insolvency or dissolution of the business, or for deficiencies which are otherwise incapable of collection (i.e. statute of limitation or other legal defense) shall not be considered a Client voluntary election to waive, and thus, Consultant would not be entitled to compensation related thereto under this provision.

4.3. Fees related to travel and lodging expenses are billed at cost and applied to all meetings (including implementation, training, operations, and support). Travel expenses only apply to out of scope travel and must therefore be pre-approved by Client.

4.4. Fees will be invoiced monthly to Client for Services performed during the prior month. Fees will be netted out of Client's monthly revenue disbursement. Client will submit payment for any balance due to Consultant within 30 days of receiving the invoice.

SCOPE OF SERVICES

Consultant will provide the following Services relative to Client's transient occupancy tax administration.

1. Operations Management Services

1.1. Establish and maintain database of Client lodging providers.
1.2. Receive and process registrations, tax returns and payments in a timely fashion.
1.3. Provide lodging providers multiple options for submitting registrations, tax returns, payments, or support requests (including via website, email, mail, phone, and fax. Consultant tax specialists will be available for live interactions Monday through Friday, 8:00am to 5:00pm Pacific).
1.4. Remit revenue to Client no less than monthly.
1.5. Provide Client staff access to website portal offering lodging provider registry inquiry and reporting capabilities.
1.6. Endeavor to ensure accurate filings of returns by consistently monitoring returns, providing compliance audits, and educating lodging providers as mutually agreed to by Client and Consultant.
1.7. Provide analysis reports monthly and annually provide revenue trends and key insights on Client lodging providers.

FEES

2. Operations Management Services

2.1. Fees for performing operations management Services shall be $564.64 per year for each monthly filing property.
2.2. Fees will be increased as of January 1st of each calendar year with reference to the 12-month percent change in the most recently published annual Consumer Price Index for All Urban Consumers (CPI-U), West Region, as reported by the U.S. Bureau of Labor Statistics (the "CPI Change"). Each annual increase in the Fees will be equal to the greater of two percent (2%) or the actual CPI Change and the lesser of ten percent (10%) or the actual CPI Change. For example, if the actual CPI Change is 1.5%, then the annual increase will be 2%, if the actual CPI Change is 3.5%, then the annual increase will be 3.5%, and if the actual CPI Change is 12%, then the annual increase will be 10%.
2.3. Fees related to travel and lodging expenses are billed at cost and apply to all meetings (including implementation, training, operations and support).
2.4. Fees will be invoiced monthly to Client for Services performed during the prior month. Fees will be netted out of Client's monthly revenue disbursement. Client will submit payment for any balance due to Consultant within 30 days of receiving the invoice.

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: John Doughty, Public Works Director
Maz Bozorginia, City Engineer
Denice Hutten, Associate Civil Engineer

TITLE: **FINAL ACCEPTANCE OF THE OCEAN COLONY FORCE MAIN AND PUMP STATION PROJECT (CIP NO. 9025)**

RECOMMENDATION:
By resolution, authorize the City Manager or his designee to file a Notice of Completion for the Ocean Colony Force Main and Pump Station Project (Project) and release the Project Retention Funds and Project Performance Bond and Labor and Materials Bond thirty (30) days after recordation of the Notice of Completion.

FISCAL IMPACT:
The City Council approved contract award was $2,092,075 with an additional $313,841 in contingency funding. The total cost of the Project was $2,202,558.71. The total cost was less than total budgeted and there are sufficient funds in the Capital Budget under CIP Project No. 9025 to cover the cost of the project.

STRATEGIC ELEMENT:
This action supports the Infrastructure and Environment, Healthy Communities and Public Safety Elements of the adopted Strategic Plan.

BACKGROUND:
On May 19, 2020, by Resolution C-2020-27, the City Council awarded a construction contract to Rangerpipelines Inc. of San Francisco, California, in the amount of $2,092,075 for the Ocean Colony Force Main and Pump Station Project.

The Project consisted of removing and replacing existing pump station equipment including pumps, piping, valves, electrical equipment and emergency generator, making modifications to the existing wetwell, installing redundant level controllers, adding a pump bypass connection, constructing new manholes, installing approximately 2,500 feet of new sanitary force main,

abandoning the existing sanitary sewer force main, installing a new air relief valve and other incidentals for a complete and usable facility.

The Contractor has completed the work to the satisfaction of the City Engineer and has provided a one-year warranty bond for the work. Total cost of construction was $2,202,558.71.

DISCUSSION:
This project is complete. The one-year warranty bond is adequate to ensure the work products perform as expected.

Staff recommends City Council authorize the City Manager or his designee to file a Notice of Completion and release the Project Retention Funds and the Performance and Labor and Materials Bonds thirty (30) days after recordation of the Notice of Completion.

ATTACHMENT:
Resolution approving final acceptance of the Ocean Colony Force Main and Pump Station Project.

Resolution No. C-2021-____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HALF MOON BAY AUTHORIZING THE CITY MANAGER OR HIS DESIGNEE TO FILE A NOTICE OF COMPLETION FOR THE OCEAN COLONY FORCE MAIN AND PUMP STATION PROJECT (PROJECT), AND RELEASE THE PROJECT RETENTION FUNDS AND PROJECT PERFORMANCE AND LABOR AND MATERIALS BONDS THIRTY (30) DAYS AFTER RECORDATION OF THE NOTICE OF COMPLETION

WHEREAS, on May 19, 2020 the City Council adopted Resolution C-2020-27 to award a construction contract for CIP No. 9025, the "Ocean Colony Force Main and Pump Station Project" (Project) to Rangerpipelines Inc., in the amount of $2,092,075; and

WHEREAS, Resolution C-2020-27 also authorized contingency funding in the amount of 15% ($313,841.25) of the contract award for the Project; and

WHEREAS, the Contractor has completed all improvements in compliance with the contract documents for a total amount of $2,202,558.71; and

WHEREAS, the Contractor has provided a one-year maintenance bond for the work executed under the construction contract.

NOW, THEREFORE, BE IT RESOLVED THAT the City Council of the City of Half Moon Bay hereby authorizes the City Manager or his designee to accept the Ocean Colony Force Main and Pump Station Project as complete and file a Notice of Completion, and also authorizes staff to release the Project retention funds and the Performance and Labor and Material Bonds thirty (30) days after recordation of the Notice of Completion.

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BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: John Doughty, Public Works Director
Maziar Bozorginia, City Engineer
Jonathan Woo, Assistant Engineer

TITLE: **ACKNOWLEDGING COMPLETION OF THE SANITARY SEWER IMPROVEMENTS AND ACCEPTANCE FOR THE CITY'S OWNERSHIP AND THE RESPONSIBILITY TO MAINTAIN THE SANITARY SEWER MAIN CONSTRUCTED WITHIN THE PUBLIC EASEMENT IN THE CARNOUSTIE PHASE 4 SUBDIVISION**

RECOMMENDATION:
Ackowledge the completion of sanitary sewer improvements required by the Subdivision Improvement Agreement dated September 17, 2019, and by resolution, accept for the City's ownership and the responsibility to maintain the sanitary sewer main constructed within the public easement in the Carnoustie Phase 4 Subdivision, subject to one-year warranty period and release of securities for the faithful performance bond and labor and materials bond.

FISCAL IMPACT:
The sanitary sewer main on Carnoustie Court will become part of the City's public sewer collection system upon acceptance by the City Council. All properties connected to the City's sewer system pay for its ongoing maintenance through annual sewer user fees.

STRATEGIC ELEMENT:
This action supports the Infrastructure and Environment, Healthy Communities and Public Safety Element of the Strategic Plan.

BACKGROUND:
On September 17, 2019, the City Council approved a Subdivision Improvement Agreement with Carnoustie, LLC, a California limited liability company. The agreement was for Carnoustie LLC to construct a sanitary sewer system for the new subdivision.

The sanitary sewer system has recently been completed by Carnoustie LLC. per the approved improvement plans and is now ready for acceptance and ownership by the City in accordance with the agreement. The subdivider's securities for the faithful performance and labor and

materials bonds will be released upon the City's receipt of a Warranty Bond in the amount of $24,500 from the subdivider, which represents 25% of the value of the improvements, in accordance with the agreement.

DISCUSSION:

The sanitary sewer system improvements for Phase 4 of the Carnoustie Subdivision were inspected, tested, and completed to the satisfaction of the City Engineer, and acceptance is ready to be granted to the subdivider. After acceptance is granted, the subdivider and the City will enter into a one-year bonded warranty period in which the subdivider will guarantee or warranty the improvements against any defective work or labor done or defective materials furnished.

ATTACHMENTS:

1. Resolution accepting sewer main for Carnoustie 4

Resolution No. C-2021-____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HALF MOON BAY ACKNOWLEDGING COMPLETION OF THE SANITARY SEWER IMPROVEMENTS AND ACCEPTING INTO THE CITY'S OWNERSHIP AND THE RESPONSIBILITY MAINTAINENCE OF THE SANITARY SEWER MAIN CONSTRUCTED WITHIN THE PUBLIC EASEMENT IN THE CARNOUSTIE PHASE 4 SUBDIVISION

WHEREAS, the Improvement Plans for Phase 4 of the Carnoustie Subdivision of Half Moon Bay were approved by the City Engineer on September 17, 2019, under and pursuant to the provisions of the Subdivision development Agreement ("agreement") between the City of Half Moon Bay and Carnoustie, LLC. ("subdivider"); and,

WHEREAS, the Subdivision Improvement Agreement required Carnoustie LLC to construct Sanitary Sewer Improvements within the public easement in the Carnoustie Phase 4 Subdivision; and,

WHEREAS, Carnoustie, LLC., executed and posted securities conditioned upon the faithful performance and labor and materials provisions of the agreement; and,

WHEREAS, the Sanitary Sewer Improvements for Phase 4 of the Carnoustie Subdivision project have been inspected, tested, and completed; and,

WHEREAS, the agreement provides that the security shall extend for a period of one-year after the date of acceptance of the Sanitary Sewer Improvements to cover the warranty period of said improvements under the agreement.

WHEREAS, the City Council is willing to release the securities for the faithful performance and labor and materials upon receipt of a warranty bond; and,

WHEREAS, the City Engineer has made a final inspection of the Public Improvements for Phase 4 of the Carnoustie Subdivision project and recommends that the City Council accept the Sanitary Sewer Improvements as constructed in accordance with the approved plans and specifications.

NOW, THEREFORE, BE IT RESOLVED THAT the City Council of the City of Half Moon Bay hereby finds, determines, and resolves as follows:

1. The City Council has considered the full record before it, which may include but is not limited to such things as the staff report, testimony by staff and the public, and other materials and evidence submitted or provided to it. Furthermore, the recitals set forth above are found to be true and correct and are incorporated herein by reference.

2. Those certain Sanitary Sewer Improvements installed by Phase 4 of the Carnoustie Subdivision Project, are hereby accepted as constructed in accordance with the approved plans and specifications upon recommendation of the City Engineer.
3. The penal sum of that certain Security furnished by the above-named subdivider in connection with the agreement may be released by the City upon receipt of a warranty bond from the subdivider in the amount of $24,500. Said warranty bond shall apply form the date of completion and acceptance of said improvements and to extend for the balance of the term of one-year of said security. Provided however, that nothing herein contained shall in any way be deemed to be a waiver, release or relinquish by City any obligations imposed upon the subdivider or his/its surety, or sureties, by law or by the agreement, save and except as expressly set forth herein.

****

I, the undersigned, hereby certify that the foregoing Resolution was duly passed and adopted on the 7th day of December 2021 by the City Council of Half Moon Bay by the following vote:

AYES, Councilmembers:

NOES, Councilmembers:

ABSENT, Councilmembers:

ABSTAIN, Councilmembers:

ATTEST:

_____
Jessica Blair, City Clerk

APPROVED:

_____
Robert Brownstone, Mayor

MASTER UTILITY PLAN
CARNOUSTIE PHASE 4
BAY HILL ROAD
HALF MOON BAY, CA 94019

SEE SHEET C-0 FOR LEGEND AND SHEET C-1 FOR NOTES

GRAPHIC SCALE 0 20 40

CALL BEFORE YOU DIG 811 USA UNDERGROUND SERVICE ALERT

Date:	06/19/2019
Scale:	1" = 20'
Design:	AJP
Check:	TRL
Drawing Number:	C-2.1
PEC Job No.	PEC 19-011

SIGNED ON: 8/27/19

REGISTERED PROFESSIONAL ENGINEER TRAVIS R. LUTZ 73638 CIVIL STATE OF CALIFORNIA

REVISIONS:
1 CITY COMMENTS 08/27/2019

PRECISION ENGINEERING AND CONSTRUCTION, INC.
901 Waltermire Street
Belmont, CA 94002
T: 650.226.8640
F: 650.226.8655
Travis@PrecisionEC.com

DRAWING NAME: G:\Drive-d-drive\PEC Projects F-I\en\2019\PEC 19-011 - Bay Hill Road, Half Moon Bay\PEC 19-011 - Bay Hill Road, Half Moon Bay\PEC 19-011 SHEETS.dwg
PLOTTED BY: AP
PLOTTED ON: 8/27/2019

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: John Doughty, Public Works Director
Maz Bozorginia, City Engineer

TITLE: **HIGHWAY 1 SAFETY AND OPERATIONAL IMPROVEMENTS SOUTH PROJECT (CIP NO. 523)**

RECOMMENDATION:

Adopt a resolution:

1) Authorizing the City Manager to amend the professional services agreement with Peninsula Municipal Engineering, Inc. for continuation of construction management services increasing the contract by $88,464 for a total not to exceed amount of $273,584;
2) Increasing the construction contingency for the Highway 1 South Project (No. 523) by $50,000; and
3) Transferring $138,464 from the Pavement Management and Traffic Safety Program (No. 0514) to the Highway 1 Safety - South Project (No. 0523).

FISCAL IMPACT:

There is currently $990,000 budgeted in the Pavement Management and Traffic Safety Program (No. 0514). The installation of Class IV bike lanes on Main Street from Highway 1 to Stone Pine Road originally included in the scope of the Pavement Management and Traffic Safety Program (No. 0514) is no longer viable due to lack of adequate roadway width, allowing the funding originally allocated for this project to be reallocated to the Highway 1 South Project (No. 523) to complete the project.

STRATEGIC ELEMENT:

This action supports the Infrastructure and Environment and Inclusive Governance elements of the Strategic Plan.

BACKGROUND:

The Highway 1 South project included improvements for a new signalized intersection at South Main Street/Higgins Canyon Rd and Highway 1, which provides protected turns for automobiles as well as a safe crossing for pedestrian and bicyclists across Highway 1 where the current

closest signalized crossings are 0.5 mile to the north and 1.0 mile to the south. Landscaped highway medians and adjustments in turning lanes improve safety and aesthetics for this section of Highway 1. Two curved concrete entry structures serve as a gateway feature welcoming visitors and residents to the historic downtown and the City of Half Moon Bay.

On July 21, 2020, the City Council executed an agreement with the San Mateo County Transportation Authority (SMCTA) for a total of $3,640,000 towards the construction of the project. SMCTA had previously contributed $300,000 for the design phase of the project. The City Council awarded the construction contract to Redgwick Construction, Inc. in the amount of $3,586,000, approved a construction contingency in an amount not exceeding $185,000 and executed professional services agreements with Peninsula Municipal Engineers, Inc. for construction management services in the amount of $185,120.

On September 28, 2020, the notice to proceed was issued for Redgwick Construction to start work. The construction was expected to last for approximately 12 months and the ribbon cutting was held approximately 12-months from initiating construction. There were numerous challenges to meet the timeline and address public safety. Notably, the initial Caltrans permitted detour plans (which required Main Street to remain open) led to two small accidents and numerous “close-calls”. Throughout the initial two months, the City’s contract project manager worked with Caltrans, the designer and contractor to substantially modify the detour plan, implement and fine-tune. The City ultimately acquires a new Changeable Message Sign (CMS) to place at the south entry to the project to assist in alerting highway users of construction. Additionally, this project was being built during Covid pandemic conditions. The contractor experienced longer than anticipated lead times for delivery of the signal equipment by the supplier and Caltrans ran out of signal control cabinets. The City’s contract project manager worked closely with the contractor and Caltrans to expedite the delivery of all equipment to ensure timely re-opening of South Main Street and the new signal.

The project included undergrounding of PG&E and Comcast facilities across Highway 1 and in the immediate vicinity of the project. In the process, PG&E relocated its underground vault to a location which directly conflicted with the project, notably the southerly sign. The City’s contract project manager worked closely with PG&E over several months to secure the relocation of the PG&E vault at their expense in order that the project could proceed.

The construction team was able to complete the construction in approximately 12 months with a ribbon cutting celebration on October 13, 2021.

DISCUSSION:

The Highway 1 South project was successfully opened to traffic in October 2021. However, there are several activities that are required for project acceptance by Caltrans (since Caltrans will operate and maintain this new Highway intersection) as well as completion/closeout of construction contract and City cost reimbursement by SMCTA.

Following substantial completion of the construction and roadway opening to traffic in October 2021, Caltrans met with the City for a site safety inspection and has provided a list of 14 items to be completed. These items are currently being coordinated with the contractor for implementation. Some of these items such as providing handrails for the pedestrian ramps (not originally included in approved plans) will require the use of the construction contingency. In addition to Caltrans' required items, the City has several Punchlist items to be completed by the contractor prior to final acceptance of the construction contract and release of retention.

One of the outstanding City items includes repair of roadway damage on Seymour Street (adjacent to Ford Dealership). This repair was not originally anticipated to be needed given the original Caltrans detour plan. However, Seymour Street was used as the detour route during the temporary closure of S. Main Street at Highway 1 when the detour plan was changed. The asphalt pavement on Seymour Street east of Highway 1 has been severely damaged due to heavy use of trucks and buses during the construction detour period. The City has received a proposal from the Redgwick Construction in the amount of $30,000 for the repair of this pavement. The City has also obtained a second proposal from Half Moon Bay Paving and Grading in the amount of $36,850 for this work. Staff is proposing to accept the Redgwick Construction proposal due to a lower cost and since Redgwick Construction already has the required Caltrans encroachment permit for improvements in this area of Highway 1. Securing a Caltrans permit for a new contractor to work in this area may take up to 6 months.

There is currently a remaining balance of $49,500,000 available from the original $185,000 approved construction contingency (5% of the construction cost). The requested additional $50,000 in construction contingency would provide for implementation of all Caltrans required safety features (such as handrails on the pedestrian ramps and additional stripping) as well as replacement of asphalt payment on a portion of Seymour Avenue adjacent to Ford Dealership.

The initial contract project management funding was agreed upon prior to initiation of the work. As noted previously, this project required significant unanticipated work by the project manager in light of the Caltrans insistence on retaining South Main Street access during construction, working to address pandemic related material issues and managing the undergrounding project (including holding PG&E accountable for a major construction error). The proposed amendment for the construction management services agreement will include funding for services provided since mid-August and provide the needed support for the remaining work including the additional Caltrans improvements, implement additional City improvements including repaving the Seymour Street/Highway 1 intersection, submit SMCTA status reports to obtain reimbursements, obtain Caltrans final approval and record the construction completion notice/close-out the contract and release retention by summer 2022. This work will also include providing status reports and reimbursement requests to SMCTA for obtaining the reimbursement balance of $870,540 from the total SMCTA share of $3,640,000 for construction costs.

CONCLUSION:

Approval of the professional services agreement amendment and increase in contingency budget will provide the project with the required funding to support closeout of the project ensuring Caltrans acceptance and final SMCTA reimbursements.

ATTACHMENTS:

1. Resolution

Resolution No. C-2021-____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HALF MOON BAY AUTHORIZING THE CITY MANAGER TO AMEND THE PROFESSIONAL SERVICES AGREEMENT FOR CONSTRUCTION MANAGEMENT SUPPORT SERVICES WITH PENINSULA MUNICIPAL ENGINEERING, INC. FOR AN ADDITIONAL AMOUNT OF $88,464 AND INCREASE CONSTRUCTIION CONTINGENCY BY $50,000 TO COMPLETE REMAINING PUNCHLIST ITEMS AND SEYMOUR STREET REPAIR AS PART OF THE HIGHWAY 1 SOUTH PROJECT (CIP NO. 523)

WHEREAS, the San Mateo County Transportation Authority has awarded the City $3.94 million (for design, right-of-way, and construction) for the Highway 1 Safety Operational Improvements -South (CIP Project No. 523); and

WHEREAS, the Highway 1 South project includes improvements for a new signalized intersection at South Main Street/Higgins Canyon Rd and Highway 1 to provide protected turns for automobiles as well as a safe crossing for pedestrian/bicyclists across Highway 1 where the current closest signalized crossings are 0.5 mile to the north and 1.0 mile to the south; and

WHEREAS, on November 28, 2018, the Planning Commission adopted the Mitigated Negative Declaration and approved the Coastal Development Permit for the project including the gateway/entrance elements.

WHEREAS, on July 21, 2020, the City awarded the construction contract to Redgwick Construction and executed a professional services agreement with Peninsula Municipal Engineers, Inc. in the amount of $185,120 for construction management services for the project; and

WHEREAS, the construction is now substantially complete and opened to traffic in October 2021; and

WHEREAS, the project experienced unexpected challenges as a result of re-designing the detour plan; Covid pandemic related delays and relocation of a PG&E high voltage vault which required additional project management and, with the detour, significant and unexpected additional project costs; and

WHEREAS, due to additional Caltrans requirements and field conditions including repaving the detour routes and implementing Caltrans safety features as well as obtaining final reimbursements from San Mateo County Transportation Authority, additional contingency funding is needed to complete remaining Punchlist items as well as to support the closeout process; and

NOW, THEREFORE, BE IT RESOLVED the City Council of the City of Half Moon Bay hereby:

1) Authorizing the City Manager to amend the professional services agreement with Peninsula Municipal Engineering, Inc. for continuation of construction management services increasing the contract by $88,464 for a total not to exceed amount of $273,584;

2) Increasing the construction contingency for the Highway 1 South Project (No. 523) by $50,000; and

3) Transferring $138,464 from the Pavement Management and Traffic Safety Program (No. 0514) to the Highway 1 Safety - South Project (No. 0523).

****

I, the undersigned, hereby certify that the foregoing Resolution was duly passed and adopted on the 7th day of December 2021 by the City Council of Half Moon Bay by the following vote:

AYES, Councilmembers:

NOES, Councilmembers:

ABSENT, Councilmembers:

ABSTAIN, Councilmembers:

ATTEST:

_____
Jessica Blair, City Clerk

APPROVED:

_____
Robert Brownstone, Mayor

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: John Doughty, Public Works Director
Jennifer Chong, Public Works Program Manager

TITLE: **MANDATORY ORGANICS WASTE DISPOSAL REDUCTION ORDINANCE AND SOLID WASTE CODE UPDATE**

RECOMMENDATION:
Conduct a public hearing, waive first reading, and introduce an ordinance:

a. Confirming without re-enacting previous repeal of Chapter 7.20 entitled "Garbage and Rubbish Disposal" in its entirety effective July 1, 2011;
b. Repealing existing Chapter 7.21 entitled "Mandatory Solid Waste Collection Service";
c. Adopting a new Chapter 7.20 entitled "Solid Waste Collection, Recycling and Disposal"; and
d. Adopting a new Chapter 7.21 entitled, "Edible Food Recovery."

FISCAL IMPACT:
There is no direct nor immediate fiscal impact associated with adopting this ordinance. Initial costs related to implementation will be absorbed by the existing solid waste rate structure and Public Works operating budget. Staff anticipates returning to the City Council to consider amendments to the Solid Waste Franchise Agreement and/or to adjust the maximum service recipient rates to address the unfunded State mandates of SB 1383.

STRATEGIC ELEMENT:
This action supports the Infrastructure and Environment and Healthy Communities and Public Safety Element of the Strategic Plan.

BACKGROUND:
California established itself as a leader in the fight against climate change by passing several laws focused on reducing the amount of waste and greenhouse gas (GHG) emissions generated in the State. Many of the laws lay requirements on local jurisdictions to ensure waste generators under their authority reduce and recycle waste as much as possible to reduce use of

landfill space. These laws generally require local jurisdictions to pass ordinances and/or other regulations establishing local enforceability of State law.

There are four primary laws that have been passed in California regulating the collection, recycling, and disposal of solid waste in the State.

- **Assembly Bill 939 (AB 939),** the Integrated Waste Management Act of 1989, established requirements for cities and counties to reduce, reuse, and recycle (including composting) solid waste generated in their jurisdictions to the maximum extent feasible before any incineration or landfill disposal of waste, to conserve water, energy, and other natural resources, and to protect the environment. AB 939 requires that by and after January 1, 2000, fifty percent (50%) of the solid waste generated must be diverted through source reduction, recycling, and composting activities.

- **Assembly Bill 341 (AB 341),** the Mandatory Commercial Recycling law, requires businesses and multi-family generators that generate a specified threshold ~~(~~amount~~)~~ of solid waste to arrange for recycling services and requires jurisdictions to implement a mandatory commercial recycling program.

- **Assembly Bill 1826 (AB 1826)**, the Mandatory Organic Recycling law, requires businesses and multi-family uses that generate a specified threshold ~~(~~amount~~)~~ of solid waste, non-organic recyclables, and organic waste per week to arrange for recycling services for those materials. It also requires jurisdictions to implement a recycling program to divert organic waste from businesses subject to the law and requires jurisdictions to implement a mandatory commercial organic waste recycling program.

- **Senate Bill 1383 (SB 1383)** is the most recent legislation. This legislation, the Short-lived Climate Pollutants: Organic Waste Reductions act of 2016, sets Statewide organic waste disposal reduction targets of fifty percent (50%) by 2020 and seventy-five percent (75%) by 2025, based on the 2014 organics waste disposal baseline. SB 1383's implementing regulations place requirements on multiple entities including jurisdictions, residential households, commercial businesses and business owners, commercial edible food generators, haulers, self-haulers, food recovery organizations, and food recovery services to support achievement of statewide organic waste disposal reduction targets. SB 1383 also requires jurisdictions to have an ordinance or other enforceable mechanism in place by January 1, 2022.

The mandates from AB 939, AB 341, and AB 1826 were incorporated into the City's existing Chapter 7.21, "Mandatory Solid Waste Collection Service". However, this chapter does not reflect all of the new mandates of SB 1383. Given the significance of the updates required for SB 1383, this is an opportune time to modernize the ordinance given the significant changes in the industry since it was adopted in 2011.

The City Council received a presentation on the goals and mandates of SB 1383 at the October 19, 2021 meeting (see Attachment 2) and directed staff to return with an ordinance that would bring the City into compliance with State law at the December 7, 2021 meeting. The proposed ordinance will bring the City into compliance with SB 1383 while streamlining and modernizing existing City code.

DISCUSSION:
The City's existing Municipal Code includes two chapters that address solid waste accumulation and disposal. Chapter 7.20, "Garbage and Rubbish Disposal," was repealed as of July 1, 2011. Chapter 7.21, "Mandatory Solid Waste Collection Service," reflects mandates from AB 939, AB 341, and AB 1826, but is not compliant with all of the incoming mandates of SB 1383.

While updating the Municipal Code to include the mandates of SB 1383 is the driving factor behind the proposed ordinance, staff also wants to modernize the existing Municipal Code to make it more comprehensive and user-friendly. This includes removing the existing, inactive Chapter 7.20, "Garbage and Rubbish Disposal" and integrating the existing Chapter 7.21, "Mandatory Solid Waste Collection Service" into a new Chapter 7.20, entitled "Solid Waste Collection, Recycling, and Disposal," that covers the collection, recycling, and disposal requirements of all current solid waste legislation. The proposed new Chapter 7.20, "Solid Waste Collection, Recycling, and Disposal," is a combination of the language from the existing municipal code and the draft ordinance language provided by the State.

The proposed new Chapter 7.21, "Edible Food Recovery," covers the new edible food recovery requirements introduced by SB 1383 and uses language provided by the County of San Mateo Office of Sustainability (OOS), with whom the City has a Memorandum of Understanding to implement the edible food program on the City's behalf.

The chart below summarizes the sections of the proposed Chapter 7.20 and Chapter 7.21 that are new and details how these sections fulfill the new mandates imposed by SB 1383.

New Chapter 7.20, "Solid Waste Collection, Recycling, and Disposal"

Proposed Section	Proposed Title	Additional Details
7.20.060	Additional Requirements for Commercial Businesses Generators	SB 1383 requires commercial businesses to provide sufficient collection containers with proper colors and/or labeling for source separation of materials. It also requires commercial businesses to provide education and training to staff and/or tenants to reduce contamination.
7.20.090	Waivers for Commercial	SB 1383 allows jurisdictions to provide waivers

	Business Generators	for commercial businesses that either produce a de minimis amount of waste (either Non-Organic Recyclable Materials or Organic Waste) or do not have the physical space to accommodate all three streams.
7.20.100	Self-Hauler Exemption	SB 1383 also allows generators to apply for a self-hauler exemption if they can prove to the City that they have the means to properly recycle and/or dispose of their solid waste.
7.20.110	Franchise to Collect Solid Waste, Recyclables, and Organic Waste	The right to grant a franchise for the collection of solid waste was implied in the existing Chapter 7.21, "Mandatory Solid Waste Collection Service," but this proposed section explicitly defines the City's Council right to award a franchise and provides details as to what that right entails.
7.20.120	Inspections and Investigations	SB 1383 includes expectations that the City will monitor generators under its authority for compliance with the new mandates. The City's Title 4, "Code Enforcement" fulfills these requirements, but highlighting the City's inspection program in this chapter will assist with SB 1383 reporting requirements as well as reaffirm to the State that the City will be inspecting and investigating generators that fall under SB 1383.
7.20.130	Enforcement	Similar to the new Section 7.20.120, this section reinforces the City's commitment to enforcing the mandates of SB 1383 and will assist with SB 1383 reporting requirements. It also provides a timeline for enforcement of these mandates, which does not begin until January 1, 2024.

New Chapter 7.21, "Edible Food Recovery"

It is important to note that the language included in this chapter was provided by OOS and that it must be adopted as written as a condition of OOS implementing the edible food recovery requirement of SB 1383 on the City's behalf.

Proposed Section	Proposed Title	Additional Details
7.21.020	Requirements for Tier One and Tier Two Commercial Edible Food Generators	SB 1383 requires commercial generators that meet certain criteria to arrange for edible food to be recovered for human consumption instead of disposed. Commercial generators must also keep

		records detailing the organizations they contract with to recover edible food, the amount of edible food recovered from each organization, the process by which the food was recovered, and more.
7.21.030	Requirements for Food Recovery Organizations and Services.	Similar to commercial generators, SB 1383 outlines reporting requirements for food recovery organizations that include tracking their contracts, quantities of edible food recovered and distributed, greenhouse gas emissions recovered, and more.
7.21.040	Inspections and Investigations	SB 1383 includes expectations that the City will monitor generators under its authority for compliance with the new mandates. The City's Title 4, "Code Enforcement" covers these expectations, but this section was included in this chapter at the request of OOS to explicitly give OOS the authority to perform inspections and investigations on behalf of the City.
7.21.050	Enforcement	Similar to Section 7.21.040, this section was included to reinforce the City's commitment to enforcing the mandates of SB 1383. It also details the process and penalties established by OOS for enforcement related to the edible food recovery program.

The charts above are provided as a high-level overview of the proposed changes to the Municipal Code. A comprehensive summary of this ordinance will be provided as part of the presentation at the December 7, 2021 City Council meeting and the full text of the proposed ordinance is attached.

ATTACHMENT:

1. Draft Ordinance
2. Senate Bill 1383 (Mandatory Organics Waste Disposal Reduction) Staff Report – October 19, 2021

ORDINANCE NO. C-2021-____

ORDINANCE AMENDING THE HALF MOON BAY MUNICIPAL CODE TO REPEAL AND REPLACE CHAPTERS 7.20 AND 7.21 WITH A NEW CHAPTER 7.20 ENTITLED "SOLID WASTE COLLECTION, RECYCLING AND DISPOSAL" AND A NEW CHAPTER 7.21 ENTITLED "EDIBLE FOOD RECOVERY"

Section 1. Findings: The City Council finds and declares as follows:

A. Assembly Bill 939, the California Integrated Waste Management Act (Sher, Chapter 1095, Statutes of 1989, as amended) ("AB 939"), requires cities and counties to reduce, reuse, and recycle (including composting) solid waste generated in their jurisdictions to the maximum extent feasible before any incineration or landfill disposal of waste, to conserve water, energy, and other natural resources, and to protect the environment. AB 939 requires that by and after January 1, 2000, fifty percent (50%) of the solid waste generated must be diverted through source reduction, recycling, and composting activities.

B. Assembly Bill 341, the California Mandatory Commercial Recycling law (Chesbro, Chapter 476, Statutes of 2011) ("AB 341"), places requirements on businesses and multi-family generators that generate a specified threshold amount of solid waste to arrange for recycling services and requires jurisdictions to implement a mandatory commercial recycling program.

C. Assembly Bill 1826, the California Mandatory Commercial Organics Recycling law (Chesbro, Chapter 727, Statutes of 2014) ("AB 1826"), requires businesses and multi-family generators that generate a specified threshold amount of solid waste, non-organic recyclables, and organic waste per week to arrange for recycling services for those materials, requires jurisdictions to implement a recycling program to divert organic waste from businesses subject to the law, and requires jurisdictions to implement a mandatory commercial organic waste recycling program.

D. Senate Bill 1383, the Short-Lived Climate Pollutant Reduction Act of 2016 (Lara, Chapter 395, Statutes of 2016) ("SB 1383"), sets statewide organic waste disposal reduction targets of fifty percent (50%) by 2020 and seventy-five percent (75%) by 2025, based on the 2014 organics waste disposal baseline. SB 1383's implementing regulations place requirements on multiple entities including jurisdictions, residential households, commercial businesses and business owners, commercial edible food generators, haulers, self-haulers, food recovery organizations, and food recovery services to support achievement of statewide organic waste disposal reduction targets. SB 1383's implementing regulations require jurisdictions to adopt and enforce an ordinance or other enforceable mechanism to implement relevant provisions of SB 1383's implementing regulations.

E. The City has entered into a Franchise Agreement for the collection and disposition of Solid Waste with Franchisee, which provides a primary framework and mechanism for the City's compliance with the requirements of SB 1383.

F. The City has coordinated with the County of San Mateo and other jurisdictions in the county to develop uniform provisions for the portions of this chapter and Chapter 7.21 addressing Edible Food Recovery. The City has determined that this coordination will simplify compliance for Businesses, promote food recovery in the city, and facilitate Edible Food Recovery capacity planning.

G. The City has determined that, in order to meet the goals and requirements of AB 939, AB 341, AB 1826, SB 1383 and its implementing regulations, and related laws, the appropriate approach is to enact this ordinance. The purpose of this ordinance is to reduce the amount of Solid Waste deposited in landfills to preserve landfill space and postpone the need for new landfill capacity

for the longest term possible. This ordinance will also help reduce food insecurity by requiring Commercial Edible Food Generators to arrange to have the maximum amount of their Edible Food, that would otherwise be disposed, be recovered for human consumption.

H. Pursuant to Ordinance C-1-11 (adopted January 18, 2011), the City Council previously repealed Chapter 7.20 of this Code effective July 1, 2011. The City confirms without re-enacting that prior repeal.

I. Requirements in this ordinance are intended to be consistent with federal, state, and City law, and other adopted laws, goals and policies of the City.

Section 2. Amendments. The following sections of the Municipal Code are amended as specified below.

Municipal Code Provision	**Action**
Chapter 7.20	Confirm without re-enacting previous repeal of chapter entitled "Garbage and Rubbish Disposal" in its entirety effective July 1, 2011.
Chapter 7.21	Repeal existing chapter entitled "Mandatory Solid Waste Collection Service" in its entirety.
Chapter 7.20 (NEW)	Adopt new chapter entitled, "Solid Waste Collection, Recycling and Disposal" as shown in Attachment A.
Chapter 7.21 (NEW)	Adopt new chapter entitled, "Edible Food Recovery" as shown in Attachment A.

Section 3. Severability. If any section, sentence, clause or phrase of this ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this ordinance. The City Council herby declares that it would have passed this ordinance and adopted this ordinance and each section, sentence, clause or phrase thereof, irrespective of the fact that any one or more section, subsections, sentences, clauses or phrases be declared invalid or unconstitutional.

Section 4. CEQA. This ordinance is not a project under the requirements of the California Environmental Quality Act of 1970, together with related State CEQA Guidelines (collectively, "CEQA") because it has no potential for resulting in physical change in the environment, either directly or ultimately. In the event that this ordinance is found to be a project under CEQA, it is subject to the CEQA exemption contained in CEQA Guidelines Section 15061(b)(3) and 15308 because it can be seen with certainty to have no possibility of a significant effect on the environment and the ordinance is an action taken by a regulatory agency for the protection of the environment. CEQA applies only to projects which have the potential of causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. In this circumstance, the amendments to the City code would have no or only a de minimis impact on the environment. The foregoing determination is made by the City Council in its independent judgment.

Section 5. Publication. The City Clerk shall publish a summary of this ordinance in a newspaper of general circulation for the City of Half Moon Bay within fifteen (15) days after its adoption.

Section 6. Effective date. This ordinance shall take effect thirty (30) days after adoption, with the exception of Section 7.21.030 (G) as shown in Attachment A, which shall be effective commencing on January 1, 2023.

INTRODUCED at a regular meeting of the City Council of the City of Half Moon Bay, California, held on the 7th of December 2021.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Half Moon Bay, California, held on the 21st day of December 2021, by the following vote:

Ayes, Councilmembers:
Noes, Councilmembers:
Absent, Councilmembers:
Abstain, Councilmembers:

ATTACHMENT A

SECTION 1. ADOPTION OF NEW CHAPTER 7.20 ENTITLED "SOLID WASTE COLLECTION, RECYCLING AND DISPOSAL", REPLACING PREVIOUSLY REPEALED CHAPTER 7.20 ENTITLED "GARBAGE AND RUBBISH DISPOSAL" IN ITS ENTIRETY

7.21 Solid Waste Collection, Recycling and Disposal

Section 7.20.010 Purpose.
Section 7.20.020 Definitions.
Section 7.20.030 Duty to Subscribe to Solid Waste Collection Service.
Section 7.20.040 Duty to Properly Sort, Store, and Dispose of Solid Waste.
Section 7.20.050 Maintenance and Use of Collection Containers.
Section 7.20.060 Additional Requirements for Commercial Business Generators.
Section 7.20.070 Ownership of Materials.
Section 7.20.080 Disposal and Handling of Exempt Waste.
Section 7.20.090 Waivers for Commercial Business Generators.
Section 7.20.100 Self-Hauler Exemption.
Section 7.20.110 Franchise to Collect Solid Waste.
Section 7.20.120 Inspections and Investigations.
Section 7.20.130 Enforcement.

7.21.010 Purpose.

A. This chapter and Chapter 7.21 are determined and declared to be a health, sanitary and safety measure necessary for the promotion, protection and preservation of the health, safety and general welfare of the people of the city of Half Moon Bay.

B. Assembly Bill 939, the California Integrated Waste Management Act (Sher, Chapter 1095, Statutes of 1989, as amended) ("AB 939"), requires cities and counties to reduce, reuse, and recycle (including composting) solid waste generated in their jurisdictions to the maximum extent feasible before any incineration or landfill disposal of waste, to conserve water, energy, and other natural resources, and to protect the environment. AB 939 requires that by and after January 1, 2000, fifty percent (50%) of the solid waste generated must be diverted through source reduction, recycling, and composting activities.

C. Assembly Bill 341, the California Mandatory Commercial Recycling law (Chesbro, Chapter 476, Statutes of 2011) ("AB 341"), places requirements on businesses and multi-family generators that generate a specified threshold amount of solid waste to arrange for recycling services and requires jurisdictions to implement a mandatory commercial recycling program.

D. Assembly Bill 1826, the California Mandatory Commercial Organics Recycling law (Chesbro, Chapter 727, Statutes of 2014) ("AB 1826"), requires businesses and multi-family generators that generate a specified threshold amount of solid waste, non-organic recyclables, and organic waste per week to arrange for recycling services for those materials, requires jurisdictions to implement a recycling program to divert organic waste from businesses subject to the law, and requires jurisdictions to implement a mandatory commercial organic waste recycling program.

E. Senate Bill 1383, the Short-Lived Climate Pollutant Reduction Act of 2016 (Lara, Chapter 395, Statutes of 2016) ("SB 1383"), sets statewide organic waste disposal reduction targets of fifty percent (50%) by 2020 and seventy-five percent (75%) by 2025, based on the 2014

organic waste disposal baseline. SB 1383's implementing regulations place requirements on multiple entities including jurisdictions, residential households, commercial businesses and business owners, commercial edible food generators, haulers, self-haulers, food recovery organizations, and food recovery services to support achievement of statewide organic waste disposal reduction targets. SB 1383's implementing regulations require jurisdictions to adopt and enforce an ordinance or other enforceable mechanism to implement relevant provisions of SB 1383's implementing regulations.

F. The City has coordinated with the County of San Mateo and other jurisdictions in the county to develop uniform provisions for the portions of this chapter and Chapter 7.21 addressing Edible Food Recovery. The City has determined that this coordination will simplify compliance for Businesses, promote food recovery in the city, and facilitate Edible Food Recovery capacity planning.

G. Pursuant to 14 California Code of Regulations Section 18981.2, jurisdictions may delegate certain responsibilities for implementing, monitoring, and enforcing their Edible Food Recovery programs to public or private entities.

H. This chapter and Chapter 7.21 will aid the City in meeting the goals and requirements of AB 939, AB 341, AB 1826, SB 1383 and its implementing regulations, and related laws; aid in preserving landfill space and postponing the need for new landfill capacity for the longest term possible; reduce the amount of Solid Waste deposited in landfills from Commercial and residential Generators; and reduce food insecurity.

I. The City may adopt, implement, and enforce a local Solid Waste recycling requirement that is more stringent or comprehensive than state law.

7.21.020 Definitions.

A. "Back-Haul" means a Commercial Business Generating and transporting Source Separated Non-Organic Recyclable Materials and/or Source Separated Organic Waste to a destination owned and operated by the Generator using the Generator's own employees and equipment, or as otherwise defined in 14 CCR Section 18982(a)(66)(A).

B. "Biohazardous" or "Biomedical Waste" means any waste which may cause disease or reasonably be suspected of harboring pathogenic organisms; included are waste resulting from the operation of medical clinics, hospitals, and other facilities processing wastes which may consist of, but are not limited to, human and animal parts, contaminated bandages, pathological specimens, hypodermic needles, sharps, and contaminated clothing and surgical gloves.

C. "Blue Container" has the same meaning as in 14 CCR Section 18982.2(a)(5) and shall be used for the purpose of storage and collection of Source Separated Non-Organic Recyclable Materials.

D. "Business", "Commercial," and "Commercial Business" means a commercial or public entity, including, but not limited to, a firm, partnership, proprietorship, joint stock company, corporation, or association that is organized as a for-profit entity or non-profit entity, or a Multi-Family Residential Property.

E. "California Code of Regulations" or "CCR" means the State of California Code of Regulations. CCR references in this subchapter are preceded with a number that refers to the relevant Title of the CCR (e.g., "14 CCR" refers to Title 14 of CCR).

F. "City" means the City of Half Moon Bay.

G. "Collection Containers" refers to carts, bins, Debris Boxes, and other storage equipment provided by a Solid Waste Collector to a Generator for the purposes of collection by that Solid Waste Collector.

H. “Collection Station” refers to a location with containers for collection of Source Separated Garbage, Non-Organic Recyclables and/or Organic Waste.

I. “Commercial Edible Food Generator” includes a Tier One or a Tier Two Commercial Edible Food Generator as defined in this chapter. For the purposes of this definition, Food Recovery Organizations and Food Recovery Services are not Commercial Edible Food Generators.

J. “Community Composting” means any activity that composts Green Waste, agricultural material, food material, and vegetative food material, alone or in combination, and the total amount of feedstock and compost on-site at any one time does not exceed one hundred (100) cubic yards and seven hundred fifty (750) square feet, as specified in 14 CCR Section 17855(a)(4); or, as otherwise defined by 14 CCR Section 18982(a)(8).

K. “Compliance Review” means a review of records by the City and/or its Designee to determine compliance with this chapter and Chapter 7.21.

L. “Compost” means the product resulting from the controlled biological decomposition of Organic Waste that is Source Separated from the Solid Waste stream, or which is separated at a centralized facility, or as otherwise defined in 14 CCR Section 17896.2(a)(4).

M. “Compostable Plastics” means items, such as bags, utensils, and foodware, that will break down or otherwise become part of usable compost in a safe and timely manner. Compostable Plastics must be certified by the Biodegradable Products Institute (BPI) or by another independent third party approved by the City and/or its Designee.

N. “Construction and Demolition Waste” or “C&D Waste” means non-hazardous waste resulting from the construction, remodeling, alteration, repair, or demolition of buildings and other structures that is subject to Chapter 14.50 of this code.

O. “California Redemption Value Beverage Containers” or “CRV Beverage Containers” means bottles and cans that are accepted in California’s Beverage Container Recycle Program.

P. “Debris Box” means a container without compaction normally tipped loaded onto a motor vehicle and transported to an appropriate facility. Debris Boxes may be used for the collection of Non-Organic Recyclables, Organic Waste, Garbage, or Construction and Demolition Waste.

Q. “Designee” means an entity that the City contracts with or otherwise arranges to carry out or assist with any of the City’s responsibilities for compliance with Solid Waste-related laws as authorized in 14 CCR Section 18981.2. A Designee may be a government entity, a hauler, a private entity, or a combination of those entities.

R. “Designee for Edible Food Recovery” means the County of San Mateo’s Office of Sustainability with which the City has a Memorandum of Understanding for the purposes of Edible Food Recovery including, but not limited to, Inspection, investigation, and enforcement of the Edible Food Recovery provisions of Chapter 7.21. Contact information for the Designee for Edible Food Recovery can be found on the County of San Mateo Office of Sustainability website. If either the County of San Mateo’s Office of Sustainability or the City decide to terminate the Memorandum of Understanding, the City may designate another entity as the Designee for Edible Food Recovery.

S. “Edible Food” means food intended for and fit for human consumption and collected or received from a Tier One or Tier Two Commercial Edible Food Generator. For the purposes of this chapter and Chapter 7.21, “Edible Food” is not Solid Waste if it is recovered and not discarded. Nothing in this chapter, Chapter 7.21 or in 14 CCR, Division 7, Chapter 12 requires or authorizes the Recovery of Edible Food that does not meet the food safety requirements of the California Retail Food Code.

T. "Edible Food Recovery" means actions to collect, receive, and/or re-distribute Edible Food for human consumption from Tier One and Tier Two Commercial Edible Food Generators that otherwise would be disposed.

U. "Exempt Waste" means Construction and Demolition Waste; Biomedical Waste; Hazardous Materials; sewage and other highly diluted water-carried materials or substances and those in gaseous form; fats, oils, and grease when such materials are Source Separated; ash and inflammable or explosive materials; automobiles, automobile parts, boats, boat parts, boat trailers, internal combustion engines; medicine; wastes under the control of the Nuclear Regulatory Commission; anything characterized as volatile, corrosive, or infectious; and toxic substances or material that facility operators that receive materials from the city and its Generators reasonably believes would, as a result of or upon acceptance, transfer, processing, or disposal, be a violation of local, state, or federal law, regulation, or ordinance.

V. "Food Distributor" means a company that distributes food to entities including, but not limited to, Supermarkets and Grocery Stores.

W. "Food Facility" has the same meaning as in Section 113789 of the Health and Safety Code.

X. "Food Recovery Organization" means an entity that engages in the collection or receipt of Edible Food from Tier One or Tier Two Commercial Edible Food Generators and distributes that Edible Food either directly or through other entities, including, but not limited to:

1. A food bank as defined in Section 113783 of the Health and Safety Code;
2. A nonprofit charitable organization as defined in Section 113841 of the Health and Safety code; and,
3. A nonprofit charitable temporary food facility as defined in Section 113842 of the Health and Safety Code.

A Food Recovery Organization is not a Commercial Edible Food Generator for the purposes of this chapter, Chapter 7.21 and implementation of 14 CCR, Division 7, Chapter 12 pursuant to 14 CCR Section 18982(a)(7).

Y. "Food Recovery Service" means a person or entity that collects and transports Edible Food from a Tier One or Tier Two Commercial Edible Food Generator to a Food Recovery Organization or other entities for Edible Food Recovery. A Food Recovery Service is not a Commercial Edible Food Generator for the purposes of this chapter, Chapter 7.21 and implementation of 14 CCR, Division 7, Chapter 12 pursuant to 14 CCR Section 18982(a)(7).

Z. "Food Service Provider" means an entity primarily engaged in providing food services to institutional, governmental, Commercial, or industrial locations of others based on contractual arrangements with these types of organizations.

AA. "Food-Soiled Paper" is compostable paper material that has come in contact with food or liquid, such as, but not limited to, uncoated paper plates, napkins, paper towels, and pizza boxes.

BB. "Food Waste" means all food and trimmings and other putrescible waste that results from food production, preparation, storage, consumption, or handling. Food Waste includes but is not limited to meat, seafood, shellfish, bones, fish and dairy waste, fruit and vegetable waste, rice, beans, pasta, bread, cheese, eggshells, grain waste, and Stable Matter. Food Waste excludes fats, oils, and grease when such materials are Source Separated from other waste.

CC. "Franchisee" means an individual, association, firm, organization or other Commercial Business who has entered into a franchise agreement with the City, whether or not said entity is operated for profit, for the collection of Solid Waste, or subsets of Solid Waste, within the city.

DD. "Garbage" means all discarded materials, substances, or objects including but not restricted to materials commonly referred to as "trash," "garbage," "refuse" and "rubbish" that are Generated by Generators within the city, excluding (a) Exempt Waste, (b) Non-Organic Recyclable Materials, and (c) Organic Waste.

EE. "Generator" means every entity that produces, keeps, deposits, places, or accumulates Solid Waste (or allows for the occurrence of same) within the city of Half Moon Bay, except Local Education Agencies and Non-Local Entities. "Generate" means the production, keeping, deposit, placing, or accumulation of Solid Waste in the city.

FF. "Gray Container" has the same meaning as in 14 CCR Section 18982.2(a)(28), and which may be colored gray or black, and shall be used for the purpose of storage and collection of Garbage.

GG. "Green Container" has the same meaning as in 14 CCR Section 18982.2(a)(29) and shall be used for the purpose of storage and collection of Source Separated Organic Waste.

HH. "Green Waste" means any vegetative matter resulting from normal yard and landscaping maintenance. Green Waste includes plant debris, such as palm, yucca and cactus, ivy, grass clippings, leaves, pruning, weeds, branches, brush, Christmas trees, and other forms of vegetative waste.

II. "Greenhouse Gas (GHG)" means carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and other fluorinated greenhouse gases.

JJ. "Greenhouse Gas Emission Reduction" or "Greenhouse Gas Reduction" means actions designed to achieve a calculated decrease in Greenhouse Gas emissions over time.

KK. "Grocery Store" means a store primarily engaged in the retail sale of canned food; dry goods; fresh fruits and vegetables; fresh meats, fish, and poultry; and any area that is not separately owned within the store where the food is prepared and served, including a bakery, deli, and meat and seafood departments.

LL. "Hauler Route" means the designated daily itinerary or sequence of stops for each segment of the City's collection service area, or as otherwise defined in 14 CCR Section 18982(a)(31.5).

MM. "Hazardous Materials" or "Hazardous Waste" means any material which is defined, regulated or listed as "hazardous", "toxic", a "pollutant", or words of similar import waste under California or United States law or any regulations promulgated pursuant to such law, as such state or federal law or regulations may be amended from time to time; and "designated waste" as defined in California Water Code Section 13173.

NN. "Health Facility" has the same meaning as in Section 1250 of the Health and Safety Code.

OO. "Hotel" has the same meaning as in Section 17210 of the Business and Professions Code.

PP. "Inspect" or "Inspection" means the City and/or its Designee's electronic or on-site visit and review of Generator's records, Collection Containers, and collection, handling, recycling, or landfill disposal of Solid Waste and/or Edible Food handling to determine if the entity is complying with requirements set forth in this chapter, Chapter 7.21 or as otherwise defined in 14 CCR Section 18982(a)(35). For the purposes of Edible Food Recovery, "Inspection" means actions to review contracts and other records related to the recovery of Edible Food, and may occur off-site via email and other forms of electronic communication, as well as the on-site review of an entity's records and collection, handling, and other procedures for the recovery of Edible Food to determine if the entity is complying with the requirements of this chapter.

QQ. "Large Event" means an event, including, but not limited to, a sporting event or a flea market, that charges an admission price, or is operated by a local agency, and serves an

average of more than 2,000 individuals per day of operation of the event, at a location that includes, but is not limited to, a public, nonprofit, or privately owned park, parking lot, golf course, street system, or other open space when being used for an event. If the definition in 14 CCR Section 18982(a)(38) differs from this definition, the definition in 14 CCR Section 18982(a)(38) shall apply to this chapter and Chapter 7.21.

RR. "Large Venue" means a permanent venue facility that annually seats or serves an average of more than 2,000 individuals within the grounds of the facility per day of operation of the venue facility. For purposes of this chapter, Chapter 7.21, and implementation of 14 CCR, Division 7, Chapter 12, a venue facility includes, but is not limited to, a public, nonprofit, or privately owned or operated stadium, amphitheater, arena, hall, amusement park, conference or civic center, zoo, aquarium, airport, racetrack, horse track, performing arts center, fairground, museum, theater, or other public attraction facility. For purposes of this chapter, Chapter 7.21 and implementation of 14 CCR, Division 7, Chapter 12, a site under common ownership or control that includes more than one Large Venue that is contiguous with other Large Venues in the site, is a single Large Venue. If the definition in 14 CCR Section 18982(a)(39) differs from this definition, the definition in 14 CCR Section 18982(a)(39) shall apply to this chapter and Chapter 7.21.

SS. "Local Education Agency" means a school district, charter school, or county office of education that is not subject to the control of City regulations related to Solid Waste, or as otherwise defined in 14 CCR Section 18982(a)(40).

TT. "Multi-Family Residential Property" or "Multi-Family" means any premises, excluding a hotel, motel, or lodging house, used for residential purposes containing five (5) dwelling units or more, irrespective of whether the residency is transient, temporary, or permanent.

UU. "Non-Local Entity" means an entity not subject to the control of the City or county regulations related to Solid Waste. These entities may include, but are not limited to, special districts, federal facilities, prisons, facilities operated by the state parks system, public universities, including community colleges, county fairgrounds, and state agencies.

VV. "Non-Organic Recyclables" or "Non-Organic Recyclable Materials" mean non-putrescible materials that can be returned to economic use as raw materials for new, reused or reconstituted products. Examples include, but are not limited to, cans, glass, certain types of plastic, metals, and automobile oil.

WW. "Notice of Violation (NOV)" means a notice that a violation has occurred that includes a compliance date to avoid an action to seek penalties, or as otherwise defined in 14 CCR Section 18982(a)(45) or further explained in 14 CCR Section 18995.4.

XX. "Occupancy" or "Occupied" refers to premises where a person or persons take or hold possession of the premises for permanent or temporary use. Occupancy shall be presumed unless evidence is presented that gas, electric, telephone and water utility services are not being provided to the premises.

YY. "Organic Waste" refers to material produced from living organisms and their metabolic waste products, including but not limited to Food Waste, Food-Soiled Paper, Compostable Plastics, Green Waste, organic textiles and carpets, lumber, wood, paper products, printing and writing paper, biosolids, digestate, and sludges, or as otherwise defined in 14 CCR Section 18982(a)(46). Paper products include, but are not limited to, paper janitorial supplies, cartons, wrapping, packaging, file folders, hanging files, corrugated boxes, tissue, and toweling, or as otherwise defined in 14 CCR Section 18982(a)(51). Biosolids and digestate are as defined by 14 CCR Section 18982(a).

ZZ. "Prohibited Container Contaminants," "Container Contaminants," or "Contamination" means the following: (i) discarded materials placed in the Blue Container that are not

identified as acceptable Source Separated Non-Organic Recyclable Materials for the City's Blue Container; (ii) discarded materials placed in the Green Container that are not identified as acceptable Source Separated Organic Waste for the City's Green Container; (iii) discarded materials placed in the Gray Container that are accepted in the City's Blue Container or Green Container; and (iv) Exempt Waste placed in any Collection Container.

AAA. "Recovery" means any activity or process described in 14 CCR Section 18983.1(b), or as otherwise defined in 14 CCR Section 18982(a)(49).

BBB. "Remote Monitoring" means the use of the internet of things (IoT) and/or wireless electronic devices in Commercial Blue Containers, Green Containers, and Gray Containers for purposes of identifying the quantity of materials in Collection Containers (level of fill) and/or presence of Prohibited Container Contaminants.

CCC. "Restaurant" means an establishment primarily engaged in the retail sale of food and drinks for on-premises or immediate consumption, or as otherwise defined in 14 CCR Section 18982(a)(64).

DDD. "Route Review" means a visual inspection of Collection Containers along a Hauler Route for the purpose of identifying Prohibited Container Contaminants, and may include mechanical or electronic inspection methods such as the use of cameras, or as otherwise defined in 14 CCR Section 18982(a)(65).

EEE. "Self-Hauler" refers to a Generator who transports Source-Separated Solid Waste they have Generated to a permitted Solid Waste processing facility using the Generator's own vehicles, equipment, and employees. Self-Hauler also includes a Generator who Back-Hauls, a landscaper, or as otherwise defined in 14 CCR Section 18982(a)(66). For Chapter 7.21, "Self-Hauler" means a Commercial Edible Food Generator which holds a contract with and hauls Edible Food to a Food Recovery Organization or other site for redistribution according to the requirements of Chapter 7.21.

FFF. "Share Table" has the same meaning as in Section 114079 of the Health and Safety Code.

GGG. "Single-Unit Dwelling," "Single-Family Dwelling," or "Single-Family" refers to any individual living unit in a single-family dwelling (SFD) or multi-family dwelling (MFD) structure or building intended for, or capable of being utilized for, residential living up to (4) units.

HHH. "Solid Waste" means all putrescible and nonputrescible solid, semisolid, and liquid discarded waste Generated by Generators, including but not limited to Garbage, Non-Organic Recyclables, Organic Waste, and Exempt Waste.

III. "Solid Waste Collection Service" means a City-authorized program for collection, transportation and/or disposal of Solid Waste, or subsets of Solid Waste, by an authorized Solid Waste Collector.

JJJ. "Solid Waste Collector" means any person or entity holding a valid permit, license, franchise or other authorization from the City to collect, receive, carry, transport, process and/or dispose of any Solid Waste, or subsets of Solid Waste, that is Generated within the city.

KKK. "Source Separated" means materials that are separated into their respective waste streams at the source of generation prior to collection and/or disposal

LLL. "Source Separated Non-Organic Recyclables" or "Source Separated Non-Organic Recyclable Materials" means Non-Organic Recyclables that have been separated from other Solid Waste prior to placement in a Blue Container for collection by a Solid Waste Collector or before being Self-Hauled.

MMM. "Source Separated Organic Waste" means Organic Waste that have been separated from other Solid Waste prior to placement in a Green Container for collection by a Solid Waste Collector or before being Self-Hauled.

NNN. "Stable Matter" means manure and other waste matter normally accumulated and associated with stables or in domestic livestock.

OOO. "Supermarket" means a full-line, self-service retail store with gross annual sales of two million dollars ($2,000,000), or more, and which sells a line of dry grocery, canned goods, or nonfood items and some perishable items, or as otherwise defined in 14 CCR Section 18982(a)(71).

PPP. "Tier One Commercial Edible Food Generator" means a Commercial Edible Food Generator that is one of the following:

1. Supermarket.
2. Grocery Store with a total facility size equal to or greater than 10,000 square feet.
3. Food Service Provider.
4. Food Distributor.
5. Wholesale Food Vendor.

If the definition in 14 CCR Section 18982(a)(73) of Tier One Commercial Edible Food Generator differs from this definition, the definition in 14 CCR Section 18982(a)(73) shall apply.

QQQ. "Tier Two Commercial Edible Food Generator" means a Commercial Edible Food Generator that is one of the following:

1. Restaurant with 250 or more seats, or a total facility size equal to or greater than 5,000 square feet.
2. Hotel with an on-site Food Facility and 200 or more rooms.
3. Health facility with an on-site Food Facility and 100 or more beds.
4. Large Venue.
5. Large Event.
6. A State agency with a cafeteria with 250 or more seats or total cafeteria facility size equal to or greater than 5,000 square feet.
7. A Local Education Agency facility with an on-site Food Facility.

If the definition in 14 CCR Section 18982(a)(74) of Tier Two Commercial Edible Food Generator differs from this definition, the definition in 14 CCR Section 18982(a)(74) shall apply.

RRR. "Wholesale Food Vendor" means a Commercial Business or establishment engaged in the merchant wholesale distribution of food, where food (including fruits and vegetables) is received, shipped, stored, prepared for distribution to a retailer, warehouse, distributor, or other destination, or as otherwise defined in 14 CCR Section 189852(a)(76).

7.21.030 Duty to Subscribe to Solid Waste Collection Service.

A. Except where a waiver or exemption is applicable under this code, Generators shall subscribe to a Solid Waste Collection Service for all Solid Waste Generated, in compliance with the provisions of this chapter.

B. It is unlawful to arrange for collection, hauling or disposal of Solid Waste provided by an entity other than as authorized or permitted by the City under this code, regardless if such services are provided on an ongoing basis, as needed, or with any other frequency.

C. Nothing in this chapter or Chapter 7.21 prohibits a Generator from preventing or reducing Solid Waste Generation, managing Organic Waste on site, or using a Community Composting site pursuant to 14 CCR Section 18984.9(c).

7.21.040 Duty to Properly Sort, Store, and Dispose of Solid Waste.

A. *Responsibility for Solid Waste.* Generators are responsible for the safe and sanitary storage and disposal of Generated Solid Waste in accordance with all federal, state, and local laws.

B. *Sorting Requirements.* Generators must participate in the City's diversion programs by Source Separating Generated Solid Waste and placing eligible items into the designated Collection Containers, and not placing Prohibited Container Contaminants in the Collection Containers. Except to the extent the City and/or its Designee directs alternative placement, Generator shall place Organic Waste in the Green Container; Non-Organic Recyclable Materials, paper products, and printing and writing paper in the Blue Container; and Garbage in the Gray Container.

C. *Storage Requirements.* Generators must store Generated Solid Waste in such a manner that it does not promote the propagation, harborage, or attraction of vectors and/or create a public nuisance.

D. *Frequency of Disposal.* At least once per week, all Garbage, Non-Organic Recyclables, and Organic Waste Generated shall be disposed of in accordance with the provisions of this chapter. CRV Beverage Containers may be accumulated for up to one month, so long as they are not stored within view of the public right of way and do not promote the propagation, harborage, or attraction of vectors and/or create a public nuisance.

E. *Illegal Dumping.* It is unlawful to store, deposit, bury or dispose of any Solid Waste, on any public property or any private property not owned by the Generator, without permission of the owner or occupant of that property.

7.21.050 Maintenance and Use of Collection Containers.

A. *Unlawful Use.* It is unlawful to use Collection Containers for anything other than their intended purpose.

B. *Container Maintenance.* It is the duty of each Generator to maintain Collection Containers in a reasonably safe and secure manner. Generator will take care to prevent damage to Collection Containers through carelessness or negligence and shall keep Collection Containers in a reasonably clean condition and free from putrescible residue. Collection Containers shall be kept out of view from the public so that they will not be a public nuisance or in any degree offensive.

C. *Collection Locations*. Collection Containers shall be placed for collection at a location and in a manner as instructed by the Solid Waste Collector, and not so that they are obstructing alleys, roadways, driveways, sidewalks or mailboxes.

D. *Container Collection Standards.* Collection Containers shall be put out for collection no earlier than 5:30pm the day prior to scheduled collection, nor left remaining after collection longer than twenty-four (24) hours following pick-up. When filled, Collection Containers shall not exceed weight limits established by the Solid Waste Collector.

7.21.060 Additional Requirements for Commercial Business Generators.

A. Commercial Businesses shall supply and allow access to adequate number, size and location of Collection Stations for collection of Source Separated Non-Organic Recyclables, Organic Waste, and Garbage for employees, contractors, tenants, and customers of the Business.

B. Commercial Businesses, except for Multi-Family Residential Properties, shall supply and provide access to Collection Stations at all indoor and outdoor locations where disposal containers for Garbage are located, except in restrooms. Each Collection Station must have separate and identifiable containers for collection of Source Separated Non-Organic Recyclables, Organic Waste, and Garbage with SB 1383 compliant container colors or labels.

1. If a Commercial Business does not generate any waste for a particular waste stream, it does not need to include a container for that type of waste at its Collection Station; but it must be able to adequately demonstrate that circumstance to the City and/or its Designee.

C. Commercial Businesses, except for Multi-Family Residential Properties, shall, to the extent practical through education, training, inspection, and/or other measures, prohibit employees from placing Prohibited Container Contaminants in a Collection Container.

D. Commercial Businesses, except for Multi-Family Residential Properties, shall periodically inspect Collection Containers for Contamination and inform employees and/or occupants of any Contamination found and of the requirements to keep Contaminants out of those Collection Containers.

E. Commercial Businesses shall annually provide information to employees, contractors, tenants and customers about the City's Solid Waste requirements and diversion goals and programs.

F. Commercial Businesses shall provide education information before or within fourteen (14) days of occupation of the premises to new tenants that describes the City's Solid Waste requirements and diversion goals and programs.

G. Commercial Businesses shall provide or arrange access for the City and/or its Designee to their properties for Inspections conducted in accordance with this chapter.

H. Commercial Businesses shall accommodate and cooperate with any future attempt by the City to implement a Remote Monitoring program.

7.21.070 Ownership of Materials.

A. Ownership of materials placed in Collection Containers remain with the Generator until such materials are placed in the Solid Waste Collector's collection vehicles.

B. No person other than the Generator, owner or occupant of premises, their designated individuals, or an employee or agent of the Solid Waste Collector shall tamper with any Collection Container or remove or scavenge its contents.

7.21.080 Disposal and Handling of Exempt Waste.

Notwithstanding any other provision of this chapter, Exempt Waste shall not be placed in the Collection Container for regular Solid Waste Collection Service, and instead must be handled and disposed in the manner described in this code, as provided by federal, state, county, or local laws and regulations, or as otherwise directed by the City, its Designee, or an authority having jurisdiction. Exempt Waste Generated within the city must be removed from premises as soon as reasonably possible.

A. *Construction and Demolition Waste*. Construction and Demolition Waste shall be handled in accordance with and is subject to the provisions of Chapter 14.50 of this code.

B. *Biomedical Waste.* The disposal of Biomedical Waste shall be performed under the supervision and direction of the County of San Mateo.

C. *Small Quantity Hazardous Waste.* Hazardous Waste generated in small quantities, such as batteries, paint and paint thinner, pesticides and fertilizers, and poisons, that are not eligible for disposal under the Solid Waste Collection Service shall be disposed of as directed by the County of San Mateo.

D. *Fats, Oils, and Grease.* Fats, oils, and grease that are Source Separated must be disposed in accordance with Title 13.

E. *Inflammable or Explosive Refuse.* Inflammable or explosive material shall be disposed of as directed by the Coastside County Fire District.

7.21.090 Waivers for Commercial Business Generators.

A. *De Minimis Waivers.* The City may waive a Commercial Business' obligation to comply with some or all the Non-Organic Recyclable Materials and/or Organic Waste collection service requirements of this chapter if the Commercial Business provides documentation that the Business Generates below a certain amount of Non-Organic Recyclable Materials and/or Organic Waste. A Commercial Business may request an application for a de minimis waiver from the City's Public Works Department.

1. If applying for a waiver for Non-Organic Recyclable Materials:
    i. The Commercial Business' total Solid Waste Collection Service is two cubic yards or more per week and Non-Organic Recyclable Materials subject to collection in a Blue Container comprises less than 20 gallons per week of the Business' total waste; or
    ii. The Commercial Business' total Solid Waste Collection Service is less than two cubic yards per week and Non-Organic Recyclable Materials subject to collection in a Blue Container comprises less than 10 gallons per week of the Business' total waste.
2. If applying for a waiver for Organic Waste:
    i. The Commercial Business' total Solid Waste Collection Service is two cubic yards or more per week and Organic Waste subject to collection in a Green Container comprises less than 20 gallons per week of the Business' total waste; or
    ii. The Commercial Business' total Solid Waste Collection Service is less than two cubic yards per week and Organic Waste subject to collection in a Green Container comprises less than 10 gallons per week of the Business' total waste.

B. *Physical Space Waivers*. The City may waive a Commercial Business' or property owner's obligations to comply with some or all of the Non-Organic Recyclable Materials and/or Organic Waste collection service requirements of this chapter if the City has evidence from its own staff, a hauler, licensed architect, or licensed engineer demonstrating that the premises lacks adequate space for the Collection Containers required for compliance with this chapter. A Commercial Business or property owner may request an application for a physical space waiver from the City's Public Works Department.

7.21.100 Self-Hauler Exemption.

A. The City may exempt Generators from complying with the requirement to subscribe to the Solid Waste Collection Service if the Generator demonstrates adequate capacity to Self-Haul under the requirements of this chapter. A Generator may request an application for a Self-Hauler exemption from the City's Public Works Department.

B. Self-Haulers shall Source Separate all Solid Waste Generated into their respective waste streams.

C. Self-Haulers shall haul their Source Separated Non-Organic Recyclable Materials to a permitted facility or operation that recovers those materials; haul their Source Separated Organic Waste to a permitted facility, operation, activity, or property that processes or recovers Source Separated Organic Waste; haul their Source Separated Garbage to a

permitted facility or operation for disposal; and haul any Exempt Waste to a permitted facility, operation, activity, or property that processes or recovers Exempt Waste.

D. Self-Haulers shall keep a record of the amount of Source Separated Solid Waste delivered to each Solid Waste facility, operation, activity, or property that processes or recovers Solid Waste; this record shall be subject to Inspection by the City. The records shall include the following information.
    1. Delivery receipts and weight tickets from the entity accepting the waste.
    2. The amount of material in cubic yards or tons transported by the generator to each entity.

7.21.110 Franchise to Collect Solid Waste.

The City Council may award an exclusive franchise to any person or entity that the City Council believes is qualified to perform Solid Waste Collection Services. The Franchisee shall have the exclusive right to collect, convey, and/or transport franchised material in, along, or over the public streets, alleys, and highways in the city, or to designated properties or areas in the city, for so long as such entity is not in material breach of any term of their franchise agreement.

A. *Charges for Solid Waste Collection Service.* The City Council reserves the right to establish by resolution a maximum schedule of rates and charges for all levels and types of Solid Waste Collection Services to be rendered by the Franchisee, who shall then have authority to collect such rates and charges. The schedule may be changed from time to time in the manner prescribed by the franchise agreement between the City and the Franchisee.

B. *Entitlement to Collect for Solid Waste Collection Services.* The Franchisee shall be entitled to payment from the recipient of Solid Waste Collection Service for any services rendered or to be rendered by the Franchisee. Upon failure to make such payment, the Franchisee may take such action as is legally available to collect or cause collection of past due amounts from Generators receiving services from Franchisee; however, Franchisee may not discontinue providing Solid Waste Collection Services without approval from the City.

7.21.120 Inspections and Investigations.

A. The City and/or its Designee are authorized to conduct Inspections and investigations, at random or otherwise, of any Collection Container, collection vehicle loads, or transfer, processing, or disposal facility for materials collected from Generators to confirm compliance with this chapter. This section does not allow the City or its Designee to enter the interior of a residential premises for inspection.
    1. For the purposes of inspecting Commercial Business Collection Containers for compliance with this chapter, the City and/or its Designee may conduct Collection Container Inspections for Prohibited Container Contaminants using Remote Monitoring, if such a program is adopted, and Commercial Businesses shall accommodate and cooperate with such Remote Monitoring pursuant to this chapter.

B. Generator shall provide or arrange for access during all Inspections (with the exception of residential premises interiors) and shall cooperate with the City and/or its Designee during such Inspections and investigations. Such Inspections and investigations may include confirmation of proper placement of materials in Collection Container, inspection of Edible Food Recovery activities, review of required records, or other verification or inspection to

confirm compliance with any other requirement of this chapter. Failure of the regulated entity to provide or arrange for: (1) access to the premises; (2) installation and operation of remote monitoring equipment, if a remote monitoring program is adopted; or (3) access to records for any Inspection or investigation is a violation of this chapter and may result in penalties described in Title 4.

C. Any records obtained by the City and/or its Designee during Inspections, Remote Monitoring, if such a program is adopted, and other reviews shall be subject to the requirements and applicable disclosure exemptions of the Public Records Act as set forth in Government Code Section 6250 et seq.

D. The City shall accept written complaints from persons regarding an entity that may be potentially non-compliant with this chapter, including receipt of anonymous complaints.

7.21.130 Enforcement.

A. Any violation of this chapter, including a continuing violation as described in Title 4, is unlawful and is hereby declared to be a nuisance.

B. For the period from January 1, 2022 (or the effective date of this chapter, whichever is later) through December 31, 2023, if the City and/or its Designee determines that an entity is not in compliance with this chapter, the City and/or its Designee shall provide educational materials to the entity, describing its obligations under this chapter and that violations may be subject to administrative citations, fines, civil penalties or other remedies beginning on January 1, 2024.

C. Beginning January 1, 2024, each and every violation of this chapter shall constitute a separate violation and shall be subject to all remedies and enforcement measures authorized by Title 4 of this code, including penalties.

D. The City and/or its Designee will monitor compliance with this chapter through Compliance Reviews, Route Reviews, investigation of complaints, and an Inspection program (that may include Remote Monitoring, if such a program is adopted).

SECTION 2. ADOPTION OF NEW CHAPTER 7.21 ENTITLED "EDIBLE FOOD RECOVERY", REPLACING EXISTING CHAPTER 7.21 ENTITLED "MANDATORY SOLID WASTE COLLECTION SERVICE" IN ITS ENTIRETY

7.22 Edible Food Recovery

Section 7.21.010 Definitions.
Section 7.21.020 Requirements for Tier One and Tier Two Commercial Edible Food Generators.
Section 7.21.030 Requirements for Food Recovery Organizations and Services.
Section 7.21.040 Inspections and Investigations.
Section 7.21.050 Enforcement.

7.22.010 Definitions.

Terms used herein are as defined in Chapter 7.20.

7.22.020 Requirements for Tier One and Tier Two Commercial Edible Food Generators.

A. Tier One Commercial Edible Food Generators must comply with the requirements of this chapter commencing January 1, 2022, and Tier Two Commercial Edible Food Generators must comply commencing January 1, 2024, pursuant to 14 CCR Section 18991.3.

B. Large Venue or Large Event operators not providing food services, but allowing for food to be provided by others, shall require Food Facilities operating at the Large Venue or Large Event to comply with the requirements of this chapter, commencing January 1, 2024.

C. Tier One and Tier Two Commercial Edible Food Generators shall comply with the following requirements:

1. Arrange to recover the maximum amount of Edible Food that would otherwise be disposed.
2. Use the CalRecycle Model Food Recovery Agreement or the contractual elements contained in the Requirements for Food Recovery Organizations and Food Recovery Services section of this chapter to contract with, or otherwise enter into a written agreement with Food Recovery Organizations or Food Recovery Services for:
    i. The collection of Edible Food for Edible Food Recovery from the Tier One or Tier Two Commercial Edible Food Generator's premises; or,
    ii. The acceptance of Edible Food that the Tier One or Tier Two Commercial Edible Food Generator Self-Hauls to the Food Recovery Organization.
3. Contract with Food Recovery Organizations and Food Recovery Services able to demonstrate a positive reduction in Greenhouse Gas emissions from their Edible Food Recovery activity. A list of Food Recovery Organizations and Food Recovery Services is available on the County of San Mateo Office of Sustainability website.
4. Shall not intentionally spoil Edible Food that is capable of being recovered by a Food Recovery Organization or a Food Recovery Service.
5. Allow the City or their Designee for Edible Food Recovery to access the premises and inspect procedures and review records related to Edible Food Recovery and/or provide them electronically if requested by the City or the Designee for Edible Food Recovery.
6. Keep records that include the following information:

i. A list of each Food Recovery Organization or a Food Recovery Service that collects or receives Edible Food from the Tier One or Tier Two Commercial Edible Food Generator pursuant to a contract or written agreement as required by this chapter.
ii. A copy of all contracts or written agreements established under the provisions of this chapter.
iii. A record of the following information for each of those Food Recovery Services or Food Recovery Organizations:
    a. The name, address and contact information of the Food Recovery Service or Food Recovery Organization.
    b. The types of food that will be collected by or Self-Hauled to the Food Recovery Service or Food Recovery Organization.
    c. The established schedule or frequency that food will be collected or Self-Hauled.
    d. The quantity of food, measured in pounds recovered per month, collected or Self-Hauled to a Food Recovery Service or Food Recovery Organization for Food Recovery.

7. No later than June 30th of each year commencing no later than July 1, 2022 for Tier One Commercial Edible Food Generators and July 1, 2024 for Tier Two Commercial Edible Food Generators, they shall provide an annual Edible Food Recovery report to the City and/or its Designee for Edible Food Recovery that includes, but is not limited to, the following information:
    i. A list of all contracts with Food Recovery Organizations and Food Recovery Services.
    ii. The amount and type of Edible Food donated to Food Recovery Organizations and Food Recovery Services, the schedule of Edible Food pickup by Food Recovery Organizations and Food Recovery Services.
    iii. A list of all types of Edible Food categories they generate, such as “baked goods,” that are not accepted by the Food Recovery Organizations and Food Recovery Services with whom they contract.
    iv. The contact information for the manager and all staff responsible for Edible Food Recovery.
    v. Certification that all staff responsible for Edible Food Recovery have obtained a food handler card through an American National Standards Institute (ANSI) accredited training provider that meets ASTM International E2659-09 Standard Practice for Certificate Programs, such as ServSafe.

    With the exception of the food safety and handling training certification, Tier One and Tier Two Commercial Edible Food Generators may coordinate with their Edible Food Recovery contractors to supply this information. The Designee for Edible Food Recovery will assist in the preparation of these reports by providing guidance and a template located on the County of San Mateo Office of Sustainability website.
8. Mandate their Edible Food Recovery staff learn and follow the donation guidelines and attend trainings conducted by Food Recovery Organizations or Food Recovery

Services with which they contract regarding best practices and requirements for the timely identification, selection, preparation, and storage of Edible Food to ensure the maximum amount of Edible Food is recovered and to avoid supplying food for collection that is moldy, has been improperly stored, or is otherwise unfit for human consumption.

9. Tier One and Tier Two Commercial Edible Food Generators who Self-Haul Edible Food shall require those transporting Edible Food for Recovery to obtain a food handler card through an American National Standards Institute (ANSI) accredited training provider that meets ASTM International E2659-09 Standard Practice for Certificate Programs, such as ServSafe and follow the best practices and standards for proper temperature control, methods, and procedures for the safe handling and transport of food.

D. Nothing in this chapter shall be construed to limit or conflict with the protections provided by the California Good Samaritan Food Donation Act of 2017, the Federal Good Samaritan Act, or Share Table and school food donation guidance pursuant to Senate Bill 557 of 2017 (approved by the Governor of the State of California on September 25, 2017, which added Article 13 [commencing with Section 49580] to Chapter 9 of Part 27 of Division 4 of Title 2 of the Education Code, and to amend Section 114079 of the Health and Safety Code, relating to food safety, as amended, supplemented, superseded and replaced from time to time).

7.22.030 Requirements for Food Recovery Organizations and Services.

A. Food Recovery Services operating in the city and collecting or receiving Edible Food directly from Tier One and/or Tier Two Commercial Edible Food Generators via a contract or written agreement established under the requirements of this chapter, shall maintain the following records:

1. The name, address, and contact information for each Tier One and Tier Two Commercial Edible Food Generator from which the service collects Edible Food.
2. The quantity in pounds of Edible Food by type collected from each Tier One and Tier Two Commercial Edible Food Generator per month.
3. The quantity in pounds of Edible Food by type transported to each Food Recovery Organization or redistribution site per month.
4. The name, address, and contact information for each Food Recovery Organization or redistribution site that the Food Recovery Service transports Edible Food to for Edible Food Recovery.

B. Food Recovery Organizations operating in the city and collecting or receiving Edible Food directly from Tier One and/or Tier Two Commercial Edible Food Generators via a contract or written agreement established under the requirements of this chapter, or receiving Edible Food from Food Recovery Services or from other Food Recovery Organizations, shall maintain the following records:

1. The name, address, and contact information for each Tier One and Tier Two Commercial Edible Food Generator, Food Recovery Service, or other Food Recovery Organization from which the organization collects or receives Edible Food.
2. The quantity in pounds of Edible Food by type collected or received from each Tier One or Tier Two Commercial Edible Food Generator, Food Recovery Service, or other Food Recovery Organization per month.

3. The name, address, and contact information for other Food Recovery Organizations or redistribution sites that the Food Recovery Organization transports Edible Food to for Edible Food Recovery.

C. Food Recovery Organizations and Food Recovery Services operating in the city shall inform Tier One and Tier Two Commercial Edible Food Generators from which they collect or receive Edible Food about California and Federal Good Samaritan Food Donation Act protection in written communications, such as in their contract or agreement established as required by this chapter.

D. Commencing no later than July 1, 2022, Food Recovery Organizations and Food Recovery Services operating in the city and collecting or receiving Edible Food from Tier One and Tier Two Commercial Edible Food Generators or any other source shall report to the City and/or its Designee for Edible Food Recovery the following:

1. A detailed Edible Food activity report of the information collected as required under this chapter, including weight in pounds by type and source of Edible Food.
2. The schedule/frequency of pickups/drop-offs of Edible Food from/to each Edible Food source or redistribution site
3. A brief analysis of any necessary process improvements or additional infrastructure needed to support Edible Food Recovery efforts, such as training, staffing, refrigeration, vehicles, etc.
4. An up to date list of Tier One and Tier Two Commercial Edible Food Generators with whom they have contracts or agreements established as required under this chapter.

The Designee for Edible Food Recovery will assist in the preparation of these reports by providing guidance and a template located on the County of San Mateo Office of Sustainability website. This Edible Food activity report shall be submitted quarterly or, at the discretion of the City and/or its Designee for Edible Food Recovery, less frequently, and shall cover the activity that occurred since the period of the last submission.

E. Food Recovery Organizations and Food Recovery Services operating in the city shall contact the Designee for Edible Food Recovery to discuss the requirements of this chapter before establishing new contracts or agreements with Tier One or Tier Two Commercial Edible Food Generators and in order to maintain existing contracts or agreements for the Recovery of Edible Food with Tier One and Tier Two Commercial Edible Food Generators.

F. In order to provide the required records to the State, the City, or the Designee for Edible Food Recovery, and Tier One or Tier Two Commercial Edible Food Generators, contracts between Food Recovery Organizations and Food Recovery Services operating in the city and Tier One and Tier Two Commercial Edible Food Generators shall either:

1. Use the Model Food Recovery Agreement developed by the State of California's Department of Resources Recycling and Recovery (CalRecycle,) and include a clause requiring the Food Recovery Organization or Food Recovery Service to report to the Tier One and Tier Two Commercial Edible Food Generators with whom they have contracts the annual amount of Edible Food recovered and to inform them of the tax benefits available to those who donate Edible Food to non-profits, or
2. Include in their contracts the following elements:
    i. List/description of allowable foods the Food Recovery Organization/Food Recovery Service will receive.

ii. List/description of foods not accepted by the Food Recovery Organization/Food Recovery Service.
iii. Conditions for refusal of food.
iv. Food safety requirements, training, and protocols.
v. Transportation and storage requirements and training.
vi. A protocol for informing the Tier One or Tier Two Commercial Edible Food Generators of a missed or delayed pickup.
vii. Notice that donation dumping is prohibited.
viii. Provisions to collect sufficient information to meet the record-keeping requirements of this chapter.
ix. Fees/financial contributions/acknowledgement of terms for the pickup and redistribution of Edible Food.
x. Terms and conditions consistent with the CalRecycle Model Food Recovery Agreement.
xi. Information supplying the Tier One or Tier Two Commercial Edible Food Generators with the annual amount of Edible Food recovered and informing them of the tax benefits that may be available to those who donate Edible Food to non-profits.
xii. Contact name, address, phone number, and email for both responsible parties, including the current on-site staff responsible for Edible Food Recovery.
xiii. Food Recovery Organizations accepting Self-Hauling of Edible Food from Tier One and Tier Two Commercial Edible Food Generators must provide a schedule, including days of the week and acceptable times for drop-offs, and information about any limitation on the amount of food accepted, and/or the packaging requirements or other conditions of transport, such as, but not limited to, maintaining proper temperature control, and other requirements for the safe handling and transport of food, the Self-Hauler must follow for the Edible Food to be accepted.

G. Food Recovery Organizations and Food Recovery Services operating in the city shall demonstrate that all persons, including volunteers and contracted workers using their own vehicle, involved in the handling or transport of Edible Food, have obtained a food handler card through an American National Standards Institute (ANSI) accredited training provider that meets ASTM International E2659-09 Standard Practice for Certificate Programs, such as ServSafe.

H. Food Recovery Organizations and Food Recovery Services operating in the city shall use the appropriate temperature control equipment and methods and maintain the required temperatures for the safe handling of Edible Food recovered from Tier One and Tier Two Commercial Edible Food Generators for the duration of the transportation of the Edible Food for redistribution, including Edible Food transported by private vehicles.

I. In order to ensure recovered Edible Food is eaten and to prevent donation dumping, Food Recovery Organizations and Food Recovery Services operating in the city shall provide documentation that all redistribution sites which are not themselves and Food Recovery Organizations to which they deliver Edible Food have a feeding or redistribution program in place to distribute, within a reasonable time, all the Edible Food they receive. Such documentation may include a website address which explains the program or pamphlets/brochures prepared by the redistribution site.

J. Food Recovery Organizations and Food Recovery Services operating in the city unable to demonstrate a positive reduction in GHG emissions for their Edible Food Recovery operational model cannot contract with Tier One and Tier Two Commercial Edible Food Generators in the city for the purpose of recovering Edible Food. Food Recovery Organizations and Food Recovery Services contracting to recover Edible Food from a Tier One and Tier Two Commercial Edible Food Generator for redistribution shall consult with the City and/or its Designee for Edible Food Recovery to document that their overall operational model will achieve a Greenhouse Gas emissions reduction. Such review may analyze route review, miles traveled for pick-up and redistribution, amount of food rescued, and the likelihood of consumption after redistribution.

K. Food Recovery Organizations and Food Recovery Services operating in the city shall visually inspect all Edible Food recovered or received from a Tier One and Tier Two Commercial Edible Food Generator. If significant spoilage is found, or if the food is otherwise found to be unfit for redistribution for human consumption, Food Recovery Organizations and Food Recovery Services shall immediately notify the Designee for Edible Food Recovery using the process found on the County of San Mateo Office of Sustainability's website. The notice shall include:

1. The type and amount, in pounds, of spoiled food or food unfit for redistribution for human consumption, or provide a photographic record of the food, or both.
2. The date and time such food was identified.
3. The name, address and contact information for the Tier One or Tier Two Commercial Edible Food Generator which provided the food.
4. The date and time the food was picked up or received.
5. A brief explanation of why the food was rejected or refused.

L. Contracts between Tier One or Tier Two Commercial Edible Food Generators and Food Recovery Organizations or Food Recovery Services shall not include any language prohibiting Tier One or Tier Two Commercial Edible Food Generators from contracting or holding agreements with multiple Food Recovery Organizations or Food Recovery Services listed on the County of San Mateo Office of Sustainability website.

M. Food Recovery Organizations and Food Recovery Services operating in the city shall conduct trainings and develop educational material such as donation guidelines and handouts to provide instruction and direction to Tier One and Tier Two Commercial Edible Food Generators with whom they contract regarding best practices and requirements for the timely identification, selection, preparation, and storage of Edible Food to ensure the maximum amount of Edible Food is recovered and to avoid the collection of food that is moldy, has been improperly stored, or is otherwise unfit for human consumption.

N. Edible Food Recovery Capacity Planning

1. *Food Recovery Services and Food Recovery Organizations.* In order to support Edible Food Recovery capacity planning assessments or other such studies, Food Recovery Services and Food Recovery Organizations operating in the city shall provide information and consultation to the City and/or its Designee for Edible Food Recovery upon request, regarding existing, proposed, new, or expanded Edible Food Recovery capacity that could be accessed by the City and its Tier One and Tier Two Commercial Edible Food Generators. A Food Recovery Service or Food Recovery Organization contacted by the City and/or its Designee for Edible Food Recovery shall respond to such requests for information within 60 calendar days.

O. Allow City and/or their Designee for Edible Food Recovery to access the premises and Inspect procedures and review records related to Edible Food Recovery and/or provide them electronically if requested by the City or the Designee for Edible Food Recovery.

7.22.040 Inspections and Investigations.

A. The City and/or its Designee for Edible Food Recovery are authorized to conduct Inspections and investigations at random or otherwise, of any Collection Container, collection vehicle loads, or transfer, processing, or disposal facility for materials collected from Generators, or Source Separated materials to confirm compliance with this chapter by Organic Waste Generators, Commercial Businesses (including Multi-Family Residential Dwellings), property owners, Tier One and Tier Two Commercial Edible Food Generators, haulers, Self-Haulers, Food Recovery Services, and Food Recovery Organizations, subject to applicable laws. This chapter does not allow the City nor its Designee for Edible Food Recovery to enter the interior of a private residential property for Inspection.

B. Regulated entity shall provide or arrange for access during all Inspections (with the exception of residential property interiors) and shall cooperate with the City and/or its Designee for Edible Food Recovery during such Inspections and investigations. Such Inspections and investigations may include confirmation of proper placement of materials in Collection Containers, Edible Food Recovery activities, records, or any other requirement of this chapter described herein.

    1. Failure to provide or arrange for: (i) access to an entity's premises; (ii) installation and operation of Remote Monitoring equipment; or (iii) access to records for any Inspection or investigation is a violation of this chapter and may result in penalties described.

C. Any records obtained by the City during its Inspections, Remote Monitoring, and other reviews shall be subject to the requirements and applicable disclosure exemptions of the Public Records Act as set forth in Government Code Section 6250 et seq.

D. The City and/or its Designee for Edible Food Recovery are authorized to conduct any Inspections, Remote Monitoring, or other investigations as reasonably necessary to further the goals of this chapter, subject to applicable laws.

E. The City shall receive written complaints from persons regarding an entity that may be potentially non-compliant with SB 1383 Regulations, including receipt of anonymous complaints.

7.22.050 Enforcement.

A. Violation of any provision of this chapter shall constitute grounds for issuance of a Notice of Violation and assessment of a fine by the City or its Designee for Edible Food Recovery. Enforcement actions under this chapter are issuance of an administrative citation and assessment of a fine. The City's procedures on imposition of administrative fines are hereby incorporated in their entirety, as modified from time to time, and shall govern the imposition, enforcement, collection, and review of administrative citations issued to enforce this chapter and any rule or regulation adopted pursuant to this chapter, except as otherwise indicated in this chapter.

B. Other remedies allowed by law may be used, including civil action or prosecution as misdemeanor or infraction. The City and/or its Designee for Edible Food Recovery may pursue civil actions in the California courts to seek recovery of unpaid administrative citations. The City and/or its Designee for Edible Food Recovery may choose to delay court action until such time as a sufficiently large number of violations, or cumulative size of violations exist such that

court action is a reasonable use of the City's and/or its Designee for Edible Food Recovery's staff and resources.

C. Responsible Entity for Enforcement
    1. Enforcement pursuant to this chapter may be undertaken by the City, which may be the City Manager or their designated entity, legal counsel, Designee for Edible Food Recovery, or combination thereof.
    2. Enforcement may also be undertaken by a regional agency enforcement official or Designee for Edible Food Recovery, designated by the Jurisdiction, in consultation with the City.
        i. The City (and regional agency or Designee for Edible Food Recovery, if using) will interpret chapter; determine the applicability of waivers, if violation(s) have occurred; implement enforcement actions; and, determine if compliance standards are met.
        ii. The City (and regional agency enforcement official, if using or Designee for Edible Food Recovery) may issue Notices of Violation(s).

D. Process for Enforcement
    1. The City and/or their Designee for Edible Food Recovery will monitor compliance with the chapter randomly and through Compliance Reviews, Route Reviews, investigation of complaints, and an Inspection program (that may include Remote Monitoring). This chapter establishes the City's and Designee for Edible Food Recovery's right to conduct Inspections and investigations.
    2. The City and/or their Designee for Edible Food Recovery may issue an official notification to notify regulated entities of its obligations under this chapter.
    3. For incidences of Prohibited Container Contaminants found in Collection Containers, the City and/or its Designee for Edible Food Recovery will issue a Notice of Violation to any Tier One or Tier Two Commercial Edible Food Generator found to have Prohibited Container Contaminants, such as Edible Food, in a Collection Container, or to any Food Recovery Organization or Food Recovery Service found to have Prohibited Container Contaminants, such as Edible Food recovered from a Tier One or Tier Two Edible Food Generator, in a Collection Container, which has not been documented by a notice of significant spoilage as required in this chapter.
        i. Such notice will be provided by email communication immediately upon identification of the Prohibited Container Contaminants or within three (3) days after determining that a violation has occurred. If the City and/or its Designee for Edible Food Recovery observes Prohibited Container Contaminants, such as Edible Food, in a Tier One or Tier Two Commercial Edible Food Generator, or Food Recovery Organization, or Food Recovery Service Collection Container on more than two (2) consecutive occasion(s), the City and/or its Designee for Edible Food Recovery may assess contamination processing fees or Contamination penalties on the Tier One or Tier Two Commercial Edible Food Generator, Food Recovery Organization, or Food Recovery Service.
    4. The City and/or its Designee for Edible Food Recovery may issue a Notice of Violation requiring compliance within 7 days of issuance of the notice. Notices shall be sent to "owner" at the official address of the owner maintained by the tax collector for the City or if no such address is available, to the owner at the address

of the dwelling or Commercial property or to the party responsible for paying for the collection services, depending upon available information.

5. Absent compliance by the respondent within the deadline set forth in the Notice of Violation, the City and/or its Designee for Edible Food Recovery shall commence an action to impose penalties, via an administrative citation and fine, pursuant to the provisions contained in this chapter.

E. Penalty Amounts for Types of Violations

The penalty levels for Edible Food Recovery violations are as follows:

1. For a first violation, the amount of the base penalty shall be $100 per violation.
2. For a second violation, the amount of the base penalty shall be $200 per violation.
3. For a third or subsequent violation, the amount of the base penalty shall be $500 per violation.

F. Compliance Deadline Extension Considerations

The City and/or its Designee for Edible Food Recovery may extend the compliance deadlines set forth in a Notice of Violation issued in accordance with this chapter if it finds that there are extenuating circumstances beyond the control of the respondent that make compliance within the deadlines impracticable, including the following:

1. Acts of God such as earthquakes, wildfires, flooding, and other emergencies or natural disasters;
2. Delays in obtaining discretionary permits or other government agency approvals; or,
3. Deficiencies in Organic Waste recycling infrastructure or Edible Food Recovery capacity and the City is under a corrective action plan with CalRecycle pursuant to 14 CCR Section 18996.2 due to those deficiencies.

G. Appeals Process.

1. Persons receiving an administrative citation containing a penalty for an uncorrected violation may request a hearing to appeal the citation. A hearing will be held only if it is requested within the time prescribed and consistent with City's and/or its Designee for Edible Food Recovery's procedures in the City's and/or the Designee for Edible Food Recovery's codes for appeals of administrative citations. Evidence may be presented at the hearing. The City and/or its Designee for Edible Food Recovery will appoint a hearing officer who shall conduct the hearing and issue a final written order.

H. Education Period for Non-Compliance.

1. Beginning January 1, 2022 and through December 31, 2023, the City and/or its Designee for Edible Food Recovery will conduct Inspections, Remote Monitoring, Route Reviews or waste evaluations, and Compliance Reviews, depending upon the type of regulated entity, to determine compliance, and if the City and/or its Designee for Edible Food Recovery determines that an Organic Waste Generator, Self-Hauler, hauler, Tier One Commercial Edible Food Generator, Food Recovery Organization, Food Recovery Service, or other entity is not in compliance, it shall provide educational materials and/or training to the entity describing its obligations under this chapter and a notice that compliance is required by January 1, 2022, and that violations may be subject to administrative civil penalties starting on January 1, 2024.

I. Civil Penalties for Non-Compliance.

1. Beginning January 1, 2024, if the City and/or its Designee for Edible Food Recovery determines that an Organic Waste Generator, Self-Hauler, hauler, Tier One or Tier

Two Commercial Edible Food Generator, Food Recovery Organization, Food Recovery Service, or other entity is not in compliance with this chapter, it shall document the noncompliance or violation, issue a Notice of Violation, and take Enforcement Action pursuant to this chapter, as needed.

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **October 19, 2021**

TO: Honorable Mayor and City Council

VIA: Matthew Chidester, Deputy City Manager

FROM: John Doughty, Public Works Director
Jennifer Chong, Public Works Program Manager

TITLE: **SENATE BILL 1383 (MANDATORY ORGANICS WASTE DISPOSAL REDUCTION)**

RECOMMENDATION:

1. Conduct a study session, take public comment, and provide direction to staff on the Mandatory Organics Waste Disposal Reduction ordinance; and
2. Continue the public hearing and introduction of the ordinance, adding Title 7, Chapter 22 Mandatory Organics Waste Disposal Reduction, to December 7, 2021; and
3. Adopt a resolution authorizing the City Manager to enter into a Memorandum of Understanding (MOU) with the County of San Mateo for the establishment of an Edible Food Recovery Program in Half Moon Bay.

FISCAL IMPACT:

Senate Bill (SB) 1383 is a State law that will require significant financial commitments from all jurisdictions throughout California. The City's Franchise Agreement with Republic Services provides a Monthly Administrative Payment that will continue to help offset the costs of overseeing and implementing solid-waste related programs, including those required by SB 1383, but additional funding will be necessary to reach full compliance with SB 1383.

STRATEGIC ELEMENT:

This action supports the Infrastructure and Environment and Healthy Communities and Public Safety Element of the Strategic Plan.

BACKGROUND:

In September 2016, Governor Brown signed SB 1383 (Lara, Chapter 395, Statutes of 2016) into law, establishing methane emissions reduction targets in a statewide effort to reduce emissions of short-lived climate pollutants in various sectors of California's economy. The law codified the California Air Resources Board's Short-Lived Climate Pollutant Strategy, established pursuant to SB 605 (Lara, Chapter 523, Statutes of 2014), to achieve reductions in the statewide emissions of short-lived climate pollutants.

As it pertains to solid waste, SB 1383 established targets to achieve 50% reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020, and a 75% reduction by 2025. It also established an additional target of recovering not less than 20% of edible food that was currently being disposed for human consumption by 2025.

In November 2020, the Department of Resources Recycling and Recovery (CalRecycle) published the Regulation Text that detailed how the State planned to meet these ambitious targets, which included mandates that local jurisdictions implement, maintain, enforce, and report on a number of programs. These programs are described in detail in the "Discussion" section of this staff report and will be expanded further in the staff presentation to the City Council.

The implementation timeline for SB 1383 is as follows:

- January 1, 2022 – Regulations take effect and State enforcement begins
- January 1, 2024 – Jurisdictions are required to take enforcement against noncompliant entities
- January 1, 2025 – The State must achieve the 75% reduction and 20% food recovery targets

DISCUSSION:

SB 1383 imposes several new mandates on local jurisdictions that are enforceable beginning January 1, 2022. While the State has not provided any funding to support the implementation of these new programs, the City of Half Moon Bay is in a strong position to comply with many of the mandates by the January 1 deadline given its working relationship with San Mateo County and other local cities. Further, the existing Franchise Agreement with Republic Services anticipated many of the rules contained in the CalRecycle Regulation Text.

The following sections summarize the six main mandates put on local jurisdictions by SB 1383. Each section details the requirement and provides a status update for the City's compliance efforts.

Mandatory Organics Collection Services

Summary: Arguably the most significant mandate of SB 1383 is the requirement for all local jurisdictions to provide organic waste collection services, including food scraps, to all residents and businesses. Additionally, waste containers used for both curbside programs and indoor waste collection stations must follow a prescribed color scheme of grey/black for trash, green for organic waste, and blue for traditional recyclables. These containers are also subject to labeling and contamination monitoring requirements.

Status: The City is already compliant with most of these requirements. The City's Franchise Agreement with Republic Services (Republic) provides all residents and businesses within the City a base level of organics collection service alongside their garbage and recycling. The Franchise Agreement also standardized the colors and labeling of curbside carts and bins.

Staff will work with Republic to educate businesses that are subject to the indoor waste

collection systems requirements to ensure they are compliant with the new mandates.

Edible Food Recovery Program

Summary: Jurisdictions are required to establish an edible food recovery program for large surplus food generators to recover as much edible food for human consumption as possible. Implementation of this program is split into two tiers, with Tier One generators having to comply in 2022 and Tier Two generators having until 2024. Tier One generators include supermarkets, large grocery stores, food service providers, food distributors, and wholesale food vendors. Tier Two generators include large restaurants, hotels, health facilities, large venues and events, and state and local education agencies.

Status: The City is partnering with the County of San Mateo Office of Sustainability (County) to implement a countywide food recovery program. After conducting an initial analysis of the food recovery programs and capacity in San Mateo County, the County determined one countywide program would be more effective than 20 independent programs. Staff agrees that this approach not only provides economy of scale, but also increases the likelihood that the maximum amount of edible food will be recovered.

Under the proposed Edible Food Recovery Program Memorandum of Understanding (Exhibit A to the Resolution), the County would operate the edible food recovery program on behalf of the City of Half Moon Bay, which would go into effect January 1, 2022.

Capacity Planning

Summary: Jurisdictions must secure access to organics processing and food recovery capacity for the programs identified in SB 1383.

Status: The City's Franchise Agreement with Republic Services includes the assurance that the City's diverted organic material will be delivered to a fully permitted organic waste processing facility. Capacity planning for food recovery will happen at the County level as part of the County's edible food recovery program.

Education and Outreach

Summary: Jurisdictions must provide linguistically accessible education and outreach to all businesses and residents regarding the mandatory participation in the organics collection service and contamination requirements. Jurisdictions must also educate commercial edible food generators on their edible food donation requirements and available edible food recovery organizations.

Status: The City's Franchise Agreement with Republic Services includes an annual education and outreach campaign. At the beginning of each calendar year, staff meets with Republic to outline the campaign for the upcoming year which always includes quarterly mailers to residents, an annual newsletter for businesses, on-site audits and technical assistance for businesses, and community meetings and workshops on the latest developments in the solid waste industry (e.g. incoming legislation).

While the Franchise Agreement will need to be amended in the coming months to reflect the education and outreach requirements specified in SB 1383, the program structure is already in place and will only need slight modifications to be SB 1383 compliant. It's important to note that education and outreach on SB 1383 has already begun with SB 1383 information being included in recent community workshops and the summer/fall newsletter. A City web page dedicated to SB 1383 is also currently under development.

Recovered Organic Waste Product Procurement

Summary: Jurisdictions must procure recycled content paper products in addition to an annual quantity of recovered organic waste products based on the City's population. The annual procurement target is assigned by CalRecycle and can be fulfilled by procuring any combination of the following waste products: compost, mulch, renewable energy (transportation fuel, heat, and electricity) from anaerobic digestion and electricity from biomass conversation. The City's estimated target for 2022 is 985 tons.

Status: Developing a program that not only meets the City's recovered organic waste product procurement target annually but uses the material properly will be challenging. While the City could enter into a purchasing agreement with Republic Services to procure the required product starting in 2022, the City's target amount far exceeds that which is used and/or needed by the City. Staff is exploring partnership opportunities with the County, the Resource Conservation District (RCD), and others to see how the City can meet its procurement target in an environmentally and fiscally sustainable way.

Meanwhile, staff will be updating the "Sustainable Purchasing and Practices Policy" that was adopted on September 10, 2020 to strengthen the language regarding purchasing recycled content paper products as required by SB 1383 and will be modifying the City's Municipal Code and professional service agreement templates to ensure the City's contractors and vendors also comply with SB 1383.

Inspection and Enforcement

Summary: SB 1383 requires local jurisdictions to monitor for compliance and conduct enforcement. Inspection requirements include:

- Annual inspections of both commercial and residential truck routes
- Compliance reviews on all commercial businesses with 2 cubic yards or more of solid waste
- Inspections of Tier One commercial edible food generators and food recovery organizations (to be performed by County)

While jurisdictions must have an enforceable mechanism (e.g. ordinance) in place by January 1, 2022, enforcement is not required until after January 2024. This provides jurisdictions two years to educate generators on the new mandates and bring them into compliance before citations must be issued. This will also provide two years to determine how best to address compliance.

Status: Staff is currently working on an ordinance that will not only bring the City into compliance with SB 1383, but amend the chapters related to solid waste to make them more comprehensive and user-friendly. The proposed amendment will be interwoven through several sections of the Municipal Code including, but not limited to, Title 4 – Code Enforcement and Title 7 – Health and Welfare and will be brought before the Council by the end of the year.

Additionally, staff is working with Republic Services to create a more robust inspection and enforcement program, but adding these programs to the Franchise Agreement will require an Amendment. Staff is also working with Republic on pursuing a joint reporting system that will help the City comply with SB 1383's detailed recordkeeping requirements.

Conclusion

SB 1383 is a significant piece of legislation that sets ambitious targets for organic waste reduction and leans heavily on local jurisdictions for implementation. While the City is in compliance with several of the mandates in SB 1383, there are still many details that need to be worked out in the coming months. Staff will continue to work with the County, Republic, CalRecycle, and other organizations throughout the county to ensure the City moves towards full compliance with SB 1383 in a thoughtful and sustainable way, with the next step being the adoption of a Mandatory Organics Waste Disposal Reduction ordinance.

ATTACHMENT:

Resolution authorizing the City Manager to sign the MOU with the County of San Mateo

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: John Doughty, Public Works Director
Veronika Vostinak, Sustainability Analyst

TITLE: **BUILDING ELECTRIFICATION ORDINANCE**

RECOMMENDATION:
Conduct a public hearing, waive first reading, and introduce an ordinance adopting a new chapter 14.06 to the Half Moon Bay Municipal Code entitled "Electrification of Buildings."

FISCAL IMPACT:
Staff has estimated the direct fiscal impact of ordinance adoption to be approximately $90,000. This cost is associated with retrofit of City facilities. There will be some additional costs of administration, but these costs will be absorbed by the operating budgets of Community Development and Public Works.

As with any other major policy initiative, preparation of this Ordinance represents a significant commitment of time and effort. We estimate that the City has spent approximately 1,000 total staff hours to research and prepare the Ordinance. These costs have been borne by the City's General Fund.

STRATEGIC ELEMENT:
This action supports the Infrastructure and Environment and Healthy Communities and Public Safety Elements of the Strategic Plan.

BACKGROUND:
The City Council conducted a community study session on building electrification policy opportunities on February 2, 2021. Following community input, the City Council directed staff to prepare a draft ordinance that addressed the following policy areas:

1. No new Fuel Gas hookups; all new construction (residential and commercial) must be built all-electric

2. Any appliance that is replaced within an existing building must be replaced with an electric alternative
3. All Fuel Gas lines must be capped and/or decommissioned by January 1, 2045

A draft ordinance was prepared and released on April 22, 2021. Consistent with Council direction, the City initiated a robust public outreach effort between its release and September 15, 2021.

On September 21, 2021, the City Council conducted a study session to receive a report on community feedback on the draft ordinance. Due to extensive public comment and City Council discussion, the item was continued to October 5th for additional review and direction. During the October 5, 2021 Study Session, staff held a guided discussion with the City Council to address policy decision points necessary to update the draft ordinance and ready the document for introduction.

For more information and background on this building electrification policy, please refer to the staff reports published for the February 2, 2021 Study Session, September 21, 2021 Study Session, October 5, 2021 Study Session, and the November 16, 2021 City Council Meeting. Links to all staff reports, attachments, staff presentations, and an FAQ on the proposed ordinance can also be found on the City's Building Electrification Webpage.

DISCUSSION:
The City Council held a Public Hearing on November 16, 2021 in anticipation of introduction of the proposed Building Electrification Ordinance. The draft ordinance included edits based on direction from previous Study Sessions. More than 80 public comments at the hearing represented both support and opposition for the proposed ordinance.

Following the public comment, City Council directed staff to make additional edits and continued the introduction of the proposed Ordinance to December 7, 2021. The major edits and significant provisions included in the current draft of the Ordinance are outlined below.

Removal of Exchange of Appliance ("Burn-Out") Provisions
The City Council directed staff to remove all provisions requiring mandatory retrofits of individual Fuel Gas appliances to electric equivalents at the time of replacement. As such, the section entitled "Exchange of Appliances" has been removed entirely from the draft ordinance being presented today for introduction. Under the updated draft, individual Fuel Gas appliances may be replaced with new Fuel Gas appliances at the time of replacement, outside of Major and/or Minor Remodel scenarios.

Definition of Major Remodel, Section 14.06.020 (K/L)
The City Council determined that a Major Remodel would be defined as any alteration and/or addition of an existing building that is equal to or greater than 500 square feet. Further, the City Council confirmed direction that a Major Remodel of any Residential, Non-Residential, or Mixed-Use Building trigger the requirement to fully electrify the entire building at the time of

remodel. This requirement would include the replacement of all existing Fuel Gas appliances with electric equivalents.

Additionally, the City Council affirmed that minor maintenance improvements such as window replacements, dry rot repair, outdoor deck repair/additions, and energy efficiency upgrades alone would not trigger the requirements associated with a Major Remodel.

If adopted as drafted, provisions related to Major Remodels would become effective on January 1, 2023 for Residential Buildings and January 1, 2025 for Non-Residential and Mixed-Use Buildings.

Minor Remodels of Residential Buildings, Section 14.06.060

The City Council provided direction related to Minor Remodels, which would include additions and/or alterations of areas smaller than 500 square feet that also include (1) adding or removing demising walls and/or (2) adding or removing cabinetry and/or countertops that comprise of at least 25% of an area or room. In these instances, any Fuel Gas appliance that is in the area or room would need to be exchanged for an electric appliance at the time of the remodel.

This provision would typically apply to remodels of kitchens, laundry rooms, utility rooms or garage spaces where Fuel Gas appliances are often housed. For example, if a building owner were replacing existing cabinetry and/or counter tops of a kitchen utilizing a Fuel Gas stove, the gas stove would need to be replaced with an electric alternative as part of the remodel.

If adopted as drafted, provisions related to Minor Remodels of Residential Buildings would become effective on January 1, 2023. There are no provisions in the proposed Ordinance that apply to Minor Remodels of Non-Residential and Mixed-Use Buildings. The City Council will revisit the requirements for these building types at a later date.

"In-Process" Applicants for New Construction, Section 14.06.030

The City Council requested that staff include some flexibility for owners who may have invested in building plans and/or are in the process of applying for permits for any new Mixed-Fuel buildings prior to the ordinance introduction. Staff has simplified the Ordinance requirements to provide "in-process" applicants some flexibility to proceed with the construction of a Mixed-Fuel Building so long as the applicant Electrically Pre-Wires for future electric appliances and receives all necessary building permits before January 1, 2023.

Summary of Ordinance Provisions

Title	Description	Effective Date	Location in Draft
Requirement for All-Electric Newly Constructed Buildings	All newly constructed buildings must be built using all-electric design	30 days after Ordinance adoption	14.06.030
Conversion to Mixed-Fuel Buildings Prohibited (Residential)	No existing All-Electric Residential Buildings may be converted to a Mixed-Fuel Building	30 days after Ordinance adoption	14.06.040(A)
Conversion to Mixed-Fuel Buildings Prohibited (Non-Residential)	No existing All-Electric Non-residential buildings may be converted to a Mixed-Fuel Building	January 1, 2025	14.06.040(B)
Major Remodels[1] of Residential Buildings	The entire ownership or tenant space must be fully electrified (including the replacement of Fuel Gas appliances) at the time of any addition or alteration that includes a space greater than 500 square feet	January 1, 2023	14.06.050(A)
Major Remodels[1] of Non-Residential and Mixed-Use Buildings	The entire ownership or tenant space must be fully electrified (including the replacement of Fuel Gas appliances) at the time of any addition or alteration that includes a space greater than 500 square feet	January 1, 2025	14.06.050(B)
Minor Remodels of Residential Buildings	If a remodel is less than 500 square feet any Fuel Gas appliance within that space must be replaced with an electric appliance at the time of the remodel	January 1, 2023	14.06.060
New Appliances	Any new appliances installed in an Existing Residential, Non-Residential, or Mixed-Use Building shall be all-electric	30 days after Ordinance adoption	14.06.070
Termination of Gas Services	All gas lines must be capped and/or decommissioned by January 1, 2045	January 1, 2045	14.06.080

[1] Basic Maintenance projects such as window replacements, floor covering replacements, energy efficiency upgrades, and/or outdoor deck repairs alone would not trigger the requirement to electrify the entire building at the time of these repairs.

Additions/alterations that result in a new Accessory Dwelling Unit would not trigger the requirement to electrify the entire building.

Exception: Existing Deed Restricted Affordable Housing	Existing Deed Restricted Affordable Housing Buildings are exempt from Major/Minor Remodel and New Appliance provisions until January 1, 2027	Expires January 1, 2027	14.06.090(A)
Exception: PG&E CARE/FERA Customers	Owner/Occupants that participate in PG&E's income-qualified CARE or FERA Programs are exempt from Major/Minor Remodel and New Appliance provisions until January 1, 2027.	Expires January 1, 2027	14.06.090(B)
Exception: Existing Commercial Greenhouses	Existing Commercial Greenhouses are exempt from Major/Minor Remodel and New Appliance provisions until January 1, 2030.	Expires January 1, 2030	14.06.090(C)
Exception: Wastewater Treatment Facilities	Wastewater Treatment Facilities are exempt from Ordinance until 2045.	Expires January 1, 2045	14.06.090(D)
Exception: Portable Propane Use Outside of Building Envelope	Portable propane appliances outside of building envelope are exempt from Ordinance.	N/A	14.06.090(E)

Next Steps

If there is consensus to proceed the Ordinance, as presented today, the Ordinance may be introduced with second reading (adoption) scheduled for the City Council meeting on December 21, 2021. If the Ordinance is adopted on December 21, 2021, the Building Electrification Ordinance would become effective thirty days later (January 21, 2022).

ATTACHMENTS:

Attachment 1: Ordinance
Attachment 2: Ordinance FAQ (Updated November 29, 2021)
Attachment 3: Comments Received from November 13, 2021 to December 2, 2021

ORDINANCE NO. C-2021-____

ORDINANCE AMENDING THE HALF MOON BAY MUNICIPAL CODE TO ADD A NEW CHAPTER 14.06 TO TITLE 14 ENTITLED "ELECTRIFICATION OF BUILDINGS"

THE COUNCIL OF THE CITY OF HALF MOON BAY DOES ORDAIN AS FOLLOWS:

Section 1. Findings. The City Council of the City of Half Moon Bay hereby adds a new Chapter 14.06 ("Electrification of Buildings") to Title 14 of the Half Moon Bay Municipal Code. The City Council finds and declares as follows:

(a) Health and Safety Code Section 18941.5, with reference to Section 17958.7, allows for more restrictive local amendments to the current California Building Standards Code ("Building Codes") that are reasonably necessary because of local climatic, geological, or topographical conditions.

(b) The Half Moon Bay City Council expressly declares that these proposed amendments to the Building Codes are reasonably necessary because of local climatic, topographical, and geological conditions, and hereby adopts the findings of reasonable necessity as set forth in Attachment A accompanying this ordinance.

(c) Express findings that these modifications to the Building Codes are reasonably necessary are hereby made and will be filed with the California Building Standards Commission in accordance with California Health and Safety Code Section 17958.7 before this ordinance takes effect.

(d) Failure to address and significantly reduce greenhouse gas emissions could result in rises in sea level that could put at risk Half Moon Bay homes and businesses, public facilities, and portions of major local and regional transportation infrastructure.

(e) Due to changes in rainfall patterns expected with climate change, the City of Half Moon Bay is likely to be subject to more severe weather events, including droughts as well as more intense storms that increase the risks of, and have actually resulted in, extreme wildfires, erosion, overland local flooding and landslides.

(f) It is expected that climate change will result in further severe and frequent extreme heat events, intensifying local heat islands and putting vulnerable populations at health risk, which has already occurred at unprecedented levels with sea level rise and widespread wildfires in the area.

(g) In 2016, the State of California enacted Senate Bill (SB) 32 to require greenhouse gas emissions to be reduced to 40 percent below 1990 levels by 2030.

(h) In 2018, Governor Brown signed Executive Order (EO) B-55-18 which calls for California to achieve carbon neutrality as soon as possible, and no later than 2045.

(i) The City of Half Moon Bay is preparing its Climate Action and Adaptation Plan to, at minimum meet State emissions goals established in SB32 and EO B-55-18.

(j) Based upon the latest available data, 48 percent of Half Moon Bay's local greenhouse gas emissions came from buildings, with 80 percent of that total coming from onsite Fuel Gas combustion.

(k) Without significant reductions in Fuel Gas combustion within existing buildings, Half Moon Bay is unlikely to achieve its greenhouse gas reduction targets.

(l) The City Council has identified electrifying buildings as a necessary strategy to achieve the City's 2030 and 2045 greenhouse gas reduction targets.

(m) Half Moon Bay primarily receives electricity from Peninsula Clean Energy, whose electricity portfolio is 100% carbon free as of January 2021, prioritizing local renewable generation and local green jobs development.

(n) Onsite Fuel Gas combustion is known to lead to elevated levels of harmful indoor air pollutants that disproportionately affect frontline communities, including people of color, immigrants, indigenous communities, low-income people, those with disabilities, and the unhoused.

(o) The indoor air pollutants that arise from onsite Fuel Gas combustion have been shown to contribute to respiratory ailments such as asthma, such that children living in homes with gas cooking are 42 percent more likely to have asthma.

(p) Fuel Gas infrastructure and pipelines contribute to the risk of fires and explosions such as the 2010 San Bruno pipeline explosion, with the risk magnified in cases of major earthquakes.

(q) Climate disruption is being fueled by the burning of fossil fuels, including "natural gas," oil, and coal, and the disruption is already having devastating impacts on those who can least afford it and are least responsible for the problem.

(r) Requiring all newly constructed buildings to be all-electric will create the groundwork for clean energy technologies to proliferate and become cost-competitive and provide the impetus for workforce development in clean energy technologies and building electrification retrofits, such that it will be easier for existing buildings to become all-electric.

(s) Highly efficient buildings enhance Half Moon Bay's public health, welfare, and resiliency by promoting environmental and economic health and safety through the design, construction, maintenance, and operation of buildings.

(t) It is reasonably necessary to require buildings to produce renewable, low-carbon electricity and to reduce energy consumption through efficient design in order to reduce the effects of climate change (which have already been experienced locally through sea level rise and wildfires), reduce regional pollution, improve overall safety, and improve resilience to climate change.

(u) Costs for all-electric new construction have been shown to be on par with or less than those for mixed-fuel construction in the Half Moon Bay climate zone.

(v) On February 2, 2021, the City Council conducted a study session on Building Electrification and directed staff to prepare a draft ordinance for consideration by the community and City Council.

(w) The requirements specified in this Ordinance were the subject of stakeholder outreach from June through September 2021, including public meetings and individual stakeholder interviews.

(x) On September 25 and October 5, 2021, the City Council conducted additional study sessions to provide policy guidance on the draft Building Electrification ordinance.

(y) Half Moon Bay can help lead the climate change movement by implementing climate solutions to benefit all people in our community, particularly those that have been disadvantaged by air pollution and other environmental harms in our most vulnerable communities.

Section 2. Addition of Chapter 14.06 to Title 14 of the HALF MOON BAY Municipal Code. The Half Moon Bay Municipal Code is hereby amended with the addition of Chapter 14.06, "Electrification of Buildings," which is adopted as set forth in Attachment B. Attachment B of this Ordinance is incorporated herein in its entirety.

Section 3. Severability. If any section, sentence, clause, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council herby declares that it would have passed this Ordinance and adopted this Ordinance and each section, sentence, clause, or phrase thereof, irrespective of the fact that any one or more section, subsections, sentences, clauses or phrases be declared invalid or unconstitutional.

Section 4. California Environmental Quality Act. The City Council finds that this Ordinance is exempt from CEQA under CEQA Guidelines section 15061(b)(3) on the grounds that the standards contained therein are more stringent than those set forth in the State Building

Standards Code, and as a result there are no reasonably foreseeable adverse impacts or possibility that the activity in question may have a significant effect on the environment. Given Half Moon Bay's clean energy sources, this Ordinance's provisions requiring a shift from fuel gas to electricity will not have any significant effect on the environment. In particular, all Half Moon Bay energy customers are automatically enrolled in the Peninsula Clean Energy (PCE) EcoPlus Service, which provides 100% Carbon Free Electricity. PCE generates electricity from 50% renewable sources, and all customers may opt into PCE's Eco100 tier, which generates energy from 100% renewable sources. There is no reasonable possibility that increasing the City's reliance on these clean and renewable energy sources could have a significant effect on the environment. The Ordinance is also exempt from CEQA under CEQA Guidelines section 15308, because it is a regulatory action for the protection of the environment. The foregoing determination is made by the City Council in its independent judgment.

Section 5. Publication. The City Clerk of the City of Half Moon Bay is hereby directed to publish this Ordinance, or the title hereof as a summary, pursuant to Government Code Section 36933, once within fifteen (15) days after its passage in the Half Moon Bay Review, a newspaper of general circulation published in the City of Half Moon Bay.

Section 6. Effective date. This Ordinance shall take effect and be in force on the thirtieth (30th) day from and after its final passage.

INTRODUCED at a regular meeting of the City Council of the City of Half Moon Bay, California, held on the ____ day of ___, 2021, by the following vote:

Ayes, Councilmembers: _____
Noes, Councilmembers: _____
Absent, Councilmembers: _____
Abstain, Councilmembers: _____

ATTEST:

_____ _____

Jessica Blair, City Clerk Robert Brownstone, Mayor

Attachment A

Section 1. Findings: The City Council hereby finds the following facts to be true:

A. Scientific evidence has established that natural gas combustion, procurement and transportation produce significant greenhouse gas emissions that contribute to global warming and climate change;
B. On June 18th, 2019, the Half Moon Bay City Council adopted a climate emergency declaration, calling for a mobilization effort to end citywide greenhouse gas emissions as quickly as possible;
C. The City of Half Moon Bay is preparing its Climate Action and Adaptation Plan to, at minimum meet State emissions goals established in SB32 and EO B-55-18; and
D. The additions and modifications to the California Building Standards Code listed below are reasonably necessary because of the following local climatic, geologic, and topographical conditions:
    1. The City limits of Half Moon Bay includes and borders areas that are considered by the State Fire Hazard Severity zone mapping system to be of High and Very High fire hazard. As such, the City is extremely vulnerable to wildfires. Human activities releasing greenhouse gas into the atmosphere cause increases in worldwide average temperature, drought conditions, vegetative fuel, and length of fire seasons, all of which have the potential to affect Half Moon Bay;
    2. Half Moon Bay is within the Coastside Fire Protection District, which is located within a high activity seismic Zone 4. The San Andreas Fault, as well as faults that are not fully charted, are within immediate boundaries of the District. The seismic geological conditions present a very severe potential for multiple fires, major breakage of water mains, major breakage of natural gas mains, multiple electrical power failures, multiple collapsed structures, large number of calls for emergency medical aid, all of which may occur simultaneously during a seismic event;
    3. In the event of a natural disaster such as earthquake or fire, the natural gas infrastructure in and around the City of Half Moon Bay presents risks to the life and safety of residents and first responders. Moreover, the electric grid system can be brought back online more swiftly than the natural gas pipeline when the community is recovering from such an event;
    4. Half Moon Bay is situated along the Pacific Coastline and the potential impacts of sea level rise are anticipated to increase the City's exposure to shoreline hazards. Human activities releasing greenhouse gas into the atmosphere contribute to sea level rise. Rising sea levels are likely to affect the amount of area in the City at risk of coastal flooding, the rate of erosion along the shoreline and bluffs, the area of the City's tsunami inundation zone, and potential seawater intrusion into riparian

systems and groundwater supplies. Loss of shoreline due to rising waters may also threaten the stability of coastal habitats, recreation areas, public access, and infrastructure; and

5. It is reasonably necessary to require buildings to produce renewable, low-carbon electricity and to reduce energy consumption through efficient design in order to reduce the effects of climate change (which have already been experienced locally through sea level rise and wildfires), reduce regional pollution, improve overall safety, and improve resilience to climate change.

Based on the above facts, the City Council finds that Half Moon Bay's local, geological, topographical, and climatic conditions require amendments to the California Building Standards Code to establish more restrictive conditions to reduce greenhouse gas emissions in new and existing buildings, thereby reducing the environmental and health hazards produced by the consumption and transportation of natural gas as summarized in the matrix included hereto in Section 2.

Section 2. Matrix of Justifications.

Matrix of Justifications for Electrification of Buildings (Half Moon Bay Municipal Code Chapter 14.06)		
Half Moon Bay Municipal Code Section(s)	**Title**	**Justification (see Section 1)**
14.06.030	Requirement for All-Electric Newly Constructed Buildings	1-5
14.06.040	Prohibition on Conversion to Mixed-Fuel Buildings	1-5
14.06.050	Major Remodels	1-5
14.06.060	Minor Remodels	1-5
14.06.070	New Appliances	1-5
14.06.080	Termination of Gas Services	1-5

Attachment B

Chapter 14.06 is hereby added to Title 14 of the Half Moon Bay Municipal Code to read as follows:

Chapter 14.06 ELECTRIFICATION OF BUILDINGS

Sections

14.06.010—Title

14.06.020—Definitions

14.06.030—Requirement for All-Electric Newly Constructed Buildings

14.06.040—Prohibition on Conversion to Mixed-Fuel Buildings

14.06.050—Major Remodels

14.06.060—Minor Remodels

14.06.070—New Appliances

14.06.080—Termination of Gas Service

14.06.090—Exceptions

14.06.100—Infeasibility Waiver

14.06.110—Appeal

14.06.120—Periodic Review

14.06.130—Violations

14.06.010 Title

This chapter shall be known as "Electrification of Buildings."

14.06.020 Definitions

A. "Accessory Dwelling Unit" shall have the same meaning as specified in Section 18.02.040 of the Half Moon Bay Municipal Code.

B. "Affordable Housing" shall have the same meaning as specified in Section 18.02.040 of the Half Moon Bay Municipal Code.

C. "All-Electric Building" or "All-Electric Design" is a building or building design that uses a permanent supply of electricity as the source of energy for all space heating, water heating (including pools and spas), cooking appliances, and clothes drying appliances, and has no Fuel Gas plumbing installed in the building.

D. “All-Electric Conversion” shall mean the conversion of a Mixed-Fuel building to a building that uses a permanent supply of electricity as the source of energy for all space heating, water heating (including pools and spas), decorative uses and lighting, cooking appliances, clothes drying appliances, and in which any previously existing Fuel Gas plumbing connection is capped or decommissioned.

E. “Building” shall have the same meaning as specified in Section 18.02.040 of the Half Moon Bay Municipal Code. Notwithstanding that definition, for purposes of this ordinance, “Building” does not include mobile homes or manufactured homes, pursuant to Health & Safety Code §§ 18015, 18030.5, and 18300(a).

F. “Commercial Greenhouse” shall have the same meaning as specified in Section 18.02.040 of the Half Moon Bay Municipal Code.

G. “Dwelling Unit” shall have the same meaning as specified in Section 18.02.040 of the Half Moon Bay Municipal Code.

H. “Electrically Pre-Wire" shall mean to install necessary electrical components to permit future conversion to electric appliances. The required Pre-Wiring measures shall include the following:

   a. A dedicated circuit, phased appropriately, for each appliance, with a minimum amperage requirement for a comparable electric appliance (see manufacturer’s recommendations) with an electrical receptacle or junction box that is connected to the electric panel with conductors of adequate capacity, extending to within 3 feet of the appliance and accessible with no obstructions. Appropriately sized conduit may be installed in lieu of conductors;

   b. Both end of the conductor or conduit shall be labeled with the words “For Future Electric appliance” and be electrically isolated;

   c. A circuit breaker shall be installed in the electrical panel for the branch circuit and labeled for each circuit (i.e., “For Future Electric Range”) and;

   d. All electrical components, including conductors, receptacles, junction boxes, or blank covers related to this section shall be installed in accordance with the California Electric Code.

I. “Fuel Gas” shall be as defined in the California Plumbing Code Section 208.0 and the California Mechanical Code Section 208.0.

J. “Junior Accessory Dwelling Unit” means a unit as defined in California Government Code Section 65852.22.

K. “Major Remodel” means any alteration or addition of floor area to an existing building that is equal to or greater than 500 square feet.

L. “Minor Remodel” means any alteration or addition of less than 500 square feet to an existing building that includes any of the following: 1) adding or removing demising walls and/or 2) adding or removing cabinetry and/or countertops that constitute at least 25% of an area or room.

M. “Mixed-Fuel Building” means a building that uses Fuel Gas as fuel for space heating or cooling, exterior heating, decorative uses or lighting, water heating (including pools and spas), cooking appliances, clothes drying appliances, or onsite generation of electricity (except where primarily fueled by onsite digestion of organic material).

N. ”Mixed-Use Building” shall have the same meaning as specified for “Mixed Use” in Section 18.02.040 of the Half Moon Bay Municipal Code.

O. “Newly Constructed Building” is a building that has never before been used or occupied for any purpose.

P. “Non-Residential Building” shall have the same meaning as specified in the California Energy Code Section 100.1.

Q. “Owner-Occupant” is a resident of a property who holds the title to that property.

R. “Residential Building” means a building in which sleeping accommodation is provided for normal residential purposes and includes one or more family dwellings, including private garages of such buildings. For purposes of this ordinance, “Residential Building” does not include mobile homes or manufactured homes, pursuant to Health & Safety Code §§ 18015, 18030.5, and 18300(a).

14.06.030 Requirement for All-Electric Newly Constructed Buildings

Newly Constructed Buildings shall meet the definition of an All-Electric Building and shall be designed using an All-Electric Design.

Exceptions:

1. Development projects for which all building and related permits have been issued and remain valid prior to January 1, 2023. These projects may be constructed as Mixed-Fuel Buildings; however, they must be Electrically Pre-Wired for future electric appliances in any location where a Fuel Gas appliance is installed.

2. New and existing Accessory Dwelling Units and Junior Accessory Dwelling Units that are attached or wholly within an existing Mixed-Fuel Residential Building may utilize an existing Fuel Gas appliance for water heating and space heating until January 1,

2045. For clarification, any new appliances installed in a new or existing Accessory Dwelling Unit or Junior Accessory Dwelling Unit must be powered by electricity only, pursuant to section 14.06.070.

3. This section shall not apply to development projects that have obtained vested rights pursuant to state law prior to the effective date of this Ordinance.

14.06.040 Prohibition on Conversion to Mixed-Fuel Buildings

A. Residential Buildings. No existing All-Electric Building may be converted into a Mixed-Fuel Building on or after the effective date of this Chapter.

B. Non-Residential and Mixed-use Buildings. No existing All-Electric Building may be converted into a Mixed-Fuel Building on or after January 1, 2025.

14.06.050 Major Remodels

A. Residential Buildings. The entire ownership or tenant space shall be converted to All-Electric as part of any Major Remodel on or after January 1, 2023.

Exception: Basic maintenance projects including but not limited to window replacements, energy efficiency projects, dry rot repair, floor covering replacements, or additions/renovations of outdoor decks.

Note: Any conversion of existing space or added floor area associated with a new Accessory Dwelling Unit or Junior Accessory Dwelling Unit shall not be considered in the calculation of square footage for a Major Remodel of an existing structure.

B. Non-Residential and Mixed-Use Buildings. The entire ownership or tenant space shall be converted to All-Electric as part of any Major Remodel on or after January 1, 2025.

Exception: Basic maintenance projects including but not limited to window replacements, energy efficiency projects, dry rot repair, floor covering replacements, or additions/renovations of outdoor decks.

C. The requirements of this section shall apply at the time of completed building permit application.

14.06.60 Minor Remodels

A. Residential Buildings. Any Fuel Gas appliances within an area undergoing a Minor Remodel shall be converted to an equivalent appliance powered by electricity as part of the Minor Remodel on or after January 1, 2023.

B. The requirements of this section shall apply at the time of Minor Remodel, whether or not a building permit is required.

C. The addition of a Junior Accessory Dwelling Unit, the conversion of existing floor space into an Accessory Dwelling Unit, or the addition of an attached Accessory Dwelling Unit that is less than 500 square feet qualifies as a Minor Remodel.

14.06.070 New Appliances

Any new appliances installed in an Existing Residential, Non-Residential, or Mixed-Use Building shall be powered by electricity only.

14.06.080 Termination of Gas Service

No later than January 1, 2045, all buildings within Half Moon Bay shall be All-Electric Buildings or All-Electric Conversions and all Fuel Gas plumbing lines shall be capped and/or decommissioned.

14.06.090 Exceptions

A. Existing Deed Restricted Affordable Housing shall be exempt from Section 14.06.050, 14.06.060 and 14.06.070 until January 1, 2027.

B. Where the Owner-Occupant is a participant in the PG&E CARE or FERA Program, that Owner-Occupant shall be exempt from Sections 14.06.050, 14.06.060, and 14.06.070 until January 1, 2027.

C. Existing Commercial Greenhouses shall be exempt from Sections 14.06.050, 14.06.060, and 14.06.070 until January 1, 2030.

D. Wastewater Treatment Facilities shall be exempt from this Chapter until January 1, 2045.

E. Fuel gas generators shall be exempt from the Chapter until January 1, 2045.

F. The requirements of this Chapter shall not apply to the use of portable propane appliances for use outside of the building envelope, such as outdoor cooking, and outdoor heating appliances.

14.06.100 Infeasibility Waiver

A. Waiver. If an applicant for a permit for a Newly Constructed Building, Major Remodel, Minor Remodel, New Appliance, or an Exchange of Fuel Gas Appliance believes that physical or technical circumstances exist that make it technically or physically infeasible to meet the requirements of this Chapter in part or in whole, the applicant may request an infeasibility waiver as set forth below. Financial considerations alone shall not be a sufficient basis for technical or physical infeasibility. In applying for an exemption, the burden is on the Applicant to show infeasibility.

B. Application Process. An applicant may apply for an infeasibility waiver by submitting a written letter of justification for an infeasibility waiver as early as practicable. Where the project involves issuance of a Coastal Development Permit (CDP) the waiver request shall be filed concurrently and considered concurrently with the CDP. The applicant shall indicate in their letter of justification the maximum threshold of compliance he or she believes is feasible for the project and the circumstances that make it infeasible to fully comply with this Chapter. Circumstances that constitute infeasibility include, but are not limited to the following:

    1. There is conflict with another City regulation, such as those requiring historic preservation;

    2. There is a lack of commercially available materials, appliances, and/or technologies to comply with the requirements of this Chapter;

    3. Applying the requirements of this Chapter would effectuate an unconstitutional interference.

C. Review of Exemption. Where the City Manager or his/her designee determines that it is infeasible for the applicant to fully meet the requirements of this Chapter based on the information provided, the City Manager or his/her designee shall determine the maximum feasible threshold of compliance reasonably achievable for the project and condition the approval accordingly. The decision of the City Manager or his/her designee shall be provided to the applicant in writing. If an exemption is granted but the City Manager or his/her designee determines that the applicant can still achieve a certain threshold of compliance, the applicant shall be required to comply with this Chapter in all other respects and shall be required to achieve, in accordance with this Chapter, the threshold of compliance determined to be achievable by the City Manager or his/her designee.

D. Final Determination. If the City Manager or his/her designee determines that it is reasonably possible for the applicant to fully meet the requirements of this Chapter, the request for an exemption shall be denied and the City Manager or his/her designee shall so notify the applicant in writing.

E. Expiration. The City Manager or his/her designee shall not grant infeasibility waivers on or after January 1, 2045. All Infeasibility Waivers granted previously shall expire on January 1, 2045.

14.06.110 Appeal

A. Any aggrieved Applicant may appeal the determination of the City Manager or his/her designee regarding the granting or denial of an exception or infeasibility waiver pursuant to this Chapter.

B. Any appeal must be filed in writing with the City Clerk not later than fourteen (14) days after the date of the City's determination. The appeal shall state the alleged error or reason for the appeal.

C. The appeal shall be processed and considered by the City Council in accordance with the provisions of the Half Moon Bay Municipal Code.

14.06.120 Periodic Review

A. The City intends for all buildings to be fully electrified by 2045 and thus monitoring and managing implementation is necessary.

B. The City Council shall review the effectiveness of this Chapter in conjunction with the annual review of the City's adopted Climate Action and Adaptation Plan (CAAP).

C. The City Council shall review this Chapter in conjunction with the triannual building code adoption cycle to ensure it is at least as stringent as State Code and to ensure progress under this Chapter is sufficient in conjunction with the City's Greenhouse Gas Emission Reduction Goals.

14.06.130 Violations

An owner of a building, a tenant and/or an agent representing the owner subject to this Chapter who fails to comply with any of requirements of this Chapter shall be subject to fines and penalties contained in Title 4 (Code Enforcement) and any other enforcement provisions authorized by the California Building Code or related Codes.

THE CITY OF HALF MOON BAY CALIFORNIA

Frequently Asked Questions About
Half Moon Bay's Proposed Building Electrification Ordinance
Updated November 29, 2021

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What is Building Electrification?

Building Electrification describes the move from fuel gas-powered appliances — like furnaces, hot water heaters, and stoves that use natural gas or propane — to clean, highly efficient electric appliances such as electric heat pumps, electric hot water heaters, and induction stoves. Fuel gas is natural or manufactured liquefied petroleum, or a mixture of these. This includes natural gas and propane.

Why adopt a Building Electrification Ordinance?

Nearly half of the greenhouse gas (GHG) emissions in Half Moon Bay come from energy use in buildings, with, 80% of those emissions are generated from fuel gas-powered energy. Switching residential and commercial buildings' energy sources away from fuel gas and toward electric appliances has the potential to significantly reduce the City's GHG emissions, and enhance indoor air quality, improve the environment and our local public health and safety, increase energy efficiency, lower overall energy use, and help the State achieve its SB32 GHG emissions reduction goals.

What would the proposed Building Electrification Ordinance do?

Taking into consideration the public comments and feedback received, and direction from the City Council at various public meetings[1], staff has drafted a Building Electrification Ordinance which would:

[1] Public Meetings discussing the proposed ordinance were held on February 2, 2021; September 21, 2021; October 5, 2021; and November 16, 2021

- Require all new construction to be electric-only – no gas or propane in new buildings (residential and commercial)
- Require all-electric retrofits for various types of remodels (residential and commercial)
- Require that fuel gas connections to most buildings in Half Moon Bay are capped and/or decommissioned by January 1, 2045

What is the status of the proposed ordinance?

The City Council discussed the most recent draft of the Ordinance at its November 16, 2021 meeting. A recording of the meeting is available online.

At that meeting, the City Council directed staff to remove requirements that mandate retrofits of individual fuel gas appliances at the time of replacement and to more fully define "Major/Minor Remodel" provisions. The public hearing and first reading of the proposed Building Electrification Ordinance has been rescheduled for the City Council meeting on December 7, 2021.

It is anticipated that, if adopted by the City Council, the Ordinance will become effective in early 2022.

Ordinance Details (Residential)

How would the proposed ordinance impact NEW residential buildings?

Any new residential building that receives building permits after the Ordinance becomes effective ***and*** before January 1, 2023, would need to pre-wire for electric appliances in any area where a fuel gas appliance is intended to be installed.

Any new residential building that receives building permits ***on or after*** January 1, 2023 must be designed and built as an all-electric building and may not include any fuel gas appliances.

How would the proposed ordinance impact EXISTING residential buildings?

Existing residential buildings would be impacted by the proposed Building Electrification Ordinance in the following ways:

Prohibition of Conversion to Mixed-Fuel Buildings: Beginning 30 days after the proposed Ordinance is adopted, any current all-electric building would not be allowed to install any fuel gas appliances.

New Appliances: Beginning 30 days after the proposed Ordinance is adopted, any new appliance that is installed where no appliance has previously been installed must be electric.

Major Remodels: Beginning January 1, 2023, any addition or alteration that includes a space of 500 square feet or more must fully electrify the entire building at the time of the remodel.[2]

Minor Remodels: Beginning January 1, 2023, any addition or alteration of less than 500 square feet (defined as a "Minor Remodel") must electrify any fuel gas appliances within the area of the remodel. If the area does not include a fuel gas appliance, no electrification measures are necessary at the time of the remodel.

Termination of Gas Services in 2045: Any fuel gas lines must be capped and/or decommissioned by January 1, 2045.

How would the proposed ordinance impact mobile home parks?

Mobile home parks and mobile homes themselves are regulated by the State of California and generally not by City Ordinances. The proposed Building Electrification Ordinance would not apply to the mobile home parks or the mobile homes located within the park (including the Ordinance's requirement to cap and/or decommission fuel gas lines by 2045).

Ordinance Details (Non-Residential)

How would the proposed ordinance impact NEW non-residential buildings?

Any new non-residential building that receives building permits after the Ordinance becomes effective ***and*** before January 1, 2023, would need to pre-wire for electric appliances in any area where a fuel gas appliance is intended to be installed.

[2] Basic Maintenance projects such as window replacements, floor covering replacements, energy efficiency upgrades, and/or outdoor deck repairs alone would not trigger the requirement to electrify the entire building at the time of these repairs.

Additions/alterations that result in a new accessory dwelling unit would not trigger the requirement to electrify the entire building.

Any new non-residential building that receives building permits ***on or after*** January 1, 2023 must be designed and built as an all-electric building and may not include any fuel gas appliances.

How would the proposed ordinance impact EXISTING non-residential buildings?

Existing non-residential buildings would be impacted by the proposed Building Electrification Ordinance in the following ways:

New Appliances: Beginning 30 days after the proposed Ordinance is adopted, any new appliance that is installed where no appliance has previously been installed must be all electric.

Prohibition of Conversion to Mixed-Fuel Buildings: Beginning January 1, 2025 any existing all-electric building would not be allowed to install any fuel gas appliances.

Major Remodels: Beginning January 1, 2025, any addition or alteration that includes a space of 500 square feet or more must fully electrify the entire building at the time of the remodel.[3]

Termination of Gas Services in 2045: Any fuel gas lines must be capped and/or decommissioned by January 1, 2045.

Does the proposed ordinance apply to existing commercial greenhouses?

Existing commercial greenhouses are exempt from electrification requirements until January 1, 2030. After 2030, electrification requirements would only apply in the cases of:

- Installation of a new appliance that previously did not exist; or
- Major remodel (500 square feet or more)

[3] Basic Maintenance projects such as window replacements, floor covering replacements, energy efficiency upgrades, and/or outdoor deck repairs alone would not trigger the requirement to electrify the entire building at the time of these repairs.

Ordinance Details (Exceptions)

Would the proposed Ordinance require electrification for appliance replacements?

No, the proposed Ordinance set to be introduced on December 7, 2021 will not include electrification requirements for individual appliance replacements other than for a minor or major remodel. If a fuel gas appliance needs to be replaced, it can be replaced with a fuel gas appliance.

Does the proposed ordinance have exceptions for low-income individuals?

Yes. There are two exceptions that may apply to low-income individuals:

- Owner/occupants of a residential building that are also PG&E CARE/FERA customers are exempt from electrification requirements for major and minor remodels of existing buildings through January 1, 2027.

- Deed-Restricted Affordable Housing is exempt from electrification requirements for major and minor remodels of existing buildings through January 1, 2027.

Does the proposed ordinance impact fuel-gas powered emergency generators?

No. Fuel-gas powered emergency generators would continue to be allowed under the proposed Building Electrification Ordinance, until 2045.

Does the proposed ordinance impact small, portable propane canisters?

No. Small, portable propane canisters such as those you would use to power outdoor grills, firepits, and space heaters would continue to be allowed under the proposed Building Electrification Ordinance.

Ordinance Process

What community outreach has been done regarding the proposed ordinance?

The City Council discussed the proposed Ordinance during their public meetings on February 2, 2021; September 21, 2021; October 5, 2021; and November 16, 2021.

At the February 2, 2021 meeting, City Council directed staff to launch a community outreach effort to encourage and gather more input on this issue from the City's businesses and residents, to help ensure the public understands the proposal and to better determine the impacts of the proposed policy. Between June and September of 2021, City staff conducted the following outreach activities:

- One-on-one meetings, phone calls, and emails with stakeholders
- Survey cards sent to all Half Moon Bay hotels and restaurants
- Online survey for residents and businesses (English and Spanish)
- Presentations to special interest groups such as the San Mateo County Association of Realtors and the Half Moon Bay Chamber of Commerce
- In-person/Zoom hybrid workshop with Senior Coastsiders (July 14 - 6 attendees); recording sent to Evergreen Coastsiders listserv
- Zoom workshop with Half Moon Bay Chamber of Commerce and Peninsula Clean Energy (August 12 - 60+ attendees); recording posted on City website
- Information tabling at Make it Main Street Festival (August 5)
- Social media posts (Twitter, Facebook, Instagram, NextDoor)
- Information in City eNews (1,359 subscribers), Sustainability Source Newsletter (116 subscribers), Building Electrification listserv (1,875 subscribers)

What are the next steps, and how can I comment on the proposed ordinance?

The City Council is scheduled to hold a public hearing and introduce the proposed Ordinance for a first reading at its December 7, 2021 meeting. Meeting details will be announced in the City's weekly eNews, the Building Electrification listserv, and on the City's Building Electrification webpage.

Ordinances must go through a minimum of two readings at a public meeting before becoming adopted. The public can participate and provide comments at one or both of the readings of the Ordinance.

Where can I find more information?

All information regarding the Building Electrification Ordinance, including copies of the most recent drafts, are posted on the Building Electrification web page.

Who should I contact with questions and comments?

Questions and comments about the Half Moon Bay Building Electrification Ordinance should be directed to: Veronika Vostinak, Sustainability Analyst: sustainability@hmbcity.com or 650-750-2019

Electricity vs Fuel Gas

Isn't electricity more expensive than fuel gas?

While electricity is more expensive per unit than fuel gas, electric appliances like heat pumps are generally more efficient and use less energy overall to run. The costs to operate will vary depending on the product chosen and consumer behavior.

Is electricity from the grid "clean?"

Peninsula Clean Energy (PCE)'s base service is 100% carbon-free as of January 2021. To learn more about PCE's power mix, please visit the PCE website.

How reliable is the electric grid as compared to natural gas?

The natural gas grid and electric grid both experience service interruptions on occasion. In fact, during California's most likely natural disaster events - wildfires and earthquakes - utilities are supposed to turn the gas off. Additionally, many new fuel gas appliances require electricity to operate.

If 100% reliability is a goal for your home or project, electrification with battery and solar backup is the best option.

Does all-electric heating use a lot of energy and can it work in our cool climate?

All-electric heat pumps are highly efficient and effective in weather far colder than our typical local temperatures. Department of Energy studies show heat pump space heaters are highly efficient at as little as five degrees Fahrenheit. The California Energy Commission's cost effectiveness studies also show high efficiency of electric heat pumps.

Don't people prefer gas stoves?

There are people who prefer gas stoves. However, many may be unfamiliar with induction stoves (electric) which offer superior speed and control, maintain cool and safe surfaces while cooking, and offer better indoor air quality. Induction stoves are increasing in popularity and are a great alternative to gas stoves.

Benefits of building electrification

What are the climate benefits of building electrification?

The State of California has adopted ambitious climate goals mandating the reduction of greenhouse gas (GHG) emissions by 40% (based on 1990 levels) by 2030[4] and to reach carbon neutrality by 2045.[5]

According to the most recent data, 49% of Half Moon Bay's GHG emissions come from energy use in buildings, with 80% of those emissions coming from fuel gas-powered energy. 97% of Half Moon Bay energy customers are receiving carbon-free electricity from PCE.

What are the safety and health benefits of Building Electrification?

Based on studies around risks related to fire and respiratory issues, electrification offers safety and health benefits.

Research indicates that natural gas is a major fire risk in the event of earthquake. The link between earthquakes and natural gas-triggered fires is well documented as an important secondary hazard risk within the studies published by the California Seismic Safety Commission.

Natural gas use in the home is linked with asthma and other health risks:

- EPA identifies indoor air quality as a significant health risk and gas appliances are listed as a point of concern
- 2019 meta research links gas stoves and asthma
- 2008 Johns Hopkins study linking gas stoves and asthma
- Lawrence Berkeley Labs, California Energy Commission, and others have also produced similar studies

[4] Senate Bill 32 (2016)
[5] Executive Order B-55-18 (2018)

- Carbon monoxide (CO) from fuel gas use has been long deemed a risk, to the extent that CO sensors are required in homes that burn fossil fuels

Subject: RE: I support your measures
Date: Monday, November 15, 2021 at 12:06:03 PM Pacific Standard Time
From: Anne Adams
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak
Attachments: image005.jpg, image006.jpg

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I support these measures also

- The Air District water heater & furnace NOx rules that would effectively ban the sale of gas appliances beginning in 2029 may be delayed; staff will propose taking more time at the Committee Hearing tomorrow, 11/15, at 9am (Agenda here & find more info here.)
  - **Please email comments in support of the rules or comment live on 11/15.**

- Help protect home solar in California. Home solar systems help make electrification much more affordable, but the "net metering" that allows that is now at risk. Find out more & please show your support here.

Anne Adams

Don't ask yourself what the world needs –
Ask yourself what makes you come alive, and then go do it.
Because what the world needs is people who have come alive.
Dr. Howard Thurman

Anne Adams, PhD
https://integrality.co/
STAMP
MONEY OUT
OF POLITICS

From: Anne Adams <aadams1@ix.netcom.com>
Sent: Monday, November 15, 2021 12:05 PM
To: 'to' <RBrownstone@hmbcity.com>; 'DRuddock@hmbcity.com' <DRuddock@hmbcity.com>; 'jjimenez@hmbcity.com' <jjimenez@hmbcity.com>; 'DPenrose@hmbcity.com' <DPenrose@hmbcity.com>;

'HRarback@hmbcity.com' <HRarback@hmbcity.com>; 'VVostinak@hmbcity.com' <VVostinak@hmbcity.com>
Subject: I support your measures

Thank you for addressing this in HMB

- **The City of Half Moon Bay is considering a first-of-its-kind Building Electrification Ordinance on November 16, at 7pm; please help circulate this Action Alert & show your support by: YES**

1. **Write the City of Half Moon Bay in Support of the Gas Phase-out by noon on Tuesday** (send comments to RBrownstone@hmbcity.com; DRuddock@hmbcity.com; jjimenez@hmbcity.com; DPenrose@hmbcity.com; HRarback@hmbcity.com; VVostinak@hmbcity.com; see the Action Alert for a sample message or draft your own about fossil fuels should be phased out)

I support you

Anne Adams, I cannot be with you at the meeting

Don't ask yourself what the world needs –
Ask yourself what makes you come alive, and then go do it.
Because what the world needs is people who have come alive.
Dr. Howard Thurman

Anne Adams, PhD
https://integrality.co/
STAMP
MONEY OUT
OF POLITICS

Subject: Fwd: Please Adopt the Electrification Ordinance to Phase Out Polluting Gas Use
Date: Tuesday, November 16, 2021 at 11:27:11 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Bellamy Cramer[redacted]
Subject: Please Adopt the Electrification Ordinance to Phase Out Polluting Gas Use
Date: 16 November 2021 at 8:21:17 pm GMT-8
To: RBrownstone@hmbcity.com, DRuddock@hmbcity.com, jjimenez@hmbcity.com, DPenrose@hmbcity.com, HRarback@hmbcity.com

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Dear Mayor Brownstone and Half Moon Bay Council Members,

I am here as a lifelong Bay Area resident and high school senior at Cañada Middle College. On behalf of my community, I would like to express my wholehearted support for the Electrification Ordinance phasing out gas in homes and buildings to reduce health and climate risks, cut fossil fuel pollution, and lead to healthier homes and more resilient communities.

As a member of the younger generation, we will be the most heavily impacted by climate change, and it is of the utmost importance to ensure a safe future for my generation. As a resident of the Bay Area, I have been incredibly proud of this city's bold climate leadership in the past and urge the city to uphold their reputation as a leader in environmentalism. This ordinance also offers Half Moon Bay the opportunity to establish itself as a climate innovator, demonstrating the leadership necessary to move forward.

We must stop treating the climate crisis as a far off issue, as the recent IPCC report stated that we are entering a "code red for humanity" and that aggressive and immediate action is necessary to address the climate crisis, including a rapid phase out of natural gas, which accounts for over 50% of Half Moon Bay's carbon pollution. Half Moon Bay is already experiencing the impacts of climate change through worsening wildfires, poor air quality, heatwaves, and drought. As a coastal city, they are also at risk for sea level rise.

We also must acknowledge that climate change does not stop at our city's borders, and that the actions you take will affect people around the world. We have also seen that climate change is an issue of equity, and people of color and lower income communities are disproportionately affected by its effects. Climate change affects everyone, and we must take drastic action

immediately in order to mitigate its effects, starting with adopting this ordinance. The proposed Building Electrification Ordinance addresses these issues and includes equity measures and flexibility to ensure an affordable transition of homes and buildings from gas to electric.

Half Moon Bay has the responsibility to not only mitigate climate change, but to improve our health, equity, and overall quality of life. This ordinance exemplifies the bold action we need to accomplish these goals. Some may think it is too extreme, but at this point, the most drastic course of action is inaction. I urge you to adopt the Electrification Ordinance to Phase Out Polluting Gas Use to lead the Bay Area toward a brighter future by adopting the Building Electrification Ordinance as soon as possible.

Sincerely,
Bellamy Cramer

Subject: Please adopt the Electrification Ordinance to Phase out Polluting Natural Gas Use
Date: Tuesday, November 16, 2021 at 11:04:27 AM Pacific Standard Time
From: [redacted]
To: RBrownstone@hmbcity.com, DRuddock@hmbcity.com, jjimenez@hmbcity.com, DPenrose@hmbcity.com, HRarback@hmbcity.com, VVostinak@hmbcity.com

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Mayor Brownstone and Council Members,

I'm a Bay Area resident and member of Carbon Free Palo Alto. I applaud your commitment to meaningful climate action and urge you to adopt the proposed Electrification Ordinance. Since gas is responsible for half of the carbon pollution in Half Moon Bay, this gas phaseout measure is critical to addressing the climate crisis. By adopting this ordinance Half Moon Bay will inspire other communities in our area to do the same to transition away from fossil fuels now, with a wise, equitable and affordable approach that can realistically put us on a path to less than 2 degrees of warming.

Sincerely,

Bret Andersen, Carbon Free Palo Alto

Subject: REACH Code Support

Date: Sunday, November 14, 2021 at 4:02:28 PM Pacific Standard Time

From: Bruce Naegel

To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Rarback@hmbcity.com, Jessica Blair, Bob Nisbet, John Doughty, Veronika Vostinak

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Re: Supporting the Half Moon Bay City Council Meeting passing the package of
ordinances on Building Electrification, EV Support, Replacing Appliances and termination of Fuel Gas service by 2045

November 16, 2021, 7 PM
https://us06web.zoom.us/j/95535614263#success
phone at 669-900-9128, using Webinar ID 955-3561-4263

Why is this needed now?

- The IPCC has indicated unequivocally that climate change is made from human activity.
- They declared we are now in Climate in Code Red
- Students (especially high school students) are effective in communicating the need for policies to address climate change.
- We are seeing the effects of climate change today in extreme weather today.
- The events in the future will be much worse than the events we see today.
- The youth will inherit the earth, what kind of world will we be leaving them?

What actions can we take now?

- We need to address both new construction and existing buildings.
- The current REACH Code focus is on New Construction since this is easier to support straightforward to support
- There are now fifty-two jurisdictions with some form of building code designed to reduce GHGs (Green House Gases) from new buildings.
- We now need to tackle existing buildings
- Half Moon Bay can adopt their proposed codes for existing buildings
- The Half Moon Bay proposal has defined programs and goals for existing buildings.

Building Requirements https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/1141346/STAFF_REPORT.pdf

- New Construction Buildings are All-Electric
- Major remodels are considered new construction.
- Termination of gas service by January 1,2045
- Greenhouses are exempted until Jan 1, 2030

EV Requirements

- https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/1141351/STAFF_REPORT.pdf
- New Construction Prewire for Battery Storage
- Require new single-family, duplexes, triplexes, and accessory dwelling units (ADUs) to pre-wire for the installation of back-up battery storage
- Expand Photovoltaic (PV) System installation requirements for new Non-Residential Buildings
- Expand electric vehicle (EV) charging requirements for Residential New Construction
- Support of Automatic Load Management System

Conclusion: / What can you do

- We need to address climate change now to get out of Code Red.
- Half Moon Bay put together a well thought out and comprehensive set of tools to address climate change
- We need to ensure this package gets put into law

COASTSIDE FAMILIES TAKING ACTION

November 15, 2021

Dear HMB City Council,

Coastside Families Taking Action is an organization of over 200 local families. Many of our members have young kids--kids that we parents know will not have the ability to have the same lifestyles we grew up with or have now due to climate change.

Some want to "stop electrification" in Half Moon Bay, arguing that the costs are too great. Of course the solutions to the global crisis we face will cost money, everything costs money. There are real questions that are only beginning to be answered about how the City and others (state, feds, utilities, etc.) can help families that can't afford to cover those costs. But help is coming from programs like Peninsula Clean Energy's new income-qualified Home Upgrade Program and Zero Interest On-Bill Financing. And the costs of inaction are significant--we are already spending billions on wildfires, droughts and floods, healthcare costs due to poor air quality, increasing insurance rates, and more. How much should we expect our children to pay in terms of lost days outside or years of their life, in terms of catastrophes and suffering?

We try to teach our children, "when you know better, you do better." We have known for decades that fossil fuels are causing climate change that will make many parts of the world uninhabitable, that will cause millions of species to go extinct, that will make the future unrecognizable. How can we explain the lack of action to our children and grandchildren?

A better future IS POSSIBLE. Why do we insist on using dirty old technology when we could have clean modern technology? Why must we keep lining the pockets of a few very wealthy people and companies while the rest of us pay the consequences?

Some argue that the grid is not reliable enough, and that has been a challenge in recent years. PG&E is investing in it--not as much or as fast as we might like, but they are. We've seen fewer PSPS events due to new grid control devices that allow them to shut down smaller areas. We could allow them to invest more in it by minimizing or eliminating their need to continue to invest in a second system (natural gas pipelines). We can install solar and battery backup to eliminate disruption from any outages and enable the clean energy transition, which also makes running your appliances on electricity very cost effective! Peninsula Clean Energy is investing heavily in clean electricity generation and energy storage as well, so the electricity we are receiving is already virtually emissions free and will become so on an hour-by-hour basis within a few years.

Some argue that “natural” gas is clean. It’s not--it is primarily methane which warms the climate 86 times more than CO2 in a 20-year timeframe, its extraction and transport is notoriously leaky, and rapidly reducing it is the best short-term action we can take to affect climate change. It also makes indoor air unhealthy and can lead to or exacerbate asthma and other respiratory problems.

Some claim that gas is more affordable, while ignoring the efficiency of modern electric appliances (many electric appliances are 3x more efficient) which makes operating electric appliances similar to or cheaper than gas. There is a lot of volatility in the price of fossil fuels, as we are currently seeing, and most experts expect prices for natural gas to go up significantly.

Some want to scare people about not being able to use their existing appliances (you can still use them until they are no longer functioning and need to be replaced, or you voluntarily decide to renovate, or 2045 when gas service will end) or being able to grill outdoors (outdoor grills and firepits using portable propane tanks are not impacted by the city’s proposal).

Some claim we shouldn’t bother doing anything because we are just one small city and this is a global problem, or that we should only act after China or others do. This is an absurd way to live your life. We have an opportunity to show leadership; others are watching and many will follow. We are feeling the effects of climate change acutely, who do we expect to save us if not ourselves? Besides, the US has played an outsized role in the creation of this problem and surely there are people in other countries wondering why they should do anything if we aren’t.

Scientists tell us that we must quit using fossil fuels and that we have all the technology we need to do so NOW, the challenges are purely political and economic. To have hope for a livable future, we should eliminate fossil fuels by mid-century, and the sooner the better. The steps the HMB city council is poised to take are rational responses to this problem--they understand that it will take time to make this transition. So they’re putting a plan in place and getting started, giving more than two decades to transition off gas by 2045 and preventing individuals and businesses from spending money on new appliances that prolong the problem and will become obsolete. They are providing sensible exemptions for facilities such as greenhouses and affordable housing which can be revisited over time as technology and economics inevitably change. We commend the HMB city council’s leadership and urge you to not turn back.

Our children are watching, and we must do better. Thank you!

Best,

Coastside Families Taking Action

Subject: Please adopt the proposed electrification ordinance
Date: Tuesday, November 16, 2021 at 9:25:43 AM Pacific Standard Time
From: Cynthia Chin-Lee
To: Veronika Vostinak

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Veronika Vostniak,

Dear Mayor Brownstone and Council Members,

I'm a Bay Area resident writing to you in strong support of the proposed Electrification Ordinance phasing out gas in homes and buildings in front of you this evening.

This crucial step will reduce health and climate risks, cut fossil fuel pollution, and lead to healthier homes and more resilient communities.

We are in the midst of both a pandemic and a climate crisis. The Bay Area is especially vulnerable to the five-fold increase of wildfires due to climate change as well as the resulting smoke which harms our health and increases COVID risks. Pollution from gas appliances exacerbates both of these risks.

We cannot put off action to cut carbon emissions and phase out polluting fossil fuels any longer. The proposed Building Electrification Ordinance includes equity guardrails and flexibility to ensure an affordable transition of homes and buildings from gas to electric.

Since gas is responsible for half of the carbon pollution in Half Moon Bay, this gas phase out measure is critical to addressing the climate crisis.

I urge you to lead Peninsula cities towards a gas-free and climate-safe future by adopting the Building Electrification Ordinance right away.

Sincerely,

Cynthia Chin-Lee
[redacted]
Half Moon Bay, California 94019-1555

Veronika Vostinak

From: Daniel Canafax [redacted]
Sent: Wednesday, December 1, 2021 4:53 PM
To: HMB Sustainability
Subject: Oppose Potential Ordinance Banning Home Gas Use

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

We oppose the potential ordinance to ban gas appliances in old homes and require them to be replaced with all electric appliances. In fact, according to the EPA, electricity generation is responsible for 25% of greenhouse gas emission vs. 13% for the combined residential and commercial sources. Therefore, the need for more electricity generation would increase greenhouse gases.
https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

Dan Canafax HMB resident since 1997.

Subject: Fwd: Some Resources on Electrification
Date: Monday, November 15, 2021 at 11:40:21 AM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak
Attachments: image001.png, Increased gas costs.png

Begin forwarded message:

From: Diane Bailey[redacted]
Subject: Some Resources on Electrification
Date: 11 November 2021 at 9:36:22 am GMT-8
To: "dpenrose@hmbcity.com" <dpenrose@hmbcity.com>

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good morning. I hope this message finds you doing well. I'd like to share a few quick updates with you.

There was a very inspiring recent letter to the editor in the HMB Review. This quote stood out:

"What do we tell our grandchildren and great-grandchildren? We knew it [Climate Change] was happening, but slowing world catastrophe was just too expensive?"

I think there may be a few other pieces like this from local community leaders in the coming days! Below, I've listed some informational resources & responses to concerns from an earlier article in the HMB Review.

Also, several news outlets are reporting price spikes this winter for natural gas. I think it's important to consider that the cost of gas is rising so much faster than electricity rates (please see the graphic attached).

I'm sure you're hearing from many different stakeholders about the Electrification Ordinance. We're strong supporters and have written with support several times, so I'll try

not to repeat that. Please reach out if questions come up that you'd like more information on.
All the best,
Diane

Some resources on electrification:
These climate talking points discuss why policies to phase out methane gas are critically needed.

Also this Frequently Asked Questions document could be a good resource. And maybe also these:

Affordable and Equitable Electrification
Benefits of Electrification
Air Quality, Health, and Resilience Benefits of Electrification

Here are some common & recent concerns addressed:

Concern 1: Cost (homeowners & business)
Yes, there may be a slightly increased cost to replace gas appliances with electric, though the cost is made up in utility bill savings over time, and there are many rebates and incentives to help. In fact, Peninsula Clean Energy is launching a new Zero Interest on bill financing program in January for electric appliances.

The cost of inaction on climate is steep (see TPs above for stats). We're already paying an invisible cost of climate with increasing insurance rates for homes & businesses, with our health and canceled events from wildfire smoke, and increasing utility costs (both water and power).

The HMB City proposal includes a phased approach allowing much more time for small businesses and exempting specialty businesses like greenhouses.

Concern 2: Favorite appliance (e.g. stove) will be taken away
The proposed rule only requires electric choices for new purchases (when an appliance fails and must be replaced or during planned renovations).

Concern 3: Electrification forces major rewiring & panel upgrades
Replacing gas with electric doesn't require any major rewiring or panel upgrades, thanks to new technology. Smart Panels can let you go from a 100 amp panel to 200amps without any electrical upgrade, just managing your load. Offerings are coming soon from **Span.IO**

and **Schneider Electric**. Also, this Electric Home Retrofit Guide, offers practical steps to fully replace gas without upsizing your home's electric panel.

Concern 4: Renters in Affordable Housing will suffer (e.g. renovictions)
CARE Customers (households on energy bill assistance programs) and affordable housing are exempt from proposed electrification requirements. Peninsula Clean Energy has no-cost home upgrade programs to assist these households.

Concern 5: Unreliable power grid

- PG&E solved part of the issue with PSPS's so that Half Moon Bay doesn't lose power anymore when they plan power shut downs in fire prone areas (I think this was the first year with their new "switches" and "zone control" in place).
- But the power still goes out sometimes – which is annoying, and life-threatening for people with medical devices, plus costs a lot when a fridge full of food spoils, so what can be done about that? PCE has a program to supply battery back-up power for any vulnerable households (like with medical devices); they also offer discounts to anyone who wants battery back-up.
- Also, new gas appliances are electronically controlled and don't function when the grid is down (unless you have a battery or generator). The one exception is gas stoves, but for cooking you can buy a cheap propane camping stove or barbecue outside (anyway without power you'd be cooking in the dark, so…not ideal).
- The bottom line is that moving from gas to electric as you replace appliances doesn't increase the inconvenience of a power outage because new gas furnaces or water heaters do not work when the power is out.

Concern 6: The city will make a fortune from "conversion permits"
Whether installing a gas furnace or an electric heat pump, a permit is needed.
"Conversion permits" aren't a thing.

Diane Bailey (she/her), Climate Change Professional (CC-P) | Executive Director
MENLO SPARK
[redacted]
Visit us: www.MenloSpark.org & www.FossilFreeBuildings.org
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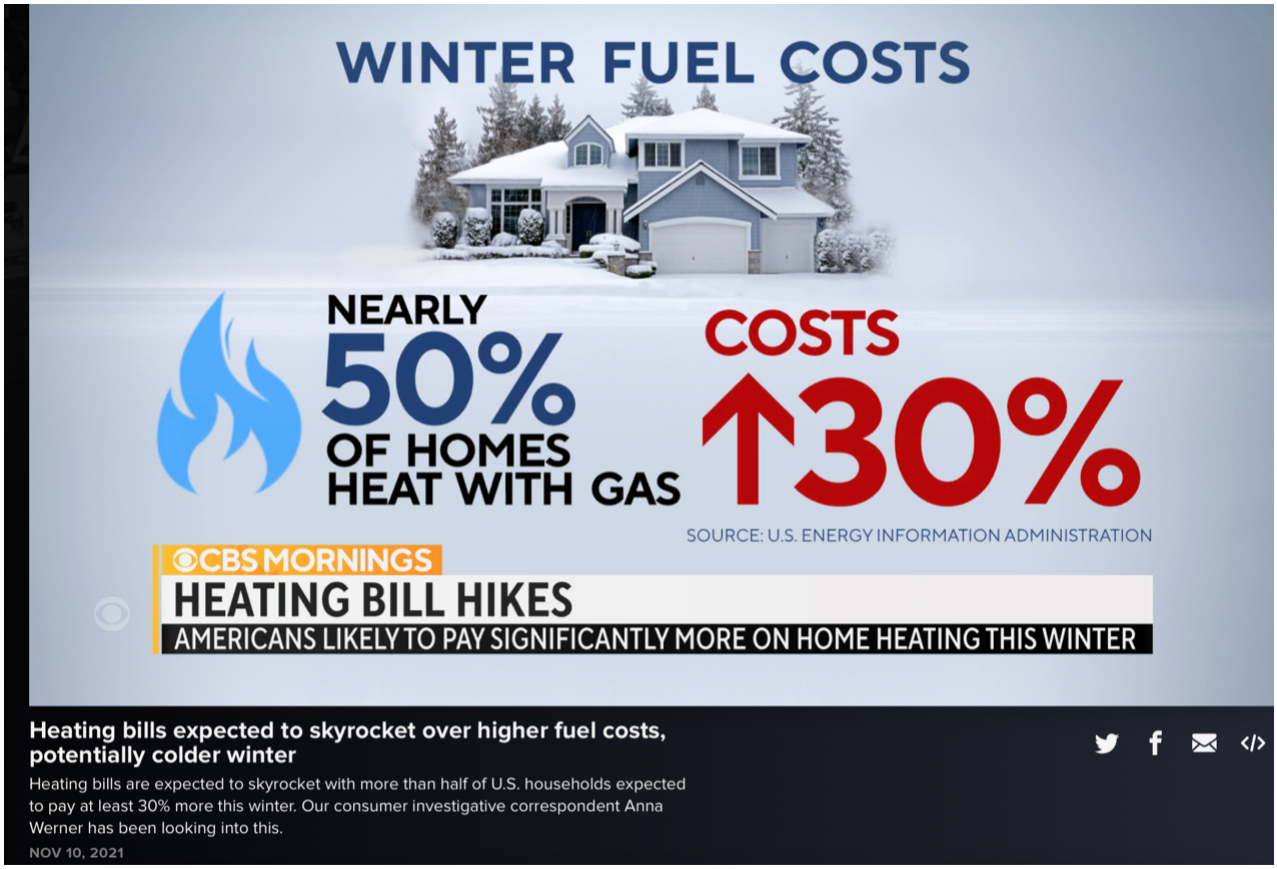
Climate Neutral for a Healthy, Prosperous Menlo Park

EV, PV & Fossil Free*: Guides for Electric Cars, solar & Fossil Free Homes at:* **http://menlospark.org/what-we-do/**

"Every day that we delay our response to climate change, the situation gets more critical." - Marina Romanello, research director and lead author on The Lancet report



Subject: Support for Building Electrification & Responsible Climate Action in Half Moon Bay
Date: Tuesday, November 16, 2021 at 9:57:23 AM Pacific Standard Time
From: Diane Bailey
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, HMB Sustainability
Attachments: image001.png

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Mayor Brownstone and Council Members,
I'm writing in strong support of the Building Electrification Ordinance under consideration this evening. Thank you for taking up this extremely important climate measure to address the largest source of greenhouse gas emissions in Half Moon Bay, coming from methane gas ("natural gas") used in homes and buildings.
As California communities face ten feet of sea level rise and many other negative impacts of climate change, this electrification ordinance is a much-needed step to help get us on track to a more resilient, climate-safe future. Each of the proposed components of the Building Electrification Ordinance are key measures to help achieve our climate goals:

- **All-electric new building construction** – Over 40 cities & counties in California are currently requiring this.
- **Electric appliances when replacements are made** (in existing buildings) – This is a smart way to achieve a healthy and affordable transition off gas use.
- **Phase out gas applications and distribution in existing buildings by 2045 -**This provides meaningful clarity, helping community members plan the transition.
- **Back-up battery storage (or prewiring) for new homes & on-site solar energy systems for buildings –** These provisions will significantly improve community resilience.
- **Expand electric vehicle (EV) charging requirements** – This helps improve access to more affordable EVs for everyone.

A well-planned transition off of methane gas – as designed here – will help Half Moon Bay families and businesses gain all the health, safety, and resilience benefits of switching to clean electric heating and appliances, while avoiding the price spikes and pollution of continued gas use.

Thank you for your leadership and commitment to a more sustainable future! The City of Half Moon Bay will benefit from being a leader phasing out fossil fuels.
Warm regards,
Diane Bailey

Diane Bailey (she/her), Climate Change Professional (CC-P) | Executive Director
MENLO SPARK
[redacted]
Visit us: www.MenloSpark.org & www.FossilFreeBuildings.org
Find us on Facebook
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Climate Neutral for a Healthy, Prosperous Menlo Park

EV, PV & Fossil Free*: Guides for Electric Cars, solar & Fossil Free Homes at:* http://menlospark.org/what-we-do/

"Every day that we delay our response to climate change, the situation gets more critical." - Marina Romanello, research director and lead author on The Lancet report

Subject: Fwd: Electrification Mandate
Date: Monday, November 15, 2021 at 6:23:45 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Doris Nishimoto [redacted]
Subject: Electrification Mandate
Date: 15 November 2021 at 3:55:26 pm GMT-8
To: "RBrownstone@hmbcity.com" <RBrownstone@hmbcity.com>, "DRuddock@hmbcity.com" <DRuddock@hmbcity.com>, "jjimenez@hmbcity.com" <jjimenez@hmbcity.com>, "DPenrose@hmbcity.com" <DPenrose@hmbcity.com>, "HRarback@hmbcity.com" <HRarback@hmbcity.com>
Cc: Noel Nish [redacted] Drew Corbett <dcorbett@cityofsanmateo.org>, Joe Goethals <jgoethals@cityofsanmateo.org>, Eric Rodriguez <erodriguez@cityofsanmateo.org>, Amourence Lee <alee@cityofsanmateo.org>, Diane Papan <dpapan@cityofsanmateo.org>, Rick Bonilla <rbonilla@cityofsanmateo.org>

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Dear City Council,

As a landowner in El Granada for 43 years, I thank you for your due diligence in preserving the coastal zones. Mandating electrification of existing homes, however, will not make a dent in the reversal of climate change and will be a hardship for the current taxpayers.

Currently, the 2 top producers of CO2 are the US and China; and scientists have pointed the finger at companies, not residential homes for out of control and under reported emissions.

It makes total sense to require *new construction* to be all electric; but to burden the taxpayer with the cost of mitigating climate change is a hardship of existing structures is a hardship unless the federal government grants subsidies for this work.

I would ask the city councils to ask for FEMA grants as *climate crisis is a natural disaster* in my eyes; then make these grants available to those existing homeowners who choose to use them to thus electrify their existing homes.

Many people are still struggling through this Pandemic without having to worry about electrification of their home which is another *stressor* at this point in time.

Doris Nishimoto, D.D.S.

[redacted]

Subject: BUILDING ELECTRIFICATION SUPPORT
Date: Friday, November 19, 2021 at 7:59:52 AM Pacific Standard Time
From: Doug Slezak
To: HMB Sustainability

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good morning,

I am writing to support the ordinance to require all new construction and replacement of existing non electric appliances ASAP. While a financial burden the time to act has long past so this is a small requirement to move us into a more sustainable future. Thanks for your work.

Doug Slezak
[redacted]
Half Moon Bay, CA 94019

ehdd.

December 2, 2021

Mayor and City Council Members
City of Half Moon Bay

Re: In Support of Building Electrification Ordinance

EHDD is an 80-person architectural firm with 20+ years of experience designing all electric buildings. Many of these projects have been renovations that switched from mixed fuel to all electric, and several of us have recently electrified our homes. We write in strong support for your building electrification ordinance. After close review, we believe you have greatly improved the ordinance with the current modifications. The accommodations for PG&E CARE customers and affordable housing address critical equity concerns, and the clarifications for minor remodels and portable propane use are thoughtfully crafted.

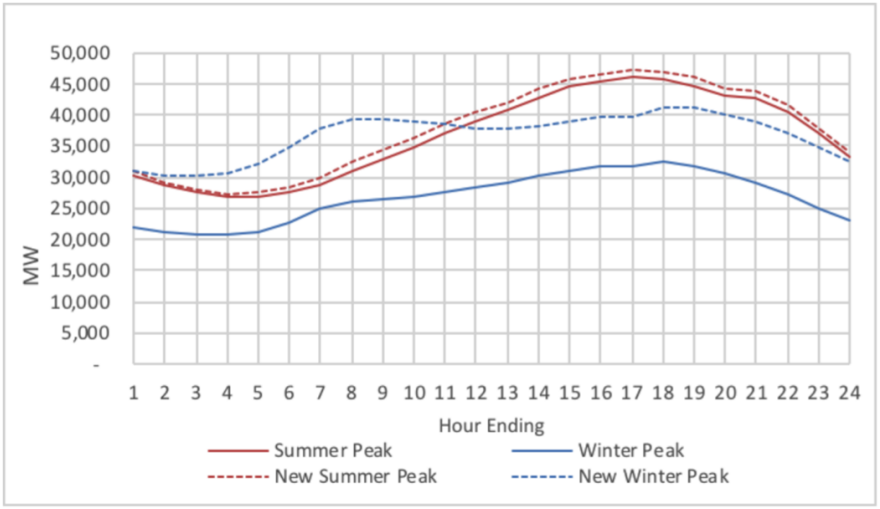
The State of California has been clear that our future energy system will be an electric one. The most cost-effective path to get there is to start right away whenever a gas appliance needs to be replaced. Continuing to install new gas infrastructure and appliances means they may need to be replaced before their end of life—a wasteful approach costly to residents. In our architectural practice we have found electrification to be a very cost-effective and robust option for our clients.

The cost of energy for customers is a key concern. Most of the cost for energy however is not for the fuel, but for the construction and maintenance of the gas grid. The 2045 deadline for phasing out gas allows the decommissioning of the gas grid along with the extensive cost of maintaining it to the benefit of the citizens of HMB. Focusing investments in hardening the electric grid is important for reliability, and lower cost than managing two parallel energy systems indefinitely.

In a recent **power outage** I learned that new gas appliances do NOT work without electricity. They all have electronic ignition (and an electric fan for the furnace). The one exception is a cooktop (not the oven) which can be lit with a match. We cooked dinner during that outage on a propane grill and a propane Coleman camp stove.

Some wonder **does the electric grid have capacity for electrification.** In California the electric grid is sized to accommodate the peak load on a hot summer afternoon when all the air conditioners are running, as shown in the red line in the graph below. The dashed red line shows a very small projected increase in that summer peak. Building electrification primarily increases WINTER loads shown in the blue lines when the grid has ample capacity. This better utilizes the electric grid throughout the year allowing fixed infrastructure costs to be spread out over many more hours.

Figure 16. Impacts on CAISO summer and winter peaks - 50 percent electrification



https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf

Heat pump water heaters and electric vehicles are also perfect for utility programs that can reduce electricity demand during peak times, reducing demand on the grid AND saving customers money.

The financial assistance and customer support for electrification have expanded rapidly in that last year. Homeowners can get free advice and technical support from a certified energy advisor thru BayRen. https://bayrenresidential.org/ Generous rebates are now available, such as for heat pump water heaters: $2,000, + $1,000 for CARE customers, + $1,500 for electric panel upgrade, +$1,000 for contractor. https://www.peninsulacleanenergy.com/heat-pump-water-heater/

Finally, the regulatory clarity this ordinance provides about phasing out the gas system is giving ample 20+ year advance notice to owners and allows all existing appliances to be used for their full life expectancy. This is clearly the most cost effective approach for this critical transition.

Sincerely,

Duncan Ballash, President
Jennifer Devlin, Partner
Scott Shell, Partner
Rebecca Sharkey, Partner
Brad Jacobson, Partner
Chris Patano, Partner

Subject: Fwd: Vote NO on Gas Ban
Date: Monday, November 15, 2021 at 6:23:13 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: [redacted]
Subject: Vote NO on Gas Ban
Date: 15 November 2021 at 5:31:47 pm GMT-8
To: DPenrose@hmbcity.com, HRarback@hmbcity.com, jjimenez@hmbcity.com, RBrownstone@hmbcity.com, DRuddock@hmbcity.com
Reply-To: [redacted]

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Mayor and Council members

Please vote NO on the Gas Ban. It does not make sense. Electricity does not come out of thin air. Gas does not come out of thin air. We must focus on saving energy in general, not banning safe, effective energy sources.

Going to electric only is not effective. Not only is imposing this on new builds/remodels not a good idea, but voting to require existing homes to convert to electric only is ridiculous and an abuse of power. It does not solve our energy problem only moves it to another bucket of issues.

VOTE NO on the gas ban

Thank you
Concerned homeowner

Subject: Architects against Fossil Fuels
Date: Monday, November 15, 2021 at 11:11:02 AM Pacific Standard Time
From: Hilary Bates
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak

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Council Members:

As a practicing architect in the Bay Area for 25+ years, I hope you will pass gas phase out ordinances in HMB!

The California AIA recently announced a climate emergency. Buildings account for as much as 40% of green house gasses, and we absolutely MUST decarbonize our building stock immediately. Here are a few good reasons:

1) methane, a by-product of fossil gas, is up to 80x more warming than carbon dioxide

2) however, since methane disperses quickly, it can deliver the quickest climate win and give the world the kind of breathing room it needs to stave off the worst impacts of climate change. We could eliminate methane IN OUR LIFE TIME.

3) we have absolutely all the technology NOW to achieve the goal of decarbonizing our building stock by 2030. We just need the political will!

https://aiacalifornia.org/aia-california-declares-a-climate-emergency/

Best,

Hilary Bates AIA
LEED Green Associate
San Mateo County Committee on the Environment
Hilarybatesarchitecture.com

Subject: Vote "YES" on the HMB Building Electrification Ordinance
Date: Tuesday, November 16, 2021 at 11:48:56 AM Pacific Standard Time
From: Hebb, Jack
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak
Attachments: Screen Shot 2021-11-16 at 14.40.07.png

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Dear Councilmembers,

I'm writing to you urging you to **vote "YES" on the Building Electrification Ordinance** in front of council today. Our community needs to step up and do our part when it comes to achieving our greenhouse gas emission targets and phasing out gas in homes and buildings will bring us one step closer to reducing our health and climate risks, cutting fossil fuel pollution, and will lead to healthier homes and more resilient communities.

The proposed Building Electrification Ordinance includes equity guardrails and flexibility to ensure an affordable
transition of homes and buildings from gas to electric. Since gas is responsible for half of the carbon pollution in
Half Moon Bay, this gas phaseout measure is critical to addressing the climate crisis. I urge you to lead Peninsula
cities towards a gas-free and climate-safe future by adopting the Building Electrification Ordinance right away.

Electric heat pumps are the future, not gas-powered central heaters. There's this concept called "locked-in emissions" and its about how much future emissions are largely decided by the choices we made today. One of the most noteworthy examples is the decision between equipping a home with a gas-powered central heater and water boiler or an electric option. By enabling new home construction to contain gas powered options, we're effectively locking in 30 years of greenhouse gas emissions which the climate simply cannot afford.

Moreover, the most sure-footed way to avoid a repeat of the 2010 San Bruno gas line leak which resulted in an explosion that destroyed 38 homes and killed 8 people is to take steps to removing this flammable hazard from our community entirely.

Please be on the right side of history and vote YES on the Building Electrification Ordinance.

Cheers,
Jack Hebb
BA Economics and Comparative Political Science
LGBTQ+ Youth Mentor
he/him/his

Subject: Electrification
Date: Tuesday, November 16, 2021 at 10:18:05 AM Pacific Standard Time
From: Jim Tierney
To: HMB Sustainability

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Read a book and become informed. I recommend Apocalypse Never.

Climate change is real but it's not even close to the most serious environmental challenges we face. Your alarmism only hurts poor people and poor countries. Renewable energy will never meet our power needs and will likely need coal or natural gas burning in power plants. Carbon emissions have peaked and have been declining for decades, deaths from extreme weather have declined 80% over the last four decades. While France and Germany are again turning to nuclear energy California is planning on shutting down our only nuclear power plant. If all of the planned nuclear power plants in California were built we would be exporting power. California has made the worst decisions about climate and the environment over the last two decades because of the climate alarmists that aren't informed. Read a book, become informed, and stop hurting poor people across the planet.

Subject: Electrification Ordinance
Date: Tuesday, November 16, 2021 at 6:57:29 PM Pacific Standard Time
From: Joanne Knaus
To: HMB Sustainability

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City of Half Moon Bay

I am strongly opposed to this electrification ordinance for a number of reasons. It will be a huge financial burden to change over to all electric appliances which are not as efficient as the gas appliances. Europe and Japan have used tankless water heaters for decades because they are energy efficient. They run on gas, not electricity. They are environmentally friendly because they heat water on demand, not 24/7 like a standard electric tank type water heater. Over 34% of California's electricity is generated by natural gas power plants. If you stop using gas and start using more electricity, then you just started burning more gas at the power plants to produce the additional electricity.

Leave the gas on at existing homes and require all electricity on new homes. For that matter, require solar power on all new homes. Now that's something that makes sense. Generating electricity on your roof top makes a heck of a lot more sense than capping gas lines.

Subject: Electrification Ordinance
Date: Tuesday, November 16, 2021 at 9:13:09 AM Pacific Standard Time
From: John Gerth
To: HMB Sustainability

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Climate change is a real and urgent problem which must be addressed and soon. I don't think there's any disagreement that electricity is the ultimate way to deliver domestic energy, rather it's how to get there. Doing that requires wholehearted, spontaneous participation from all of us.

Whatever the merits of proposed ordinance are, it seems to me to not be likely to achieve its goals and risks compromising them because it is at the wrong scale. This should be at least a county, if not state level, program. And this is not because this isn't urgent, but rather because having each municipality craft its own regulations will result in confusing property owners; risk anger and evasion rather than enthusiasm, and ultimately delay actually acheiving the conversion.

We need to be creative about how to have influence. Some years back we had a referendum about a single bridge on Main Street. If we had one now to demonstrate widespread support for conversion,
then perhaps the Council's role could be to take that mandate and become a unified and outspoken advocate for this change, lobbying higher levels of government and building support among other municipalities to get a uniform set of rules in place so we can get on with this.

--
John Gerth
[redacted]

Subject: Fwd: Are Solar Panels " Carbon Neutral" ? Not in COHMB
Date: Tuesday, November 16, 2021 at 12:42:31 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak
Attachments: 1-s2.0-S0038092X14001935-main.pdf

Begin forwarded message:

From: J T Mead[redacted]
Subject: FW: Are Solar Panels " Carbon Neutral" ? Not in COHMB
Date: 16 November 2021 at 12:24:36 pm GMT-8
To: "DRuddock@hmbcity.com" <DRuddock@hmbcity.com>, "HRarback@hmbcity.com" <HRarback@hmbcity.com>, "jjimenez@hmbcity.com" <jjimenez@hmbcity.com>, "RBrownstone@hmbcity.com" <RBrownstone@hmbcity.com>
Cc: "DPenrose@hmbcity.com" <DPenrose@hmbcity.com>

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Do Solar Panels 'Fight Climate Change' ?
Not in HMB, because we already get 100% GHG-free power.

Typed by a guy with vision issues.
I use this font to see my typing.
Please ignore typos and El Wrongo
spellchecker interjections.

From: J T Mead or
Sent: Friday, November 12, 2021 4:45 PM
To: DPenrose@hmbcity.com
Subject: Are Solar Panels " Carbon Neutral" ? Not in COHMB

Dr. Penrose;

The 'carbon footprint' of PV panel manufacture is well studied.
See attached.
(note, there was a subsequent corrigendum which corrected a 'typesetting error' in equation 3, which did not affect the conclusions.)

The question for COHMB, is ;
Can that 'Carbon Footprint' ever be paid back?

The usual answer is that PV solar generation displaces fossil-fueled electricity,
And eventually the initial (manufacturing) emissions
Are overcome by not using Grid electricity that would have made more emissions.

However, the 'Peninsula Clean Energy' company has stipulated,
And COHMB staff has concurred,
That PCE power is " 100% GHG-Free" since 2021.
PCE supplies 97% of COHMB accounts.

Thus, any new PV solar in COHMB,
can only displace PCE power which is 100% GHG-Free.
If you force people to install it,
You are causing CO2 emissions that can never be 'paid back'.

Thus, the proposed electrification ordinance will *cause* 'Climate Change'.
Probably not what you intended.

John Meador
jtm

Subject: Fwd: Attached Analysis of Residential Reach Code Effectiveness
Date: Tuesday, November 16, 2021 at 12:44:56 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak
Attachments: A54AE9045FC5431F8D868B317FF7F8E0.png, C976A61408AE497B816236C6F63E349F.png, 9E4B0EFD4ACB4A7CBD4FE307FB94ED38.png, 5045E8BD6BEE46EF8604A50DDC801BD1.png, 2019-V2-Residential-Retrofit-Cost-eff-Report.pdf

Begin forwarded message:

From: J T Mead or[redacted]
Subject: FW: Attached Analysis of Residential Reach Code Effectiveness
Date: 16 November 2021 at 12:19:04 pm GMT-8
To: "DRuddock@hmbcity.com" <DRuddock@hmbcity.com>, "HRarback@hmbcity.com" <HRarback@hmbcity.com>, "jjimenez@hmbcity.com" <jjimenez@hmbcity.com>, "RBrownstone@hmbcity.com" <RBrownstone@hmbcity.com>
Cc: "DPenrose@hmbcity.com" <DPenrose@hmbcity.com>

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Typed by a guy with vision issues.
I use this font to see my typing.
Please ignore typos and El Wrongo
spellchecker interjections.

From: J T Mead or
Sent: Friday, November 12, 2021 3:32 PM
To: Deborah Penrose
Subject: Attached Analysis of Residential Reach Code Effectiveness

Dr. Penrose,
The 'incremental' replacement of gas appliances with electric ones will cost homeowners a lot of money.
Feel free to forward to other COHMB persons.

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

2019 Cost-Effectiveness Study:
Existing Single Family Residential Building Upgrades

Published March 2021.
168 pages of detailed analysis and results.

I have digested it and will copy/paste the relevant pages without modification.
COHMB is located within Climate Zone 3, a.k.a. CZ3.
Time-Dependent-Value for electricity is about the same between 2019 and 2022.
TDV for Gas was assumed to be 70% (!) higher in 2022 vs 2019.
(This is totally unjustified in my opinion.
More later on this, if you really want to rely on that data point.)

New electric heat replacing gas heater in newer home:
From report page 30, (page 38 of PDF)

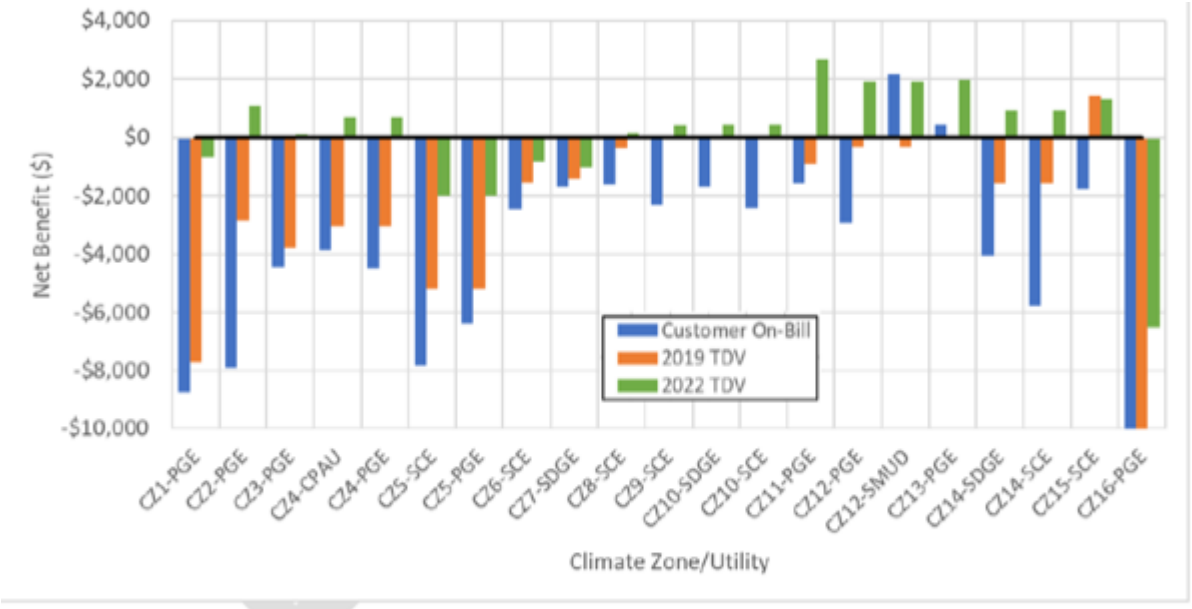

Figure 4: Net benefit – minimum efficiency heat pump at HVAC replacement: 1992-2010.
Source: Statewide Reach Code Team

As you can see, big loser for CZ3, the third set of blue-red-green from the left
The graph for older homes would look worse.
.
What about replacing domestic hot water heater with Heat PumpHW?
From page 32 of the report, page 40 of PDF;

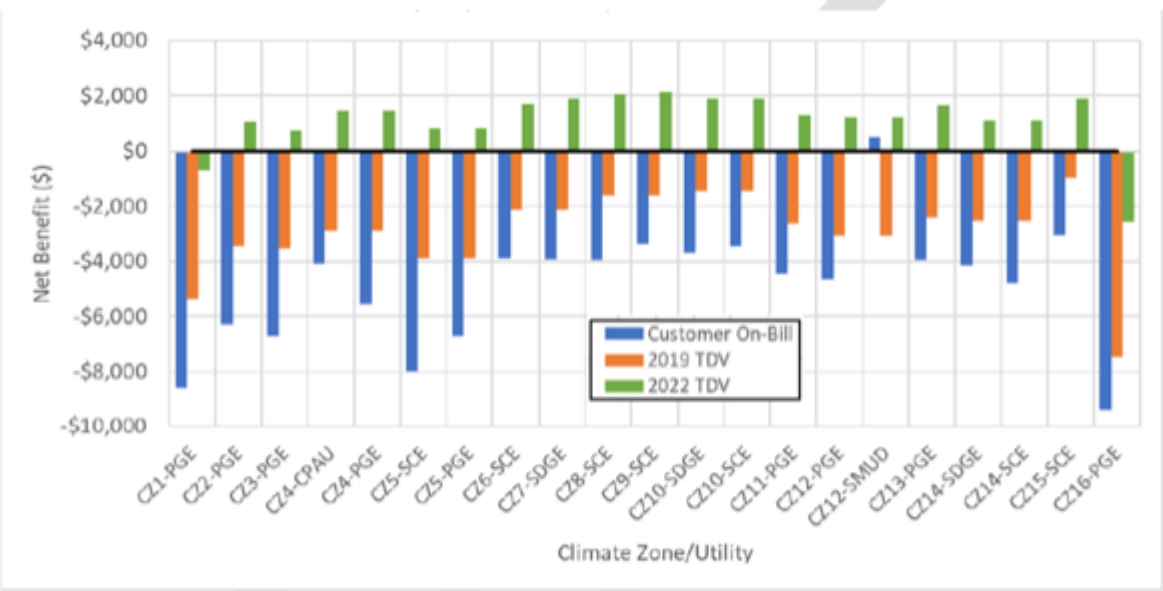

Figure 6: Net benefit – minimum efficiency HPWH at DHW replacement: 1992-2010.
Source: Statewide Reach Code Team

OUCH, even worse.
Again, the graph for older homes would look worse, so they didn't print it.

They also have specific commentary for CZ3.
B/C is Benefit/Cost, shown in red for losers. PV is Solar Photo Voltaic
NPV is Net Present Value of a future cash flow.
Page 79 of the report, page 87 of the PDF;

Table 39: CZ 3 - Single Family Equipment Fuel Substitution Cost-Effectiveness Results

Measure	Vintage	Measure Cost ($)	Electricity Savings (kWh)	Gas Savings (therm)	GHG Savings (lb CO_2e)	Utility Cost Savings		Customer On-Bill		2019 TDV		2022 TDV	
						Year 1	Avg Annual	B/C Ratio	NPV	B/C Ratio	NPV	B/C Ratio	NPV
Heat Pump at HVAC Replacement	Pre-1978	$1,555	-2,496	241	1,527	-$243	-$169	0.00	-$6,672	0.00	-$6,181	1.32	$501
	1978-1991		-1,895	178	1,030	-$184	-$129	0.00	-$5,470	0.00	-$5,781	0.78	-$340
	1992-2010		-1,651	164	793	-$139	-$95	0.00	-$4,460	0.00	-$3,779	1.06	$89
High-Effic. Heat Pump at HVAC Replacement	Pre-1978	$4,024	-2,284	241	1,624	-$180	-$119	0.00	-$7,728	0.00	-$7,423	0.85	-$613
	1978-1991		-1,737	178	1,104	-$138	-$93	0.00	-$6,953	0.00	-$7,354	0.54	-$1,852
	1992-2010		-1,524	164	850	-$103	-$67	0.00	-$6,170	0.00	-$5,502	0.57	-$1,748
Heat Pump at HVAC Replacement + PV	Pre-1978	$8,441	968	241	1,753	$627	$518	1.69	$6,318	1.05	$413	1.55	$4,607
	1978-1991		1,569	178	1,256	$667	$543	1.77	$7,079	1.09	$796	1.44	$3,752
	1992-2010		1,812	164	1,018	$708	$574	1.87	$7,996	1.33	$2,813	1.50	$4,190
HPWH at Water Heater Replacement	Pre-1978	$2,594	-1,308	164	1,378	-$164	-$115	0.00	-$6,341	0.00	-$3,565	1.31	$808
	1978-1991		-1,317	165	1,386	-$167	-$117	0.00	-$6,406	0.00	-$3,542	1.33	$845
	1992-2010		-1,320	165	6,211	-$178	-$127	0.00	-$6,690	0.00	-$3,539	1.28	$727
NEEA Tier 3 HPWH at Replacement	Pre-1978	$2,775	-986	163	1,488	-$62	-$35	0.00	-$4,130	0.28	-$1,991	1.81	$2,249
	1978-1991		-990	164	1,500	-$63	-$35	0.00	-$4,150	0.28	-$1,986	1.81	$2,249
	1992-2010		-993	164	5,883	-$74	-$45	0.00	-$4,430	0.29	-$1,963	1.76	$2,119
HPWH at Water Heater Replacement + PV	Pre-1978	$9,480	2,155	164	1,604	$801	$646	1.85	$8,882	1.34	$3,186	1.54	$5,087
	1978-1991		2,146	165	1,611	$790	$638	1.82	$8,623	1.34	$3,206	1.54	$5,118
	1992-2010		2,143	165	1,612	$774	$625	1.78	$8,242	1.34	$3,209	1.53	$5,000
Electric Ready Pre-Wire + PV	Pre-1978	$10,977	3,464	0	226	$817	$645	1.59	$7,146	1.22	$2,460	1.00	-$11
	1978-1991		3,464	0	226	$789	$623	1.53	$6,483	1.22	$2,455	1.00	-$17
	1992-2010		3,464	0	226	$774	$611	1.50	$6,114	1.22	$2,455	1.00	-$17

Wow this is just getting Worser and Worser.
One point they didn't consider, is that 'permanently-installed electric heat' is required to get the higher baseline allowance; swapping out a gas water heater for electric will definitely use more electricity, probably at the higher tier rates.

Please take time to think very seriously about the ordinance before you.
It will seriously hurt a few individual homeowners, gratuitously.
John Meador
jtm

Subject: Support for Building Electrification Ordinance
Date: Tuesday, November 16, 2021 at 6:27:00 AM Pacific Standard Time
From: Julia Zeitlin
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak

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Dear Mayor Brownstone and Council Members,

I'm a Bay Area resident and 15-year-old sophomore student at Castilleja School. I am a member of the Palo Alto Youth Council, am a Green Team member and the Community Action Representative for my student body. I'm writing to you today in strong support of the proposed Electrification Ordinance phasing out gas in homes and buildings to reduce health and climate risks, cut fossil fuel pollution, and lead to healthier homes and more resilient communities.

Climate change is the most prevalent issue of our time and my generation. We need to make bold and impactful changes now! This phase-out gas ordinance is an incredible step forward for Half Moon Bay. We applaud the work made so far and implore you to approve this plan and start implementing it immediately.

Methane is not a "natural" gas. It is a toxic gas. Gas appliances emit harmful pollutants and increase the AQI in our homes. We cannot put off action to cut carbon emissions and phase out polluting fossil fuels any longer. The proposed Building Electrification Ordinance includes equity guardrails and flexibility to ensure an affordable transition of homes and buildings from gas to electric.

Since gas is responsible for half of the carbon pollution in Half Moon Bay, this gas phaseout measure is critical to addressing the climate crisis. On behalf of the Bay Area youth, I urge you to lead Peninsula cities towards a gas-free and climate-safe future by adopting the Building Electrification Ordinance right away.

Sincerely,
Julia Zeitlin

Subject: Please Adopt the Electrification Ordinance to Phase Out Polluting Gas Use
Date: Monday, November 15, 2021 at 9:27:12 AM Pacific Standard Time
From: Kathy Battat
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak

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Dear Mayor Brownstone and Council Members,

I'm a Bay Area resident. I'm writing you in strong support of the proposed Electrification Ordinance phasing out gas in homes and buildings to reduce health and climate risks, cut fossil fuel pollution, and lead to healthier homes and more resilient communities.

COP26 made it clear that methane emissions need to be a priority for the entire world in order to keep global warming down to livable temperatures and to avoid irreversible damage to our environment. We are in the midst of both a pandemic and a climate crisis. The Bay Area is especially vulnerable to the five-fold increase of wildfires due to climate change as well as the resulting smoke which harms our health and increases COVID risks. Pollution from gas appliances exacerbates both of these risks. We cannot put off action to cut carbon emissions and phase out polluting fossil fuels any longer.

The proposed Building Electrification Ordinance includes equity guardrails and flexibility to ensure an affordable transition of homes and buildings from gas to electric. Since gas is responsible for half of the carbon pollution in Half Moon Bay, this gas phaseout measure is critical to addressing the climate crisis. I urge you to lead Peninsula cities towards a gas-free and climate-safe future by adopting the Building Electrification Ordinance right away.

Sincerely,

Kathy Battat

Kathy Battat
[redacted]

Subject: Council agenda items 2.A Building Electrification and 2.B EV & PV Reach Codes
Date: Monday, November 15, 2021 at 11:44:40 AM Pacific Standard Time
From: Kristel Wickham
To: RBrownstone@hmbcity.com, DRuddock@hmbcity.com, jjimenez@hmbcity.com, DPenrose@hmbcity.com, HRarback@hmbcity.com, VVostinak@hmbcity.com

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Mayor Brownstone, Vice Mayor Ruddock, and Councilmembers Jimenez, Penrose, and Rarback,

I want to commend you for considering agenda item 2.A the building electrification ordinance and urge you to adopt it on November 16. Item 2.B regarding Electric Vehicle and Photovoltaic reach codes is also worthy of passage.

I am writing to you as a human, on my own behalf. Although I do not represent all of humanity nor all of the humans yet to come, your decision will affect them all a very small amount. But like a seed can grow into a magnificent oak or redwood, I know that this ordinance will have impact on other cities and serve as a model for not only what we know must be done, but also for what is possible.

It takes courage to be the first city to adopt something. I wish my city were first on this topic, and I will continue to advocate that my city follows close behind. Cities have been trying education, incentives and voluntary measures as their first approaches to reducing greenhouse gas emissions. Those are good and necessary, but insufficient. Having an ordinance such as is proposed for existing buildings will complement those efforts and make it more likely to reach the 2030 (and 2045) goals of the city, state, nation and world. There are so many examples of good government mandates that work - seat belts, clean air and water regulations, and yes, even vaccines. This ordinance will be looked back at from the future as the start of an obvious tool to aid the transition off of fossil fuels.

I've been following the progress of this ordinance and commend the city staff and council for a process that was transparent and a model of good governance. I was so heartened to witness the council and staff on October 5 engaged in the democratic process of going step by step to get council's direction on the detailed policy decisions that needed to be addressed.

Every additional puff of CO2 and methane that is sent to the atmosphere eats into our 'carbon budget' and worsens the effects of climate change. By passing this ordinance now, you are preparing Half Moon Bay for the future. The earlier you provide the signal to residents and businesses, the better prepared they will be. It gives them time to plan and research options. Cities that act later may not be able to offer as much time for their citizens as the effects of climate change and the urgency to act become even more pressing.

I know you've been hearing some 'outrage' and a threat of a lawsuit. Change is not easy. Climate change in particular is also not easy. Yes the transition will cost money. Yes there will be bumps in the road. Yes some people will be angry.

But it is the right thing to do and the sooner it is done the sooner the difficulties can be worked out. You may discover over time that the ordinance isn't perfect, and some adjustments will be needed. That's ok, and no one expects the first ordinance like this in the country to be perfect. You can tune it up over time (but it's already pretty darn good).

The equity protections are a good start (the exception for CARE customers, and the phase out of gas cooking - a major cause of indoor air pollution), but there may need to be additional measures in future such as rent protections in multifamily dwellings that are retrofitted with electric appliances. Also, education, outreach and contractor supports will be needed to connect people with reliable and trustworthy contractors and to provide information on going electric. Several cities have full electrification webpages for support - see Berkeley and Piedmont CA sites. Also the Switch is On and Peninsula Clean Energy have great resources. This Watt Diet Calculator is extremely helpful for letting people know they can have a fully electrified home on a 100A service panel.

As the first city to adopt an ordinance of this type for existing buildings, you will be uniquely suited to leverage upcoming regional, state and national funding (and perhaps even private capital) to support low and medium income families to switch to electric when it's time to replace an existing gas appliance or their vehicle.

Cities have a unique role to play in emissions reductions and this ordinance shows exactly how to do that. Federal and state regulations as well as monetary support are likely to come perhaps sooner than many think. This ordinance is innovative and ground breaking and I hope you will adopt it as well as the EV and PV reach codes.

Sincerely,

Kristel Wickham
homo-sapiens
mother of two
climate action advocate
occasional tourist (via electric vehicle) to the charming city and beaches of Half Moon Bay
Sunnyvale homeowner in a 'going electric' home (rooftop solar + heat pump space conditioning, + solar hot water, + 1 induction cook-plate + hybrid heat pump clothes dryer)

Subject: Fwd: Electrification of HMB
Date: Monday, November 15, 2021 at 12:42:38 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Laurie Torres[redacted]
Subject: Electrification of HMB
Date: 15 November 2021 at 12:11:55 pm GMT-8
To: "DPenrose@hmbcity.com" <dpenrose@hmbcity.com>

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Dear Counsel Member Penrose,

In my opinion, the proposal being discussed this week is not well thought out. For new builds and major remodels, yes, requiring electrification makes sense.

Requiring all current gas appliances (this includes water heaters, dryers, furnaces, stoves) to be replaced with electric appliances when they no longer work, is a financial burden that most can not afford. What has not been take into consideration is that a major upgrade of a homes wiring and electrical panel will be needed in order to run all of the new electrical appliances. In addition, the cost of electricity is much higher than gas. The financial burden of this proposal, on residents, is excessive. In addition, there is zero data showing that PG&E can support the additional burden of the increase in electricity.

I hope you will consider amending the current proposal so that it does not cause undue hardship on your constituents.

Respectfully,

Laurie Torres
[redacted]
Half Moon Bay

Veronika Vostinak

From: Leigh Dreo [redacted]
Sent: Thursday, December 2, 2021 7:07 AM
To: HMB Sustainability
Subject: Against Replacing Gas with Electric

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Hello.

There is no way this option/plan is workable. It is unaffordable. What is your plan/timing? And, how would you expect to enforce? Completely wrong!

Leigh Dreo
[redacted]
HMB

Subject: Comments on Electrification Ordinance
Date: Monday, November 15, 2021 at 2:46:29 PM Pacific Standard Time
From: [redacted]
To: HMB Sustainability
CC: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback

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Date: November 15, 2021
To: City Council
From: Les Deman
Subject: Electrification Ordinance

This is not the time to restrict the replacement of gas heating and other appliances to electric only. The reasons include:

1. It is very costly since older homes are not wired for heavier loads such as electric heating. This is an equity issue because older and lower-income residents will be unable to fund these upgrades.
2. Costs of electric heating are significantly higher than for natural gas (another equity issue). The U.S. Department of Energy estimated that average winter heating costs this winter will be $1330, while gas heating costs $664. This is also an equity issue. (See: https://www.eia.gov/outlooks/steo/special/winter/2021_winter_fuels.pdf)
3. Electric disruptions are increasing. During recent outages gas heating, water heating and stoves were available. Moreover, we now have a proliferation of noisy gasoline-powered generators spewing higher emissions during outages. (See: https://www.eia.gov/todayinenergy/detail.php?id=50316)
4. California currently uses natural gas for 48% of its electric power generation. Using natural gas to generate electricity is only about 33% efficient while using natural gas directly in appliances is upwards of 85% efficient. Higher electricity use will increase natural gas demand in the foreseeable future and increase emissions. The electrons purchased from Peninsula Clean Energy are not really "green," since they are part of the states and region's overall mix (renewables, hydro, natural gas, nuclear and other fuels).

Please delay the adoption of a mandatory electric appliance replacement for Half Moon Bay homeowners. California electric generating capacity and the electricity grid is not yet adequate or sufficiently robust to see an increase in loads. We have power alerts and outages regularly. A better policy would be to further incentivize the addition of solar panels for new and existing construction, thereby encouraging consumers to use electricity for all of their power needs. Additionally, a carbon tax that consumers can actually see would provide an economic incentive to purchase low-carbon or zero-emission appliances and vehicles.

Les Deman
[redacted]
Half Moon Bay. CA 94019
[redacted]

Subject: Opposing the Electrification of HMB Residential Homes
Date: Tuesday, November 30, 2021 at 2:56:43 PM Pacific Standard Time
From: Leslie Jeffries
To: HMB Sustainability

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Hello,

I am a HMB homeowner and resident, and just want to write to strongly oppose the potential requirements electrification of HMB Residential homes.

I am a Senior Citizen who came to HMB for retirement. This would put an undue financial requirement on us when we go to remodel or sell our home. In addition, this would increase our already high PG&E bills, and we are on a fixed income. Also, the current inflation in our economy caused by poorly thought out recent government decisions would make these changes an impossible financial burden.

In addition, PG&E is barely able to keep our current system up here in HMB. There is no way I would trust them to increase their load on the system.

Therefore I am a strong NO on this proposal in any format. If the HMB leaders pursue this, they should remember that we the people have power through the ballot box, and will make our voices strongly heard.

Best regards,
Leslie

Sent from my iPad

Subject: Fwd: Electrification of Half Moon Bay
Date: Tuesday, November 16, 2021 at 11:26:58 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: "Inman, Lezlee'[redacted]
Subject: Electrification of Half Moon Bay
Date: 16 November 2021 at 8:07:26 pm GMT-8
To: "RBrownstone@hmbcity.com" <RBrownstone@hmbcity.com>, "DRuddock@hmbcity.com" <DRuddock@hmbcity.com>, "jjimenez@hmbcity.com" <jjimenez@hmbcity.com>, "DPenrose@hmbcity.com" <DPenrose@hmbcity.com>, "HRarback@hmbcity.com" <HRarback@hmbcity.com>

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Good Evening,
Unfortunately I am not able to stay on for the duration of tonight's meeting and comments, however I would like to share some brief thoughts.
I applaud the efforts of the council to tackle this issue and take a proactive stance towards mitigating climate change. That being said I do not believe the mandate as I understand it is just and fair. Due to our current economic crisis we are all aware that those with less suffer the greatest. In this case mandating that all replacement appliances be converted to electric will pose an undue burden on those who can least afford the additional expense. Many are just getting by and may need to replace a gas heater, stove or water heater. These appliances are necessities in our area and costly enough without the additional cost of conversion.
No doubt landlords will pass this cost on to their tenants further burdening those who have the least.

I gladly support the "mandate" for new construction including ADUs and the like. I believe this could be expanded in many ways before requiring that individuals currently using gas are forced to pay the additional cost of conversion on top of the unexpected replacement of a major appliance.

Thank you for your time.

Best,

Lezlee Inman
[redacted]
Half Moon Bay Ca.

Subject: Fwd: Please adopt the proposed electrification ordinance
Date: Tuesday, November 16, 2021 at 12:47:41 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Mary Dateo [redacted]
Subject: Please adopt the proposed electrification ordinance
Date: 16 November 2021 at 11:41:12 am GMT-8
To: DPenrose@hmbcity.com
Reply-To: mdateo@sbcglobal.net

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Councilmember Deborah Penrose,

Dear Mayor Brownstone and Council Members,

I'm a Bay Area resident writing to you in strong support of the proposed Electrification Ordinance phasing out gas in homes and buildings in front of you this evening.

We recently electrified our home, and are very happy with the heating, water heating, and cooking.

Thank you for taking leadership on this urgent need.

Sincerely,

Mary Dateo, Mountain View

Mary Dateo
[redacted]
Mountain View, California 94040

Subject: Please adopt the proposed electrification ordinance
Date: Tuesday, November 16, 2021 at 9:24:18 AM Pacific Standard Time
From: Maureen Perron
To: Veronika Vostinak

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Veronika Vostniak,

Dear Mayor Brownstone and Council Members,

I'm a Bay Area resident writing to you in strong support of the proposed Electrification Ordinance phasing out gas in homes and buildings in front of you this evening.

This crucial step will reduce health and climate risks, cut fossil fuel pollution, and lead to healthier homes and more resilient communities.

We are in the midst of both a pandemic and a climate crisis. The Bay Area is especially vulnerable to the five-fold increase of wildfires due to climate change as well as the resulting smoke which harms our health and increases COVID risks. Pollution from gas appliances exacerbates both of these risks.

We cannot put off action to cut carbon emissions and phase out polluting fossil fuels any longer. The proposed Building Electrification Ordinance includes equity guardrails and flexibility to ensure an affordable transition of homes and buildings from gas to electric.

Since gas is responsible for half of the carbon pollution in Half Moon Bay, this gas phase out measure is critical to addressing the climate crisis.

I urge you to lead Peninsula cities towards a gas-free and climate-safe future by adopting the Building Electrification Ordinance right away.

Sincerely,

Maureen Perron
[redacted]
Half Moon Bay, California 94019

Subject: Fwd: Electrification proposal
Date: Wednesday, November 17, 2021 at 1:43:45 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Michelle Briggs[redacted]
Subject: Electrification proposal
Date: 17 November 2021 at 12:28:03 pm GMT-8
To: Robert Brownstone <RBrownstone@hmbcity.com>, Harvey Rarback <HRarback@hmbcity.com>, "jjimenez@hmbcity.com" <jjimenez@hmbcity.com>, Debbie Ruddock <DRuddock@hmbcity.com>, Deborah Penrose <DPenrose@hmbcity.com>

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon HMB City Council members,

I'm writing to express my support of gradually electrifying HMB. We need bold and long term, forward thinking proposals such as this one.

I fully support this measure and despite my love of cooking with gas in a gas fireplace, our electric range will be arriving next week! This is a small price to pay for the greater good and for the world our children and grandchildren will inhabit. I hope the city Council will support this measure.

Thank you,
Michelle Briggs
HMB resident

Subject: Electrification Initiative
Date: Tuesday, November 16, 2021 at 7:10:14 PM Pacific Standard Time
From: Monnett Soldo
To: HMB Sustainability

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Hello,

I emailed earlier regarding this topic and never received a response.

I believe I may have built the first new construction all electric house in Half Moon Bay (not sure, but based on the permitting challenges I think so).

I point this out to emphasize that I am all for electrification.

And, I support most of the elements of the proposed legislation - requiring all electric for new builds, etc.

However, I do not agree with the proposal to require all homes, including existing homes, to go all electric by a specific year. Specifically, I do not believe that all electric heat and hot water should be required of all homeowners, it will be unreasonably financially burdensome in my opinion.

I doubt very much that the council members has in front of it actual, realistic data on what this would cost - if you did, I do not believe this would even be proposed.

I have offered such data, but nobody took me up on the offer - so, I have a request. Could you please share the data on which you are relying, so that it can be adequately discussed. I attended prior study sessions and have not seen it.

Thanks in advance,

Monnett Soldo
[redacted]

Veronika Vostinak

From: Deborah Penrose <DPenrose@hmbcity.com>
Sent: Tuesday, November 23, 2021 10:32 PM
To: Veronika Vostinak
Subject: Fwd: Electrification of Half Moon Bay

Begin forwarded message:

From: Nils Moberg[redacted]
Subject: Electrification of Half Moon Bay
Date: 23 November 2021 at 9:47:02 pm GMT-8
To: jjimenez@hmbcity.com, hrarback@hmbcity.com, RBrownstone@hmbcity.com, dpenrose@hmbcity.com, druddock@hmbcity.com

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Hello City Council members,
My name is Nils Moberg, my wife and me have lived here in Half Moon Bay since 1989. I'm a general contractor and built our first home on Garcia Ave near the bluff top, we now live near Main Street and downtown. First off, I would like to commend the council for removing the motion that would mandate all existing homes be converted to electric within the city of Half Moon Bay. With electrical panel upgrades, new electrical forced air heating units, new electrical appliances and the reviewing of many homes, the cost would be out of reach for most residents. Now you must take the next step and resend the requirement requiring all new construction to be all electric. PG&E cannot provide enough electricity for our requirements today, where will the electricity come from to meet your new requirements? It will come from out of state, coal burning generation plants. Please, let's do a common sense check here, or perhaps let's put it on the ballot and see what the residents of our city want to do.
Nils Moberg

Sent from my iPad

Subject: Please Adopt the Electrification Ordinance to Phase Out Polluting Gas Use
Date: Tuesday, November 16, 2021 at 9:45:55 AM Pacific Standard Time
From: Robert Gould
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak

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Dear Mayor Brownstone and Council Members,

I'm Dr. Robert Gould. After working as a Pathologist at San Jose Kaiser for over 30 years, since 2012, I've been an Associate Adjunct Professor at UCSF School of Medicine, working in our Program on Reproductive Health and the Environment. Since 1989 I've also been President of San Francisco Bay Physicians for Social Responsibility (PSR), for which I'm speaking today, representing hundreds of health professionals throughout our region, who speak for the health of our patients and communities, who are increasingly impacted by the unfolding public and environmental health impacts of global warming, and clearly connected issues of air pollution.

The recently released assessment by the Intergovernmental Panel on Climate Change is unequivocal in its call for urgent action to ensure an energy efficient and fossil free future. In the SF Bay Area, we witness the intersecting impacts of our pandemic and climate crisis, having suffered through our two recent wildfire seasons, with the resultant smoke harming our overall health while increasing the toll of COVID, especially among already increasingly over-burdened communities who are poor and of color.

Promoting *Building Electrification*, and reducing toward elimination our current reliance on gas appliances is health protective, not only in the climate benefits of moving away from fossil fuel extraction and use, but also because gas stoves and other appliances can be a large source of toxic pollution in homes, reaching levels of pollution that would be illegal in outdoor settings. Children, especially those of color,

are particularly at risk of respiratory illnesses, such as asthma, associated with gas appliance pollution, and lower income households may be at higher risk of exposure.

So, as one example, a 2013 meta-analysis looking at the association between gas stoves and childhood asthma found children in homes with gas stoves have a 42% increased risk of experiencing asthma symptoms (current asthma), a 24% increased risk of ever being diagnosed with asthma by a doctor (lifetime asthma), and an overall 32% increased risk of both current and lifetime asthma.

In addition, there is mounting evidence linking combustion related air pollution with adverse brain development. A 2009 study found evidence that infant through preschool-age early-life exposure (through age four) to indoor air pollution from gas appliances may be related to impaired cognitive function and may increase the risk of developing attention-deficit/ hyperactivity disorder (ADHD) symptoms.

Accordingly, we strongly support Half Moon Bay adopting the proposed Electrification Ordinance phasing out gas in homes and buildings, increasing the availability of electric vehicle charging, and other important measures that can accomplish much toward reducing health and climate risks, while creating healthier homes and more resilient communities. We are also very appreciative that the proposed Ordinance includes equity guardrails and flexibility to ensure an equitable and affordable transition of homes and buildings from gas to electric.

By adopting this Ordinance, Half Moon Bay would join many other cities in California who have already adopted electric requirements for new construction that avoid new fossil gas use, in recognition of numerous benefits to community health, safety, and a stable climate future afforded by this transformation.

In conclusion, we at SF Bay Physicians for Social Responsibility call on you to use this critical opportunity to demonstrate Half Moon Bay's leadership and commitment to rapidly develop the more economical, pollution-free buildings we need now for the optimal public, environmental and climate health we and future generations so deserve.

Sincerely,

Robert M. Gould, MD
President
San Francisco Bay Physicians for Social Responsibility

Subject: Fwd: Support for All HMB Electric Code
Date: Monday, November 15, 2021 at 11:29:09 AM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Robert Whitehair[redacted]
Subject: Support for All HMB Electric Code
Date: 15 November 2021 at 11:10:36 am GMT-8
To: DPenrose@hmbcity.com

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Dear Council Member Penrose

The City of Half Moon Bay is to be congratulated for its leadership in consideration of an All-Electric Building Code and the capping of natural gas lines by 2045. I support approval of the ordinance before you for adoption on Tuesday.

Many of us have been actively following Half Moon Bay's process of writing the new ordinance, as you undertook an extensive, robust process to reach out to the community, including groups that are not often heard.

As a resident of San Mateo, I am pleased that the local, regional, and global issue of elimination of fuel gas in buildings is receiving so much careful thought and consideration. As you know, buildings contribute a very large share of the world's climate changing Green House gases.

If no more methane, AKA natural gas, is consumed, a major step will have been taken in reversing climate change. The air inside homes will be healthier, and methane emissions (30-80 times deadlier than Carbon Dioxide as a Green House Gas) from leaks and usage will be stopped. Rather than install appliances and piping that become "stranded assets" for up to 20 years, limited financial resources can be put to better use.

I grew up in a home with gas heating, a gas stove, a gas water heater, and a portable gas bathroom heater. I and my six siblings suffer from bronchitis and other health issues because of all that.

My wife and I live in a 70-year-old home with a gas furnace, which we are in the process of replacing, along with replacing a gas fireplace. We have already replaced our gas water heater with a Heat Pump Water Heater, and our stove with induction cooking. We have installed solar PV and a battery backup.

All of this of course has been very expensive, but well worth the investment in the climate.

My wife and I appreciate all the City of Half Moon Bay is doing.

Thank you

Robert Whitehair
San Mateo

Subject: Draft Addition of Section 14.06 to Chapter 14 of the Half Moon Bay Municipal Code
Date: Tuesday, November 16, 2021 at 5:57:33 PM Pacific Standard Time
From: Robin King
To: HMB Sustainability, Robin King

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November 16, 2021

Re: Draft Addition of Section 14.06 to Chapter 14 of the Half Moon Bay Municipal Code.

Members of the Half Moon Bay City Council and Staff,

The proposed addition of Section 14.06 of the HALF MOON BAY Municipal Code would inflict immediate and serious financial harm on existing HMB residents and health and safety risks as well. This cannot be approved without major revision. Clearly more time and input is needed for the Council to understand its repercussions.

If the Council is eager to proceed I recommend dividing the ordinance into two sections and addressing them separately: 1) New Construction, and 2) Existing Structures.

For new structures it is simple and cost effective to include the necessary high load electrical infrastructure when the structure is built. Even so, owners of buildable lots should have more time to respond.

Retrofitting existing homes is another story:

You cannot simply announce that 30 days after signing this, homeowners experiencing a failing gas furnace, water heater or stove must suddenly gut a home designed and approved for gas appliances and retrofit it with high load electric wiring for electric ones.

That's an unacceptable financial hurdle estimated at over $50,000 and you have not addressed how residents are expected to pay the unexpected cost. Without that you will be forcing some people from their homes and making their homes unsaleable. It could constitute an illegal taking.

The ordinance does not allow for financial hardship under any circumstance: 14.06.050 Infeasibility Waiver. "Financial considerations shall not be a sufficient basis for technical or physical infeasibility."

The high cost is obviously not from the appliance but from replacing the electrical systems inside and outside the home. Work could include but not be limited to:

The transformer at the power line

The power line itself for multiple house upgrades

Power pole on your house

New electrical box

Replacing most of the power lines in your home from the breaker to new appliances.

Please publish estimates from at least three licensed electricians, assuming all homes on the street will be drawing new high loads on the power lines too.

Are you assuming people will purchase a solar system to support the high cost of electricity?

Next are the unknown delays. In 30 days after signing when HMB furnaces and water heaters fail you could be forcing frail people to go without heat or hot water in the cold in a pandemic!

It could easily take months to complete such a project with electricians are in short supply and materials scarce in the pandemic's long term supply chain problem. That's unsafe and forcing that probably violates health codes.

Finally, 14.06.020 Definitions - outlawing gas home generators for the times when electricity is down means residents will have to suffer in the cold and the dark without even a stove for hot food: No soup for you! You cannot be serious.

I'm sad to say that this is the most onerous and poorly considered draft ordinance I have seen in my 34 years here. Please offer a path to a cleaner environment with incentives, not destruction.

Thank you,

Robin King

[redacted]

Half Moon Bay, CA 94019

SECTION 2. Addition of Section 14.06 to Chapter 14 of the HALF MOON BAY Municipal Code.

Half Moon Bay Municipal Code Chapter 14.06 is hereby added to read as follows:

Section 14.06 ELECTRIFICATION OF BUILDINGS

14.06.010 Applicability.
B. The requirements of this Chapter shall apply at the time of building permit application for Exchange of Gas Appliances, as defined in Section 14.06.020(C)

14.06.020 Definitions.
C. “Exchange of Fuel Gas Appliances” shall mean the voluntary or mechanically necessary replacement of appliances fueled by Fuel Gas for space heating or cooling, exterior heating, decorative uses and lighting, water heating (including pools and spas), cooking, clothes drying, and onsite generation of electricity (except where primarily fueled by onsite digestion of organic material) with other appliances fueled by Fuel Gas.

14.06.030 Requirement for All-Electric Construction.
D. Exchange of Fuel Gas Appliances.
The Building Official shall not issue permits to replace Fuel Gas powered appliances with Fuel Gas powered appliances where the application is submitted on or after the effective date of this chapter.

14.06.050 Infeasibility Waiver.
A. Waiver.
If an applicant for a permit for a Newly Constructed Building or an Exchange of Fuel Gas Appliance believes that physical or technical circumstances exist that make it technically or physically infeasible to meet the requirements of this Chapter in part or in whole, the applicant may request an exemption as set forth below. Financial considerations shall not be a sufficient basis for technical or physical infeasibility. In applying for an exemption, the burden is on the Applicant to show infeasibility.

Subject: Please Adopt the Electrification Ordinance to Phase Out Polluting Gas Use
Date: Sunday, November 14, 2021 at 8:30:44 PM Pacific Standard Time
From: Robin
To: Robert Brownstone, Debbie Ruddock, Joaquin Jimenez, Deborah Penrose, Harvey Rarback, Veronika Vostinak

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Dear council members and Mayor,

My name is Robin and I'm a student at Homestead High School, in the Bay Area. I am also a member of the Silicon Valley Youth Climate Action team in Sunnyvale. I'm writing in support of the Electrification Ordinance which will phase out from gas to electric energy, reducing the effects of global warming. This will be better for our communities and our planet. Reducing gas usage is one of the key actions that will help us fight against climate change. Methane gas has 80 times the power of CO2 to produce warmth, and yet gas powers half of Half Moon Bay. This is clearly an issue that can be solved by using affordable electricity instead.

If we don't act soon to reduce our gas usage, our planet's future is at risk. I remember when the sky turned red all across California, and you couldn't go outside without breathing in and smelling smoke. Climate change is not something that we can put off and ignore in favor of financial wealth or anything, really. It will affect our safety and our lives, disproportionately impacting those who have already been harmed by the pandemic. This Electrification Ordinance is crucial to ensure our safety. We youth are urging you to pass this proposal.

Sincerely,
Robin

Subject: Public Comment in Support of the Building Electrification Ordinance
Date: Monday, November 15, 2021 at 12:10:36 PM Pacific Standard Time
From: Sophia Ravner
To: Robert Brownstone
CC: Joaquin Jimenez, Deborah Penrose, Veronika Vostinak, Harvey Rarback, Debbie Ruddock

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Dear Half Moon Bay City Council,

I'm a Bay-Area resident and a student at Gateway High School. On behalf of my community, I express our strong support for the passage of the building electrification ordinance in Half Moon Bay, which would help aid the energy transition we desperately need to achieve a healthy, sustainable future.

As a young person today, climate change is my primary concern. I fear what my future habitat will be if we keep polluting and the Earth continues warming. My peers and I experience intense anxiety over this and are trying our best to get the attention of local politicians to make changes. Small policy changes can go a long way; reducing greenhouse gas emissions anywhere helps everyone everywhere.

The burnout ordinance will be beneficial to the people of Half Moon Bay as coastal regions will be the first to experience the terrible effects of climate change, like sea-level rise. In addition to sea-level rise, California is also prone to wildfires, made more frequent and worse by atmospheric warming. Half Moon Bay needs to protect its residents in the long term by drastically reducing the usage of fossil fuels fast and through any means necessary.

I urge this council to help lead California on its path towards a sustainable, greener future by implementing this burnout ordinance.

Best,
Penguin Ravner
Student at Gateway high School, Class of 2022

This message is from a current, former or graduate student of Gateway Public Schools, SF, CA. Content should be consistent with education environments and relevant communications.

Subject: Stop Electrification of HMB
Date: Monday, November 15, 2021 at 2:27:25 PM Pacific Standard Time
From: Steve Hyman
To: HMB Sustainability

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear City Council,
This email is to voice my strong objection to the proposed ordinance to eliminate gas appliances 9in homes and businesses.
My name is Steve Hyman and I have been a property tax paying resident here for almost 40 years.
I also have owned the Century 21 franchise on Main St for over 30 years. In this capacity I have dealt with a few hundred home buyers and their reaction to electric appliances. In almost every instance, people hated them because they were both ugly and very expensive to operate. As a result most people who bought these older homes went to great expense to convert them (stove, dryter, water heater and electric heat) to gas.
Converting all these appliances plus more will cost the average homeowner a lot of money, conservatively $20,000-$40,000, and more for larger homes But the worst part is that after you've spent all this money, you will have much higher PG&E monthly bills putting all your living bills in 1 basket from a utility that is in bankruptcy and has proven to be unreliable.
And for what purpose are we doing this? I don't believe the scientific data saying there will be any improvement in reduction of global warming.
This is a really bad idea. But if you Council members think it is so great, I challenge you to lead by example and convert your homes now (without creative financing not available to the general public) and report back to the public what the conversion and operating costs are. Then we can decide if this pencils out. Put your money where your mouths are or leave us alone.
Steve Hyman
Half Moon Bay

Suzan Suer
[redacted]Half Moon Bay, CA 94019
November 16, 2021

Dear City Council Members

Thank you for the opportunity to provide feedback on the electrification ordinance.

As context, I have a 1,500 sq foot all electric home, and we have two hybrid electric cars. I wholly support promoting electric on a voluntary basis -- but I object to electrification as a mandatory requirement for existing homes.

Why? For our 1,500 square foot home, our electric bills run about $275 a month, based on the last 12 months of PGE bills. This is certainly expensive relative to gas. While there are some aspects I prefer such as radiant heat over forced air heat -- the efficiency of electric overall overall is quite uneven. I particularly hate cooking on an electric stovetop -- even with one of the induction burners some advocate for. Despite some listening session claims to the contrary, independent research indicates that most chefs still prefer a gas stovetop. In any event, I object to the city eliminating gas stovetop cooking.

However, overshadowing all of this is the potential loss of heat that comes with electric outages under mandatory electrification -- particularly with such outages becoming been increasingly frequent in recent years.

During listening sessions I heard people say in response -- well just get solar!

I have looked into solar and can tell you firsthand that it is not easy to sort out the options -- even with a research background -- and they are not cheap! According to EnergySage.com, a website designed to help people make sense of solar, the average 2019 out of pocket cost of solar in San Mateo County was $14,577 to $19,722. They estimated the cost of solar for my specific home to be $29,000 based on a google map image of my roof.

My understanding is that I would also need battery storage with this being an extra cost. As of July 2021, the cost of one Tesla powerwall battery plus installation is about $10,500. So my best guess is a cost of $30,000 to $40,000 to install solar and have battery storage backup. There are some loans available--but this is a pretty heavy financial obligation even with 0% loans. Especially for those of us who are approaching retirement. If the city wants electrification then I think it has an obligation to help subsidize the incremental costs homeowners have to absorb.

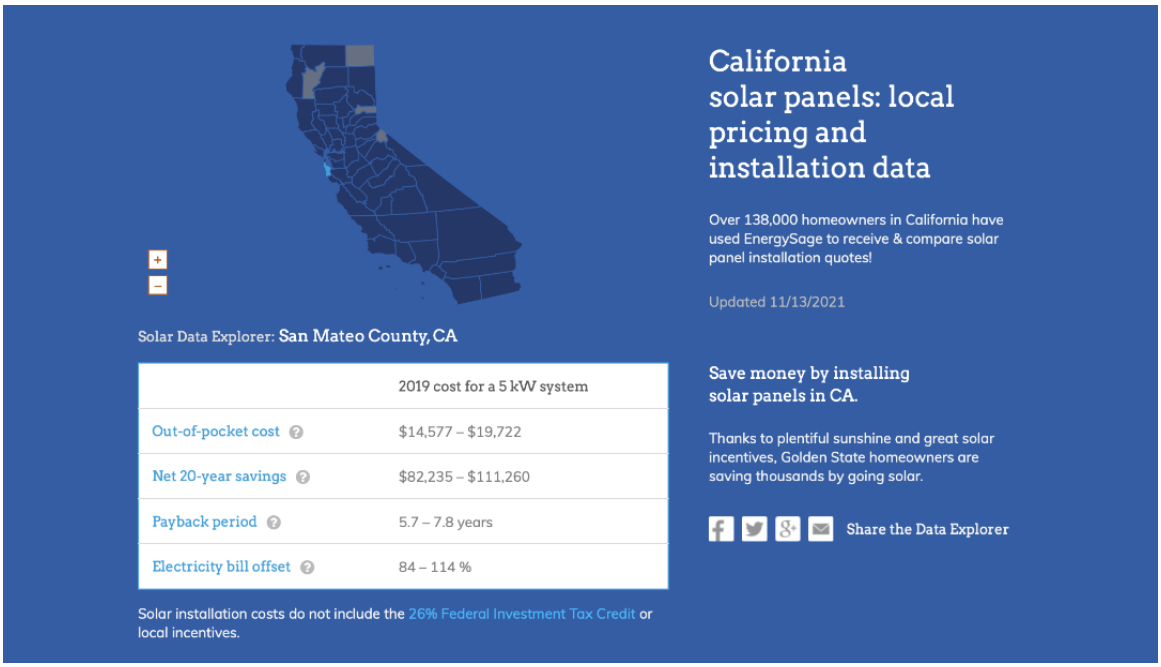
I can also share that on nextdoor there are many horror stories about bad solar companies and installations not going to plan and/or serious delays. It is one thing to require all electric for new construction but it seems quite unfair to expect the average homeowner to navigate this level of complexity and cost.

Finally, the process of producing solar panels and solar batteries is not pollution free--and some battery and other materials are becoming quite scarce to obtain--I wonder if this has been factored into the ordinance considerations.

Thank you for considering my perspective.

Respectfully,
Suzan Suer

I attach some supporting information from EnergySage.com:



Your Estimated Savings with Solar

This ballpark estimate is based on the information you provided. Your actual numbers will vary on your roof characteristics, selected hardware and financing.

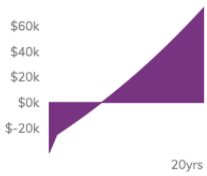
Estimates are based on Real-Time EnergySage Marketplace Data in CA.

PAY CASH

Own the system; maximize savings

Pay for a turnkey system; Government incentives cover 30% - 65% of the cost.

$74,000	20 Year Net Savings
$29,000	Net Cost
6.8 Years	Payback
3% or more	Increase in Property Value



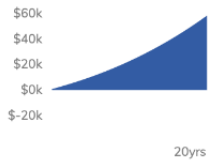
Your Estimated Savings

$0-DOWN LOAN

Own the system; no up-front cost

Qualify for government incentives; Interest may be tax deductible.

$57,000	20 Year Net Savings
$0	Out-of-Pocket Cost
Immediate	Payback
3% or more	Increase in Property Value



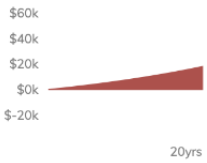
Your Estimated Savings

$0-DOWN LEASE/PPA

Rent the system; no up-front cost

Solar company owns and maintains the system; buy electricity at a discount.

$18,000	20 Year Net Savings
$0	Out-of-Pocket Cost
Immediate	Payback
0%	Increase in Property Value



Your Estimated Savings

Subject: Proposed Building Electrification Start Date -- Start of Construction vs Permit Filing Date
Date: Monday, November 15, 2021 at 6:45:36 PM Pacific Standard Time
From: suzanne emersonenvironmental.com
To: Veronika Vostinak, John Doughty

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Ms. Vostinak and Mr. Doughty,

First, thank you for all your work on the proposed Building Electrification Ordinance.

In my experience working as a Green Building Consultant and Green Building Special Inspector, most construction project teams are accustomed to the applicable codes and regulations locking in on the date that the permit is accepted for filing. If I understand it correctly, it appears that section 14.06.030 would apply the All-Electric Construction requirement to any project that begins construction on or after 1/1/2023, regardless of when the permit was filed. This could create a situation where permits are accepted for filing in mid- or late-2022 with gas piping and equipment indicated in the plan set, but then depending on when the actual construction begins (before or after 1/1/2023), the project may or may not then be required to change the plans to not install gas. It seems it would be much more consistent with expectations of architects and builders to have a date certain for filing after which all plan sets must be all-electric. That way, the plan checkers will know whether or not the all-electric requirement applies, and there won't be changes required after permits are issued based on when construction actually begins. To reflect the Council Members' concerns about providing an exemption for projects that are currently in the process of filing for a permit, the All-Electric Buildings provision could be set to go into effect for all single-family projects filing for permit on or after March 1, 2022 and for multi-family projects filing for permit on or after August 1, 2022.

I also want to thank you for your ground-breaking work on bringing forward an Electrify-on-Replacement ordinance. I look forward to the hearing and am hopeful for the adoption and implementation of the Half Moon Bay electrification ordinance.

Suzanne Henderson Emerson

Emerson Environmental
[redacted]

Subject: Support for Item 2a, Building Electrification Ordinance
Date: Monday, November 15, 2021 at 9:40:07 AM Pacific Standard Time
From: Terry Nagel
To: Debbie Ruddock, Deborah Penrose, Harvey Rarback, Joaquin Jimenez, Robert Brownstone
CC: Bob Nisbet, Veronika Vostinak, Jessica Blair

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Mayor Brownstone and Council Members,

I'm writing to voice my wholehearted support for the building electrification ordinance you are due to consider at your November 16th meeting. By approving this ordinance, you will be addressing climate change in one of the fastest ways possible because **buildings account for 27 percent of carbon emissions in California**. The state's transition to electric vehicles will address emissions coming from transportation, the biggest source of emissions, but getting emissions out of construction still requires support from elected officials. **Your action will inspire leadership from other leaders.**

Both the California Energy Commission and the Bay Area Air Quality Management District are moving toward requirements that will phase out natural gas, which is 97 percent methane. **It doesn't make sense to keep allowing builders to install two power systems** (gas and electric) in new buildings (at a higher cost to property owners) that are designed to last for decades when new laws will likely require owners to replace them.

Powering water heaters and space heaters with heat pumps is not new technology. It's been in widespread use in other parts of the U.S. and other countries for many years. Nearly 60 percent of new homes nationwide are being built all-electric and 40 percent have heat pumps. In fact, everyone with a refrigerator already has this technology in their home.

An added benefit of a heat pump space heater is that **it also acts as an air-conditioner**. As more local residents opt for home cooling systems because of rising temperatures and smoke from wildfires, it would be helpful to let them know that a new heat pump space heater can also cool their home.

There are many other reasons to support electrification, such as the number of new jobs it will create, the safety and superior performance of induction cooktops, and the many new electric alternatives there are for appliances, fireplaces and pool heaters (there are even electric saunas and heated lawn furniture!), but **the major reason to support electrification is to show that you are serious about addressing climate change**.

Please support electrification and help your residents enjoy the benefits of cleaner, safer and more efficient electric energy.

Best regards,

Terry

Terry Nagel
Chair, Sustainable San Mateo County
Former Mayor, Burlingame

Veronika Vostinak

From: Trish Hayward [redacted]
Sent: Wednesday, December 1, 2021 4:54 PM
To: HMB Sustainability
Subject: I Oppose the Electrification Ordinance being Debated

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Hello.

I am writing to formally voice my opposition to the electrification ordinance that is currently being debated by the HMB City Council. There does not appear to be high enough ecological benefit to this change to warrant the cost to homeowners. I recommend you use your council powers to encourage solar installations instead.

Thank you.

Trish Hayward

[redacted]
Half Moon Bay CA 94019
[redacted]

Subject: Fwd: THANK YOU
Date: Tuesday, November 23, 2021 at 10:31:46 PM Pacific Standard Time
From: Deborah Penrose
To: Veronika Vostinak

Begin forwarded message:

From: Zarine Batliwalla[redacted]
Subject: THANK YOU
Date: 23 November 2021 at 4:22:29 pm GMT-8
To: "jjimenez@hmbcity.com" <jjimenez@hmbcity.com>

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To Whom It May Concern:
I would like to thank the City Council members for listening to the people and not imposing the strict rule to change homes to electric.
This would have been extremely costly and a burden to everyone whether they are on a fixed income or not.
Thank you again
Zarine Batliwalla

Zarine
Real Estate Advisor
D.R.E # 01096437
BETTER HOMES & GARDENS, THRIVE
[redacted]

Thanks for the trust you exhibit when you refer us to your friends and associates.

Veronika Vostinak

From: Guy Rabbat [redacted]
Sent: Thursday, December 2, 2021 12:25 PM
To: HMB Sustainability
Cc: Nadia Rabbat; Guy Rabbat; [redacted]
Subject: Potential Electrification of Half Moon Bay - December 6, 2021

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Dear HBM City,

Our recommendation is to postpone any decision that would affect all residents of Half Moon Bay and allow for the collection of data pertaining to global warming impact of appliances in Half Moon Bay.

Based on my contacts, we can collect the extensive data at no cost to the City and present its analysis to the HBM City Council within the next 3 months.

We would appreciate allowing us to proceed with this analysis based on the data.

Thanks,
Guy and Nadia Rabbat
[redacted]

Cell : [redacted]

Veronika Vostinak

From: Jonne Van Meer & Jim Moran [redacted]
Sent: Thursday, December 2, 2021 12:31 PM
To: HMB Sustainability
Subject: electrification issue

[CAUTION]: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello:

We're writing to urge the city of HMB not to demand the electrification of existing homes, or the electrification of large-scale remodels.

My wife and I moved to HMB earlier this year (into a house that is almost 50 years old). She is over 70, I'm nearing 70, and like many retirees we live on a fixed income. The electrification of our home would doubtless run into many thousands of dollars. Please do not force the residents of HMB who live in existing structures to take on that kind of financial burden. Understanding and compassion for such residents would be greatly appreciated.

We hope you will take our comments seriously as you prepare for next week's council meeting.

Respectfully,
James Moran & Jonne Van Meer

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: John Doughty, Public Works Director
Veronika Vostinak, Sustainability Analyst

TITLE: **ELECTRIC VEHICLE AND PHOTOVOLTAIC SYSTEM REACH CODES FOR 2019 ENERGY CODE**

RECOMMENDATION:
Conduct a public hearing, waive first reading, and introduce an ordinance repealing and replacing Chapter 14.04.040 ("Energy Code") and Chapter 14.04.120 ("Green Building Standards Code") of the Half Moon Bay Municipal Code to expand the requirements for PV in new non-residential buildings, require pre-wiring for back up battery storage, and expand EV charging requirements in new residential buildings.

FISCAL IMPACT:
The fiscal impact to the City is unknown at this time. The provisions of the ordinance will apply to new City buildings including the City's proposed Corporation Yard.

STRATEGIC ELEMENT:
This action supports the Infrastructure and Environment and Healthy Communities and Public Safety Elements of the Strategic Plan.

BACKGROUND:
California continues to lead the fight against climate change. The effort to fight climate change is delegated to State agencies, regional planning/transportation agencies and local governments like Half Moon Bay and San Mateo County.

The State legislature and Governor(s) have created legislation, rules and executive orders to create a framework for ambitious statewide greenhouse gas (GHG) reductions. The following is a list of some of the more prominent guiding policy documents:

- Assembly Bill 32 (AB 32) - established the goal of reducing GHG emissions to 1990 levels by 2020

- Senate Bill 32 (SB 32) - established the goal of reducing GHG emissions 40% below 1990 levels by 2030
- Executive Order (EO) B-55-18 - established the goal of achieving carbon neutrality by 2045 at the latest and maintaining net negative emissions from that point forward
- Senate Bill 100 (SB 100) - requires a 100% clean electric grid by 2045
- EO N-79-20 - requires all new cars and passenger trucks sold in California be zero emission by 2035

The City is currently in the process of preparing its first Climate Action and Adaptation Plan (CAAP). This plan will provide an inventory of emissions, estimates of future unmitigated emissions and policies/implementation measures to reduce GHG emissions into the future. Notably, energy use for buildings represents approximately 49% of the GHG emissions in Half Moon Bay, which is the greatest proportion of the City's total GHG emissions. Closely following building energy, 45% of the GHG emissions generated in Half Moon Bay are generated from transportation, including gas-powered vehicles.

Local jurisdictions may contribute to the reduction of statewide GHG emissions by adopting the California Building Standards Code combined with more stringent local policies. The City Council has previously indicated a desire to proceed with adoption of a local ordinance that goes beyond statewide standards.

Every three years, the State of California develops and adopts revisions to the State model building and related codes, which are found in Title 24 of the California Code of Regulations and referred to collectively as the California Building Standards Code ("State Building Codes"). The State Building Codes include the Energy Code and Green Building Standards Code, among others. In January 2020, the City Council adopted the most recent State Building Codes (dated 2019), and the next State Building Codes are expected to be introduced in 2022. The State has provided local jurisdictions the authority to adopt amendments to the State Building Codes that exceed Statewide standards. In order to adopt such amendments, local governments must make findings of reasonable necessity based on local topographical, geological, or climatic conditions.

In addition, in the case of local amendments to the Energy Code (Title 24, Part 6), the California Energy Commission (CEC) requires that local governments make a determination that the amendments are cost-effective, and file that determination with the CEC. It is required that the City adopt a determination that the standards are cost-effective and do not represent an unreasonable burden to the non-residential and residential applicants. The CEC must also find that the standards will require buildings to be designed to consume no more energy than is permitted by the state Energy Code. Neither a cost-effectiveness study nor an energy consumption finding is required for amendments to the Green Building Code (Title 24, Part 11).

DISCUSSION:
To help curb GHG emissions generated within the City, work toward a cleaner environment, and assist the State in reaching SB32 goals, staff has prepared an Ordinance that would:

- Require new single-family, duplexes, triplexes, and accessory dwelling units (ADUs) to pre-wire for the installation of back-up battery storage
- Expand Photovoltaic (PV) System installation requirements for new Non-Residential Buildings
- Expand electric vehicle (EV) charging requirements for Residential New Construction

Each of these provisions is outlined in more detail below. All of these provisions apply to new construction projects only and would not apply to any existing buildings, including remodels.

Pre-Wire for Back-Up Battery Storage in New Residential Buildings
The current Energy Code requires PV installation on new construction of single-family and multi-family homes up to three stories high, based on square footage. However, there is no requirement in the Energy Code to install or pre-wire for stationary battery back-up storage. The proposed amendment would require that any new single-family, duplex, triplex and accessory dwelling units pre-wire for stationary battery back-up storage.

Back-up battery storage allows for clean self-generation, storage, and resiliency during planned and unplanned power outages. Pre-wiring for these systems at the time of construction is most cost-effective and provides freedom for the current or future homeowner to decide if they would like to install a battery depending on their specific needs.

PV Installation in New Non-Residential Buildings
Unlike residential buildings, the current state Energy Code does not require that new non-residential buildings install PV systems at the time of construction. The proposed amendment would require that new non-residential buildings install a solar PV system equivalent in size to 15 percent of the roof area, and new hotels/motels new non-residential buildings install a solar PV system equivalent in size to 5 percent of the roof area.

Expanding the PV requirements to include non-residential buildings would provide greater local GHG-free energy. Installing PV systems at the time of construction is likely to decrease the overall costs as compared to retrofitting a building later with PV. Furthermore, installing a PV system results in energy cost savings derived monthly.

Expanded EV Charging Requirements for Residential Buildings
The State of California has established the goal to require all new cars and passenger trucks sold in California to be zero emission by 2035. The EV charging infrastructure needs will greatly increase as more individuals switch to EVs. Access to charging infrastructure is one of the main barriers behind price preventing individuals from purchasing an EV. A market research survey conducted by PCE in 2020, found that 36% of those surveyed did not have access to a convenient charging location near their home, work or school.

The current state Green Building Standards Code includes requirements to install EV charging. however, these requirements are unlikely to keep pace with expected EV growth looking towards 2030. Staff has proposed using the provisions for residential buildings suggested by Peninsula Clean Energy and Silicon Valley Clean Energy to remain consistent with other municipalities throughout San Mateo and Santa Clara Counties. The current suggestions do not include non-residential buildings, due to the unique needs and space challenges of non-residential buildings in Half Moon Bay, particularly in the downtown area.

The provisions of the proposed EV changes compared to the current state Green Building Standards Code are outlined in the table below.

Building Type	**Current State Green Building Standards Code**	**Proposed Changes**	**Exceptions**
Single-Family, Duplex, Townhome with dedicated garage, ADUs with dedicated parking space	(1) Level 2 EV Capable for one parking space per dwelling unit	(1) Level 2 EV Ready circuit per dwelling unit; and (1) Level 1 EV Ready circuit per dwelling unit	• Dwelling Units with only one parking space shall install a Level 2 EV Ready Space • ADUs without a dedicated spot when there is no panel upgrade
Multi-family (<20 dwelling units)	(1) Level 2 EV capable for 10% of parking spaces	(1) Level 2 EV Ready for each dwelling unit	N/A
Multi-family (>20 dwelling units)	(1) Level 2 EV capable for 10% of parking spaces	(1) Level 2 EV Ready for first 20 dwellings, then: **25%** Level 2 EV Ready, **75%** are Level 1 EV Ready	Affordable Housing (After first 20 dwellings): • **10%** Level 2 EV Ready • **90%** Level 1 EV Ready

Requirements to install new EV infrastructure in new residential buildings at the time of construction is an opportunity to expand EV access as adoption continues to expand. It is significantly more expensive to install charging infrastructure as a retrofit than it is during new construction. As such, ensuring that newly constructed residential buildings have ample EV charging capability will reduce long-term costs of EV infrastructure installation, while helping to increase EV adoption and decrease transportation-related greenhouse gas emissions. The proposed amendments are more in-line with local EV adoption trends, while providing flexibility for the builder and keeping construction costs as low as possible.

ATTACHMENTS:
Attachment 1: Ordinance
Attachment 2: Cost Effectiveness Study for Non-Residential Buildings

ORDINANCE NO. C-2021-____

ORDINANCE REPEALING SECTIONS 14.04.040 (ENERGY CODE) AND 14.04.120 (GREEN BUILDING STANDARDS CODE) OF THE HALF MOON BAY MUNICIPAL CODE AND ADOPTING NEW SECTIONS 14.04.04 AND 14.04.120

THE CITY COUNCIL OF THE CITY OF HALF MOON BAY DOES ORDAIN AS FOLLOWS:

Section 1. Findings. The City Council of the City of Half Moon Bay hereby repeals and replaces Section 14.04.040 ("Energy Code") and Section 14.04.120 ("Green Building Standards Code") of the Half Moon Bay Municipal Code. The City Council finds and declares as follows:

(a) Health and Safety Code Section 18941.5, with reference to Section 17958.7, allows for more restrictive local amendments to the current California Building Standards Code ("Building Codes") that are reasonably necessary because of local climatic, geological, or topographical conditions.

(b) The Half Moon Bay City Council expressly declares that these proposed amendments to the Building Codes are reasonably necessary because of local climatic, topographical, and geological conditions, and hereby adopts the findings of reasonable necessity as set forth in Attachment A accompanying this ordinance.

(c) Express findings that these modifications to the Building Codes are reasonably necessary are hereby made and will be filed with the California Building Standards Commission in accordance with California Health and Safety Code Section 17958.7 before this ordinance takes effect.

(d) Failure to address and significantly reduce greenhouse gas emissions could result in rises in sea level that could put at risk Half Moon Bay homes and businesses, public facilities, and portions of major local and regional transportation infrastructure.

(e) Due to changes in rainfall patterns expected with climate change, the City of Half Moon Bay is likely to be subject to more severe weather events, including droughts as well as more intense storms that increase the risks of, and have actually resulted in, extreme wildfires, erosion, overland local flooding and landslides.

(f) It is expected that climate change will result in further severe and frequent extreme heat events, intensifying local heat islands and putting vulnerable populations at health risk, which has already occurred at unprecedented levels with sea level rise and widespread wildfires in the area.

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(g) In 2016, the State of California enacted Senate Bill (SB) 32 to require greenhouse gas emissions to be reduced to 40 percent below 1990 levels by 2030.

(h) In 2018, Governor Brown signed Executive Order (EO) B-55-18 which calls for California to achieve carbon neutrality as soon as possible, and no later than 2045.

(i) The City of Half Moon Bay is preparing its Climate Action and Adaptation Plan to, at minimum meet State emissions goals established in SB32 and EO B-55-18.

(j) On February 2, 2021, the City Council conducted a study session on reach codes and directed staff to prepare a draft building electrification ordinance including measures to expand the requirements for photovoltaic system and electric vehicle charging systems in new construction for consideration by the community and City Council.

(k) The requirements specified in this Ordinance were the subject of stakeholder outreach from June through September 2021, including public meetings and individual stakeholder interviews.

(l) On September 25 and October 5, 2021, the City Council conducted additional study sessions to provide policy guidance on the draft Building Electrification ordinance, which included measures to increase photovoltaic panel and electric vehicle systems in new construction.

(m) Half Moon Bay can help lead the climate change movement by implementing climate solutions to benefit all people in our community, particularly those that have been disadvantaged by air pollution and other environmental harms in our most vulnerable communities.

(n) A "Reach Code Cost Effectiveness Study" dated July 25, 2019, and prepared for Southern California Edison Company, Codes and Standards Program analyzed the feasibility and cost-effectiveness of requiring nonresidential new construction to exceed the 2019 Building Energy Efficiency Standards (a copy of the Study is on file with the Department of Environmental Services).

(o) A "Reach Code Cost Effectiveness Study" dated August 1, 2019, and prepared for Pacific Gas and Electric Company, Codes and Standards Program analyzed the feasibility and cost-effectiveness of requiring low-rise residential new construction to exceed the 2019 Building Energy Efficiency Standards (a copy of the Study is on file with the Department of Environmental Services).

(p) Said Cost Effectiveness Studies evaluated efficiency packages for 16 different climate zones and determined that the energy efficiency standards in this Ordinance meet the Study's cost-effectiveness standards for climate zone 3, which includes Half Moon Bay.

(q) The City Council finds that the additions, deletions, modifications and amendments made to the Energy Code as described herein are cost-effective in accordance with California Public Resources Code section 25402.1(h)(2). The finding of cost-effectiveness is described in

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greater detail in the Staff Report and the accompanying analyses, and is primarily derived from the California Codes and Standards Reach Code Program, which has determined specific modifications to the 2019 State Energy Code for climate zone 3 that are cost-effective. The City Council also finds, pursuant to Public Resources Code Section 25402.1(h)(2), that the additions, deletions, modifications and amendments to the Energy Code as described herein will require the diminution of energy consumption levels permitted by the 2019 State Energy Code. The City Council's findings of cost-effectiveness and energy savings will be filed with the California Energy Commission pursuant to Title 24 Chapter 10-106 before this ordinance takes effect.

Section 2. Municipal Code Amendments. Sections 14.04.040 and 14.04.120 of the Half Moon Bay Municipal Code are hereby repealed in their entirety and replaced with new Sections 14.04.040 and 14.04.120, which are adopted as set forth in Attachment B. Attachment B of this Ordinance is incorporated herein in its entirety.

Section 3. Severability. If any section, sentence, clause or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council herby declares that it would have passed this Ordinance and adopted this Ordinance and each section, sentence, clause or phrase thereof, irrespective of the fact that any one or more section, subsections, sentences, clauses or phrases be declared invalid or unconstitutional.

Section 4. California Environmental Quality Act. The City Council finds that this Ordinance is exempt from CEQA under CEQA Guidelines section 15061(b)(3) on the grounds that the standards contained therein are more stringent than those set forth in the State Energy Code and Green Building Standards Code, and as a result there are no reasonably foreseeable adverse impacts or possibility that the activity in question may have a significant effect on the environment. The Ordinance is also exempt from CEQA under CEQA Guidelines section 15308, because it is a regulatory action for the protection of the environment. The foregoing determination is made by the City Council in its independent judgment.

Section 5. Publication. The City Clerk shall publish a summary of this Ordinance in a newspaper of general circulation for the City of Half Moon Bay within fifteen days after its adoption.

Section 6. Effective date. This Ordinance shall take effect and be in force on the thirtieth (30th) day from and after its final passage and upon approval by the California Energy Commission.

INTRODUCED at a regular meeting of the City Council of the City of Half Moon Bay, California, held on the __ of _____ 2021.

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INTRODUCED at a regular meeting of the City Council of the City of Half Moon Bay, California, held on the ____ day of ___, 2021, by the following vote:

Ayes, Councilmembers: _____
Noes, Councilmembers: _____
Absent, Councilmembers: _____
Abstain, Councilmembers: _____

ATTEST:

_____ _____
Jessica Blair, City Clerk Robert Brownstone, Mayor

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Attachment A

Section 1. Findings: The City Council hereby finds the following facts to be true:

A. Scientific evidence has established that natural gas combustion, procurement and transportation produce significant greenhouse gas emissions that contribute to global warming and climate change;
B. On June 18th, 2019, the Half Moon Bay City Council adopted a climate emergency declaration, calling for a mobilization effort to end citywide greenhouse gas emissions as quickly as possible;
C. In November 2019, Half Moon Bay City Council adopted a Sustainability Implementation plan that put Half Moon Bay on a path to reduce greenhouse gas emissions in response to climate change;
D. The City recognizes the need for an organized and equitable transition away from fossil fuels used in buildings and transportation;
E. The additions and modifications to the California Energy Code and Green Building Standards Code listed below are reasonably necessary because of the following local climatic, geologic and topographical conditions:
    1. The City limits of Half Moon Bay includes and borders areas that are considered by the State Fire Hazard Severity zone mapping system to be of High and Very High fire hazard. As such, the City is extremely vulnerable to wildfires, and human activities releasing greenhouse gas into the atmosphere cause increases in worldwide average temperature, drought conditions, vegetative fuel, and length of fire seasons, all of which have the potential to affect Half Moon Bay;
    2. Half Moon Bay is within the Coastside Fire Protection District, which is located within a high activity seismic Zone 4. The San Andreas Fault, as well as faults that are not fully charted, are within immediate boundaries of the District. The seismic geological conditions present a very severe potential for multiple fires, major breakage of water mains, major breakage of natural gas mains, multiple electrical power failures, multiple collapsed structures, large number of calls for emergency medical aid, all of which may occur simultaneously during a seismic event;
    3. Half Moon Bay is situated along the Pacific Coastline and the potential impacts of sea level rise are anticipated to increase the City's exposure to shoreline hazards. Human activities releasing greenhouse gas into the atmosphere cause increases in Rising sea levels are likely to affect the amount of area in the city at risk of coastal flooding, the rate of erosion along the shoreline and bluffs, the area of the City's tsunami inundation zone, and potential seawater intrusion into riparian systems and groundwater supplies. Loss of shoreline due to rising waters may also threaten the stability of coastal habitats, recreation areas, public access, and infrastructure.

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4. Vehicular traffic through Half Moon Bay is significant and continues to increase as Half Moon Bay is a tourism destination as well as the location of residential projects. Moreover, the observed increase in plug-in electric vehicle adoption reduces the climate impact of vehicular greenhouse gas emissions;
5. Locally generated and stored renewable energy, such as the energy generated through a rooftop photovoltaic system, provides an opportunity to further increase the availability of carbon-free energy and reduce the climate impact from building energy.

Based on the above facts, the City Council makes the following finding: that Half Moon Bay's local, geological, topographical, and climatic conditions require amendments to the California Energy Code and the California Green Building Standards Code to establish more restrictive conditions to reduce greenhouse gas emissions in new buildings, thereby reducing the environmental and health hazards produced by the consumption and transportation of natural gas, and to promote electric vehicle charging infrastructure and additional green building measures as summarized in the matrix included hereto in Section 2.

Section 2. Matrix of Justifications.

Matrix of Justifications for Local Amendments to 2019 California Energy Code (Title 24, Part 6)						
Half Moon Bay Municipal Code Section(s)	**State Code Section(s)**	**Title**	**Add**	**Deleted**	**Amended**	**Justification (see Section 1)**
14.04.040	140.3(a)(10)	Nonresidential, High-Rise Residential, and Hotel/Motel Occupancies – Performance and Prescriptive Compliance Approaches for Achieving Energy Efficiency			x	1, 2, 3, 4
14.04.040	150.1(c)13	Battery Storage Pre-Wire	x			1, 2, 3

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Matrix of Justifications for Local Amendments to 2019 Green Building Standards Code (Title 24, Part 11)						
Half Moon Bay Municipal Code Section(s)	**State Code Section(s)**	**Title**	**Add**	**Deleted**	**Amended**	**Justification (see Section 1)**
14.04.120	4.106.4	Electric vehicle (EV) charging for new construction			x	1, 2, 4
14.04.120	4.106.4.1	4.106.4.1 New one- and two family dwellings, town- houses with attached private garages, and ADUs with parking.			x	1, 2, 4
14.04.120	4.106.4.2.2	Electric vehicle charging space (EV space) dimensions			x	1, 2, 4
14.04.120	4.106.4.2.3	Single EV space required		x		1, 2, 4
14.04.120	4.106.4.2.3	Automated Load Management Systems	x			1, 2, 4
14.04.120	4.106.4.2.4	Multiple EV spaces required		x		1, 2, 4
14.04.120	4.106.4.2.5	Identification		x		1, 2, 4

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Attachment B

Section 1. Section 14.04.040 of the Half Moon Bay Municipal Code is hereby repealed in its entirety and replaced with the following Section 14.04.040 to be entitled, numbered, and to read as follows:

14.04.040 Energy Code

Those certain codes and standards known as the 2019 California Energy Code, Title 24, Part 6, published by the California Building Standards Commission, are hereby adopted by reference as if fully set forth in this chapter with the following amendments:

(a) Subchapter 5, "Nonresidential, High-Rise Residential, and Hotel/Motel Occupancies – Performance and Prescriptive Compliance Approaches for Achieving Energy Efficiency," is amended as follows:

Section 140.3 is amended by adding the following subsection:

Section 140.3(a)(10) Photovoltaic Requirements for Nonresidential Buildings and Hotel/Motel Occupancies. A solar photovoltaic system equivalent in size to 15 percent of the roof area, excluding any skylight area, shall be installed on the roof or overhang of the building or on the roof or overhang of another structure located within 250 feet of the building or on covered parking installed with the building project.

Exceptions:

1. The City Manager or his/her designee may grant a modification if the applicant demonstrates that the required percentage of solar photovoltaic installation will over-generate the annual kWh required to operate the proposed building;

2. The solar photovoltaic system size may be reduced in size to the maximum that can be accommodated by the effective annual solar access due to shading from existing permanent natural or manmade barriers external to the building, including but not limited to trees, hills, and adjacent structures. The effective annual solar access shall be 70 percent or greater of the output of an unshaded solar photovoltaic array on an annual basis. No solar photovoltaic system is required if the effective annual solar access is restricted to less than 200 contiguous square feet. If the applicant demonstrates that conditions exist where excessive shading occurs, a performance equivalency approved by the Building Official may be used as an alternative.

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3. Vegetative roofs covering 35 percent of the roof area or greater, meeting all relevant code requirements including considerations for wind, fire, and structural loads.

(b) Subchapter 8, "Low-Rise Residential Buildings – Performance and Prescriptive Compliance Approaches," is amended as follows:

Section 150.1(c) is amended by adding the following subsection:

Section 150.1(c)15 Battery Storage Pre-Wire. All new single-family residential units, duplexes, triplexes, and ADUs shall be prewired for the installation of Battery Storage. The prewiring shall be in accordance with California Building, Residential, and Electrical Codes and be adequately sized by a licensed professional to accommodate the back- up loads installed in the critical load panel with a minimum of 5 kwh.

Section 2. Section 14.04.120 of the Half Moon Bay Municipal Code is hereby repealed in its entirety and replaced with the following Section 14.04.120 to be entitled, numbered, and to read as follows:

14.04.120 Green building standards code

Those certain codes and standards known as the 2019 California Green Building Standards Code, Title 24, Part 11, published by the California Building Standards Commission, are hereby adopted by reference as if fully set forth in this chapter with the following amendments:

(a) Chapter 2, "Definitions," is amended to add or change the following definitions:

Affordable Housing: Residential buildings that entirely consist of units below market rate and whose rents or sales prices are governed by local agencies to be affordable based on area median income.

Automatic Load Management Systems (ALMS): A control system which allows multiple EV chargers or EV-Ready electric vehicle outlets to share a circuit or panel and automatically reduce power at each charger, providing the opportunity to reduce electrical infrastructure costs and/or provide demand response capability. ALMS systems must be designed to deliver a minimum of 8-amperes and not less than 1.4-kiloWatts at the provided voltage, to each EV Capable, EV Ready or EVCS space served by the ALMS, and meet the requirements of California Electrical Code Article 625. The connected amperage on-site shall not be lower than the required connected amperage per Part 11, 2019 California Green Building Code for the relevant building types.

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Electric Vehicle (EV) Capable: A parking space linked to a listed electrical panel with sufficient capacity to provide at least 110/120 volts and 20 amperes to the parking space. Raceways linking the electrical panel and parking space only need to be installed in spaces that will be inaccessible in the future, either trenched underground or where penetrations to walls, floors, or other partitions would otherwise be required for future installation of branch circuits. Raceways must be at least 1" in diameter and may be sized for multiple circuits as allowed by the California Electrical Code. The panel circuit directory shall identify the overcurrent protective device space(s) reserved for EV charging as "EV CAPABLE." Construction documents shall indicate future completion of raceway from the panel to the parking space, via the installed inaccessible raceways. The parking space shall contain signage with at least a ½" font adjacent to the parking space indicating the space is designated as EV Capable for future connection of infrastructure at the designed voltage and amperage levels.

Electric Vehicle Charging Station (EVCS): ~~One or more electric vehicle charging spaces served by electric vehicle charger(s) or other charging equipment allowing charging of electric vehicles. Electric vehicle charging stations are not considered parking spaces.~~ A parking space that includes installation of electric vehicle supply equipment (EVSE) with a minimum capacity of 30 amperes connected to a circuit serving a Level 2 EV Ready Space. EVCS installation may be used to satisfy a Level 2 EV Ready Space requirement. Electric vehicle supply equipment (EVSE) shall be installed in accordance with the California Electrical Code, Article 625.

Level 1 EV Ready Space: A parking space served by a complete electric circuit with a minimum of 110/120 volt, 20-ampere capacity including electrical panel capacity, overprotection device, a minimum 1" diameter raceway that may include multiple circuits as allowed by the California Electrical Code, wiring, and either a) a receptacle labelled "Electric Vehicle Outlet" with at least a ½" font adjacent to the parking space, or b) electric vehicle supply equipment (EVSE).

Level 2 EV Ready Space: A parking space served by a complete electric circuit with 208/240 volt, 40-ampere capacity including electrical panel capacity, overprotection device, a minimum 1" diameter raceway that may include multiple circuits as allowed by the California Electrical Code, wiring, and either a) a receptacle labelled "Electric Vehicle Outlet" with at least a ½" font adjacent to the parking space, or b) electric vehicle supply equipment (EVSE) with a minimum output of 30 amperes.

(b) Chapter 4, "Residential Mandatory Measures," is amended as follows:

Section 4.106.4-4.106.4.2.5 is amended to read:

4.106.4 Electric vehicle (EV) charging for new construction. New construction shall comply with Sections 4.106.4.1, 4.106.4.2, or 4.106.4.3 to facilitate future

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installation and use of EV chargers. ~~Electric vehicle supply equipment (EVSE) shall be installed in accordance with the California Electrical Code, Article 625.~~

Exceptions:

~~1. On a case-by-case basis, where the local enforcing agency has determined EV charging and infrastructure are not feasible based upon one or more of the following conditions:~~

1. Where there is no commercial power supply

~~1.1. Where there is evidence substantiating that meeting the requirements will alter the local utility infra- structure design requirements on the utility side of the meter so as to increase the utility side cost to the homeowner or the developer by more than $400.00 per dwelling unit.~~

2. Accessory Dwelling Units (ADU) and Junior Accessory Dwelling Units (JADU) without additional parking facilities and without electrical panel upgrade or new panel installation. Notwithstanding the foregoing, ADUs and JADUs without additional parking but with electrical panel upgrades or new panels must have reserved breakers and electrical capacity according to the requirements of 4.106.4.1.

3. Multifamily residential building projects with valid entitlements granted by the City that have not otherwise expired before the effective date of this ordinance shall provide at least ten (10) percent of the total number of parking spaces on a building site, provided for all types of parking facilities, with Level 2 EV Ready Circuits. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

4.106.4.1 New one- and two-family dwellings, town- houses with attached private garages, and ADUs with parking.

For each dwelling unit, install a Level 2 EV Ready Space and Level 1 EV Ready Space. ~~listed raceway to accommodate a dedicated 208/240-volt branch circuit. The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or other enclosure in close proximity to the proposed location of an EV char- ger. Raceways are required to be continuous at enclosed, inaccessible or concealed areas and spaces. The service panel and/or subpanel shall provide capacity to install a 40-ampere minimum dedicated branch circuit and space(s) reserved to permit installation of a branch circuit overcurrent protective device.~~

~~**Exception:** A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the proposed location of an EV charger at the time of original construction in accordance with the *California Electrical Code*.~~

Exception: For each dwelling unit with only one parking space, install a Level 2 EV Ready Space.

4.106.4.1.1 Identification. ~~The service panel or sub- panel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging as "Level 2 EV CAPABLE".~~ The raceway termination location shall be permanently and visibly marked as ~~"EV CAPABLE".~~ "Level 2 EV-Ready".

4.106.4.2 New multifamily dwellings. ~~If residential parking is available, ten (10) present in total number of parking spaces on a building site, provided for all types of parking facilities, shall be electric vehicle charging spaces (EV spaces) capable of supporting future EVSE. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.~~ The following requirements apply to all new multifamily dwellings.

1. For multifamily buildings with less than or equal to 20 dwelling units, one parking space per dwelling unit with parking shall be provided with a Level 2 EV Ready Space.

2. When more than 20 multifamily dwelling units are constructed on a building site:

    a. Install one Level 2 EV Ready Space in the first 20 dwelling unit parking spaces.

    b. For each additional dwelling unit over 20, 25% of the dwelling units with parking space(s) shall be provided with at least one Level 2 EV Ready Space. Calculations for the required minimum number of Level 2 EV Ready spaces shall be rounded up to the nearest whole number.

    c. In addition, each remaining dwelling unit with parking space(s) shall be provided with at least a Level 1 EV Ready Space.

Exception: For all multifamily Affordable Housing, 10% of dwelling units with parking space(s) shall be provided with at least one Level 2 EV Ready Space. Calculations for the required minimum number of Level 2 EV Ready spaces shall be rounded up to the nearest whole number. The remaining dwelling units with parking space(s) shall each be provided with at least a Level 1 EV Ready Space.

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~~1. Construction documents are intended to demonstrate the project's capability and capacity for facilitating future EV charging.~~

~~2. There is no requirement for EV spaces to be constructed or available until EV chargers are installed for use.~~

1. Installation of Level 2 EV Ready Spaces above the minimum number required level may offset the minimum number Level 1 EV Ready Spaces required on a 1:1 basis.
2. The requirements apply to multifamily buildings with parking spaces including: a) assigned or leased to individual dwelling units, and b) unassigned residential parking.
3. A parking space served by electric vehicle supply equipment or designed as a future EV charging space shall count as at least one standard automobile parking space for the purpose of complying with any applicable minimum parking space requirements established by a local jurisdiction. See *Vehicle Code* Section 22511.2 for further details.
4. In order to adhere to accessibility requirements in accordance with California Building Code Chapters 11A and/or 11B, it is recommended that all accessible parking spaces for covered newly constructed multifamily dwellings are provided with Level 1 or Level 2 EV Ready Spaces.

4.106.4.2.1 Electric vehicle charging space (EV space) locations.
Construction documents shall indicate the location of proposed EV spaces. Where common use parking is provided at least one EV Space shall be located in the common use parking area and shall be available for use by all residents.

4.106.4.2.1.1 Electric vehicle charging stations (EVCS). When EV chargers are installed, EV spaces required by Section 4.106.4.2.2, Item 3, shall comply with at least one of the following options:

1. The EV space shall be located adjacent to an accessible parking space meeting the requirements of the *California Building Code*, Chapter 11A, to allow use of the EV charger from the accessible parking space.

2. The EV space shall be located on an accessible route, as defined in the *California Building Code*, Chapter 2, to the building.

   Exception: Electric vehicle charging stations designed and constructed in compliance with the California Building Code, Chapter 11B, are not required to comply with Section 4.106.4.2.1.1. and Section 4.106.4.2.2, Item 3.

   Note: Electric vehicle charging stations serving public housing are required to comply with the *California Building Code*, Chapter 11 B.

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4.106.4.2.2 Electric vehicle charging space (EV space) dimensions. The EV spaces shall be designed to comply with the following:

1. The minimum length of each EV space shall be 18 feet (5486 mm).
2. The minimum width of each EV space shall be 9 feet (2743 mm).
3. One in every 25 EV spaces, but not less than one, shall also have an 8-foot (2438 mm) wide minimum aisle. A 5-foot (1524 mm) wide minimum aisle shall be permitted provided the minimum width of the EV space is 12 feet (3658 mm).
    a) Surface slope for this EV space and the aisle shall not exceed 1 unit vertical in 48 units horizontal (2.083 percent slope) in any direction.

Exception: Where Half Moon Bay's Municipal Code permits parking space dimensions that are less than the minimum requirements stated in this section 4.106.4.2.2, and the compliance with these minimum requirements would be infeasible due to particular circumstances of a project, an exception may be granted while remaining in compliance with 2019 California Building Code Section Table 11B-228.3.2.1 and 11B-812, as applicable.

4.106.4.2.3 Automated Load Management Systems.

1. As defined in Chapter 2, ALMS shall be allowed to meet the requirements of 4.106.4.2.
2. Where ALMS serve Direct Current Fast Charging stations, the power demand from the Direct Current Fast Charging station shall be prioritized above Level 1 and Level 2 spaces.

~~**Single EV space required.** Install a listed raceway capable of accommodating a 208/240-volt dedicated branch circuit. The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or enclosure in close proximity to the proposed location of the EV spaces. Construction documents shall identify the raceway termination point. The service panel and/or subpanel shall provide capacity to install a 40-ampere minimum dedicated branch circuit and space(s) reserved to permit installation of a branch circuit over- current protective device.~~

~~**Exception**: A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the proposed~~

~~location of an EV charger, at the time of original construction in accordance with the *California Electrical Code*.~~

~~**4.106.4.2.4 Multiple EV spaces required**. Construction raceway termination point and proposed location of future EV spaces and EV chargers Construction documents shall also pro- vide information on amperage of future EVSE, raceway method(s), wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformer(s), have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the EVSE. Plan design shall be based upon a 40-ampere minimum branch circuit. Raceways and related components that are planned to be installed underground, enclosed, inaccessible or in concealed areas and spaces shall be installed at the time of original construction.~~

~~**Exception:** A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the proposed location of an EV charger, at the time of original construction in accordance with the *California Electrical Code*.~~

4.106.4.2.5 Identification. The service panel or sub- panel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging purposes as “EV CAPABLE” in accordance with the California Electrical Code.

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CALIFORNIA ENERGY CODES & STANDARDS

A STATEWIDE UTILITY PROGRAM

Title 24, Parts 6 and 11
Local Energy Efficiency Ordinances

2019 Nonresidential New Construction Reach Code Cost Effectiveness Study

Prepared for:
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Codes and Standards Program
Southern California Edison Company

Prepared by:
TRC
EnergySoft

Last Modified: July 25, 2019

LEGAL NOTICE

This report was prepared by Southern California Edison Company (SCE) and funded by the California utility customers under the auspices of the California Public Utilities Commission.

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1 Introduction

The California Building Energy Efficiency Standards Title 24, Part 6 (Title 24) (CEC, 2019) is maintained and updated every three years by two state agencies: the California Energy Commission (the Energy Commission) and the Building Standards Commission (BSC). In addition to enforcing the code, local jurisdictions have the authority to adopt local energy efficiency ordinances—or reach codes—that exceed the minimum standards defined by Title 24 (as established by Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards). Local jurisdictions must demonstrate that the requirements of the proposed ordinance are cost-effective and do not result in buildings consuming more energy than is permitted by Title 24. In addition, the jurisdiction must obtain approval from the Energy Commission and file the ordinance with the BSC for the ordinance to be legally enforceable. This report was developed in coordination with the California Statewide Investor Owned Utilities (IOUs) Codes and Standards Program, key consultants, and engaged cities—collectively known as the Reach Code Team.

This report documents cost-effective combinations of measures that exceed the minimum state requirements for design in newly-constructed nonresidential buildings. Buildings specifically examined include medium office, medium retail, and small hotels. Measures include energy efficiency, solar photovoltaics (PV), and battery storage. In addition, the report includes a comparison between a baseline mixed-fuel design and all-electric design for each occupancy type.

The Reach Code team analyzed the following seven packages as compared to 2019 code compliant mixed-fuel design baseline:

- **Package 1A – Mixed-Fuel + Energy Efficiency (EE):** Mixed-fuel design with energy efficiency measures and federal minimum appliance efficiencies.
- **Package 1B – Mixed-Fuel + EE + PV + Battery (B)**: Same as Package 1A, plus solar PV and batteries.
- **Package 1C – Mixed-fuel + High Efficiency (HE)**: Baseline code-minimum building with high efficiency appliances, triggering federal preemption. The intent of this package is to assess the standalone contribution that high efficiency appliances would make toward achieving high performance thresholds.
- **Package 2 – All-Electric Federal Code-Minimum Reference**: All-electric design with federal code minimum appliance efficiency. No solar PV or battery.
- **Package 3A – All-Electric + EE**: Package 2 all-electric design with energy efficiency measures and federal minimum appliance efficiencies.
- **Package 3B – All-Electric + EE + PV + B**: Same as Package 3A, plus solar PV and batteries.
- **Package 3C – All-Electric + HE**: All-electric design with high efficiency appliances, triggering federal preemption.

Figure 1 summarizes the baseline and measure packages. Please refer to *Section 3* for more details on the measure descriptions.

Figure 1. Measure Category and Package Overview

Measure Category	Report Section	Mixed Fuel				All-Electric			
		Baseline	1A	1B	1C	2	3A	3B	3C
		Fed Code Minimum Efficiency	EE	EE+ PV + B	HE	Fed Code Minimum Efficiency	EE	EE+ PV + B	HE
Energy Efficiency Measures	3.1		X	X			X	X	
Solar PV + Battery	3.2			X				X	
All-Electric Measures	3.3					X	X	X	X
Preemptive Appliance Measures	3.4				X				X

The team separately developed cost effectiveness results for PV-only and PV+Battery packages, excluding any efficiency measures. For these packages, the PV is modeled as a "minimal" size of 3 kW and a larger size based on the available roof area and electric load of the building. PV sizes are combined with two sizes of battery storage for both mixed fuel and all electric buildings to form eight different package combinations as outlined below:

- **Mixed-Fuel + 3 kW PV Only**
- **Mixed-Fuel + 3 kW PV + 5 kWh Battery**
- **Mixed-Fuel + PV Only:** PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller
- **Mixed-Fuel + PV + 50 kWh Battery:** PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller, along with 50 kWh battery
- **All-Electric + 3 kW PV Only**
- **All-Electric + 3 kW PV + 5 kWh Battery**
- **All-Electric + PV Only:** PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller
- **All-Electric + PV + 50 kWh Battery:** PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller, along with 50 kWh battery.

Each of the eight packages are evaluated against a baseline model designed as per 2019 Title 24 Part 6 requirements. The Standards baseline for all occupancies in this report is a mixed-fuel design.

The Department of Energy (DOE) sets minimum efficiency standards for equipment and appliances that are federally regulated under the National Appliance Energy Conservation Act (NAECA), including heating, cooling, and water heating equipment.[1] Since state and local governments are prohibited from adopting

[1] https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=8de751f141aaa1c1c9833b36156faf67&mc=true&n=pt10.3.431&r=PART&ty=HTML#se10.3.431_197

higher minimum efficiencies than the federal standards require, the focus of this study is to identify and evaluate cost-effective packages that do not include high efficiency equipment. However, because high efficiency appliances are often the easiest and most affordable measures to increase energy performance, this study provides an analysis of high efficiency appliances for informational purposes. While federal preemption would limit a reach code, in practice, builders may install any package of compliant measures to achieve the performance requirements, including higher efficiency appliances that are federally regulated.

2 Methodology and Assumptions

With input from several stakeholders, the Reach Codes team selected three building types—medium office, medium retail, and small hotel—to represent a predominant segment of nonresidential new construction in the state.

This analysis used both on-bill and time dependent valuation of energy (TDV) based approaches to evaluate cost-effectiveness. Both methodologies require estimating and quantifying the energy savings associated with energy efficiency measures, as well as quantifying the costs associated with the measures. The main difference between the methodologies is the valuation of energy and thus the cost savings of reduced or avoided energy use. TDV was developed by the Energy Commission to reflect the time dependent value of energy including long-term projected costs of energy such as the cost of providing energy during peak periods of demand and other societal costs including projected costs for carbon emissions. With the TDV approach, electricity used (or saved) during peak periods has a much higher value than electricity used (or saved) during off-peak periods.[2]

The Reach Code Team performed energy simulations using EnergyPro 8.0 software for 2019 Title 24 code compliance analysis, which uses CBECC-Com 2019.1.0 for the calculation engine. The baseline prototype models in all climate zones have been designed to have compliance margins as close as possible to 0 to reflect a prescriptively-built building.[3]

2.1 Building Prototypes

The DOE provides building prototype models which, when modified to comply with 2019 Title 24 requirements, can be used to evaluate the cost effectiveness of efficiency measures. These prototypes have historically been used by the California Energy Commission to assess potential code enhancements. The Reach Code Team performed analysis on a medium office, a medium retail, and a small hotel prototype.

Water heating includes both service water heating (SWH) for office and retail buildings and domestic hot water for hotels. In this report, water heating or SWH is used to refer to both. The Standard Design HVAC and SWH systems are based on the system maps included in the 2019 Nonresidential Alternate

[2] Horii, B., E. Cutter, N. Kapur, J. Arent, and D. Conotyannis. 2014. "Time Dependent Valuation of Energy for Developing Building Energy Efficiency Standards." Available at: http://www.energy.ca.gov/title24/2016standards/prerulemaking/documents/2014-07-09_workshop/2017_TDV_Documents

[3] EnergySoft and TRC were able to develop most baseline prototypes to achieve a compliance margin of less than +/-1 percent except for few models that were at +/- 6 percent. This indicates these prototypes are not exactly prescriptive according to compliance software calculations. To calculate incremental impacts, TRC conservatively compared the package results to that of the proposed design of baseline prototypes (not the standard design).

Calculation Method Reference Manual.[4] The Standard Design is the baseline for all nonresidential projects and assumes a mixed-fuel design using natural gas as the space heating source in all cases. Baseline HVAC and SWH system characteristics are described below and in Figure 2:

- The baseline medium office HVAC design package includes two gas hot water boilers, three packaged rooftop units (one for each floor), and variable air volume (VAV) terminal boxes with hot water reheat coils. The SWH design includes one 8.75 kW electric resistance hot water heater with a 30-gallon storage tank.
- The baseline medium retail HVAC design includes five single zone packaged rooftop units (variable flow and constant flow depending on the zone) with gas furnaces for heating. The SWH design includes one 8.75 kW electric resistance hot water heater with a 30-gallon storage tank.
- The small hotel has two baseline equipment systems, one for the nonresidential spaces and one for the guest rooms.
  - The nonresidential HVAC design includes two gas hot water boilers, four packaged rooftop units and twelve VAV terminal boxes with hot water reheat coils. The SWH design include a small electric resistance water heater with 30-gallon storage tank.
  - The residential HVAC design includes one single zone air conditioner (AC) unit with gas furnace for each guest room and the water heating design includes one central gas water heater with a recirculation pump for all guest rooms.

Figure 2. Prototype Characteristics Summary

	Medium Office	Medium Retail	Small Hotel
Conditioned Floor Area	53,628	24,691	42,552
Number of Stories	3	1	4
Number of Guest Rooms	0	0	78
Window-to-Wall Area Ratio	0.33	0.07	0.11
Baseline HVAC System	Packaged DX VAV with gas furnaces + VAV terminal units with hot water reheat. Central gas hot water boilers	Single zone packaged DX units with gas furnaces	Nonresidential: Packaged DX VAV with hot water coil + VAV terminal units with hot water reheat. Central gas hot water boilers. Residential: Single zone DX AC unit with gas furnaces
Baseline Water Heating System	30-gallon electric resistance water heater	30-gallon electric resistance water heater	Nonresidential: 30-gallon electric resistance water heater Residential: Central gas water heater with recirculation loop

[4] Nonresidential Alternative Calculation Method Reference Manual For the 2019 Building Energy Efficiency Standards. Available at: https://www.energy.ca.gov/2019publications/CEC-400-2019-006/CEC-400-2019-006-CMF.pdf

2.2 Cost Effectiveness

The Reach Code Team analyzed the cost effectiveness of the packages by applying them to building prototypes (as applicable) using the life cycle cost methodology, which is approved and used by the Energy Commission to establish cost effective building energy standards (Title 24, Part 6).[5]

Per Energy Commission's methodology, the Reach Code Team assessed the incremental costs of the energy efficiency measure packages and compared them to the energy cost savings over the measure life of 15 years. Incremental costs represent the equipment, installation, replacements, and maintenance costs of the proposed measure relative to the 2019 Title 24 Standards minimum requirements. The energy savings benefits are estimated using both TDV of energy and typical utility rates for each building type:

- **Time Dependent Valuation:** TDV is a normalized monetary format developed and used by the Energy Commission for comparing electricity and natural gas savings, and it considers the cost of electricity and natural gas consumed during different times of the day and year. Simulation outputs are translated to TDV savings benefits using 2019 TDV multipliers and 15-year discounted costs for the nonresidential measure packages.
- **Utility bill impacts (On-bill):** Utility energy costs are estimated by applying appropriate IOU rates to estimated annual electricity and natural gas consumption. The energy bill savings are calculated as the difference in utility costs between the baseline and proposed package over a 15-year duration accounting for discount rate and energy cost escalation.

In coordination with the IOU rate team, and rate experts at a few electric publicly owned utilities (POUs), the Reach Code Team used the current nonresidential utility rates publicly available at the time of analysis to analyze the cost effectiveness for each proposed package. The utility tariffs, summarized in Figure 3, were determined based on the annual load profile of each prototype, and the most prevalent rate in each territory. For some prototypes there are multiple options for rates because of the varying load profiles of mixed-fuel buildings versus all-electric buildings. Tariffs were integrated in EnergyPro software to be applied to the hourly electricity and gas outputs. The Reach Code Team did not attempt to compare or test a variety of tariffs to determine their impact on cost effectiveness.

The currently available and applicable time-of–use (TOU) nonresidential rates are applied to both the base and proposed cases with PV systems.[6] Any annual electricity production in excess of annual electricity consumption is credited at the applicable wholesale rate based on the approved NEM tariffs for that utility. For a more detailed breakdown of the rates selected refer to *Appendix 6.4 Utility Rate Schedules*. Note that most utility time-of-use rates will be updated in the near future, which can affect cost effectiveness results. For example, Pacific Gas and Electric Company (PG&E) will introduce new rates for new service connections in late 2019, and existing accounts will be automatically rolled over to new rates in November 2020.

[5] Architectural Energy Corporation (January 2011) Life-Cycle Cost Methodology. California Energy Commission. Available at: http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/general_cec_documents/2011-01-14_LCC_Methodology_2013.pdf

[6] Under NEM rulings by the CPUC (D-16-01-144, 1/28/16), all new PV customers shall be in an approved TOU rate structure. As of March 2016, all new PG&E net energy metering (NEM) customers are enrolled in a time-of-use rate. (http://www.pge.com/en/myhome/saveenergymoney/plans/tou/index.page?).

Figure 3. Utility Tariffs used based on Climate Zone

Climate Zones	Electric / Gas Utility	Electricity (Time-of-use)	Natural Gas
IOUs			
1-5,11-13,16	PG&E	A-1/A-10	G-NR1
5	PG&E / Southern California Gas Company	A-1/A-10	G-10 (GN-10)
6,8-10,14,15	SCE / Southern California Gas Company	TOU-GS-1/TOU-GS-2/TOU-GS-3	G-10 (GN-10)
7,10,14	San Diego Gas and Electric Company (SDG&E)	A-1/A-10	GN-3
Electric POUs			
4	City of Palo Alto (CPAU)	E-2	n/a
12	Sacramento Municipal Utility District (SMUD)	GS	n/a
6,7,8,16	Los Angeles Department of Water and Power (LADWP)	A-2 (B)	n/a

The Reach Code Team obtained measure costs through interviews with contractors and California distributors and review of online sources, such as Home Depot and RS Means. Taxes and contractor markups were added as appropriate. Maintenance costs were not included because there is no assumed maintenance on the envelope measures. For HVAC and SWH measures the study assumes there are no additional maintenance cost for a more efficient version of the same system type as the baseline. Replacement costs for inverters were included for PV systems, but the useful life all other equipment exceeds the study period.

The Reach Code Team compared the energy benefits with incremental measure cost data to determine cost effectiveness for each measure package. The calculation is performed for a duration of 15 years for all nonresidential prototypes with a 3 percent discount rate and fuel escalation rates based on the most recent General Rate Case filings and historical escalation rates.[7] Cost effectiveness is presented using net present value and benefit-to-cost ratio metrics.

- **Net Present Value (NPV)**: The Reach Code Team uses net savings (NPV benefits *minus* NPV costs) as the cost effectiveness metric. If the net savings of a measure or package is positive, it is considered cost effective. Negative savings represent net costs. A measure that has negative energy cost benefits (energy cost increase) can still be cost effective if the costs to implement the measure are more negative (i.e., material and maintenance cost savings).
- **Benefit-to-Cost Ratio (B/C)**: Ratio of the present value of all benefits to the present value of all costs over 15 years (NPV benefits *divided by* NPV costs). The criteria for cost effectiveness is a B/C greater than 1.0. A value of one indicates the savings over the life of the measure are equivalent to the incremental cost of that measure.

[7] 2019 TDV Methodology Report, California Energy Commission, Docket number: 16-BSTD-06
https://efiling.energy.ca.gov/GetDocument.aspx?tn=216062

There are several special circumstances to consider when reviewing these results:

- Improving the efficiency of a project often requires an initial incremental investment. However, some packages result in initial construction cost savings (negative incremental cost), and either energy cost savings (positive benefits), or increased energy costs (negative benefits). Typically, utility bill savings are categorized as a 'benefit' while incremental construction costs are treated as 'costs.' In cases where both construction costs are negative and utility bill savings are negative, the construction cost savings are treated as the 'benefit' while the utility bill negative savings are the 'cost.'
- In cases where a measure package is cost effective immediately (i.e., there are upfront cost savings and lifetime energy cost savings), cost effectiveness is represented by ">1".
- The B/C ratios sometimes appear very high even though the cost numbers are not very high (for example, an upfront cost of $1 but on-bill savings of $200 over 30 years would equate to a B/C ratio of 200). NPV is also displayed to clarify these potentially confusing conclusions – in the example, the NPV would be equal to a modest $199.

3 Measure Description and Cost

Using the 2019 Title 24 code baseline as the starting point, The Reach Code Team identified potential measure packages to determine the projected energy (therm and kWh) and compliance impacts. The Reach Code Team developed an initial measure list based on experience with designers and contractors along with general knowledge of the relative acceptance and preferences of many measures, as well as their incremental costs.

The measures are categorized into energy efficiency, solar PV and battery, all-electric, and preempted high efficiency measures in subsections below.

3.1 Energy Efficiency Measures

This section describes all the energy efficiency measures considered for this analysis to develop a non-preempted, cost-effective efficiency measure package. The Reach Code Team assessed the cost-effectiveness of measures for all climate zones individually and found that the packages did not need to vary by climate zone, with the exception of a solar heat gain coefficient measure in hotels, as described in more detail below. The measures were developed based on reviews of proposed 2022 Title 24 codes and standards enhancement measures, as well as ASHRAE 90.1 and ASHRAE 189.1 Standards. Please refer to *Appendix Section 6.86.7* for a list of efficiency measures that were considered but not implemented.

Figure 4 provides a summary of the cost of each measure and the applicability of each measure to the prototype buildings.

3.1.1 Envelope

- **Modify Solar Heat Gain Coefficient (SHGC) fenestration**
  - Office and Retail - All Climate Zones: reduce window SHGC from the prescriptive value of 0.25 to 0.22
  - Hotel
    - Climate zones 1, 2, 3, 5, and 16: Increase the SHGC for all nonresidential spaces from the prescriptive value of 0.25 to 0.45 in both common and guest room spaces.
    - Climate zones 4, and 6-15: Reduce window SHGC from the prescriptive value of 0.25 to 0.22, only for common spaces.

  In all cases, the fenestration visible transmittance and U-factor remain at prescriptive values.
- **Fenestration as a function of orientation**: Limit the amount of fenestration area as a function of orientation. East-facing and west-facing windows are each limited to one-half of the average amount of north-facing and south-facing windows.

3.1.2 HVAC and SWH

- **Drain water heat recovery (DWHR)**: Add shower drain heat recovery in hotel guest rooms. DWHR captures waste heat from a shower drain line and uses it to preheat hot water. Note that this measure cannot currently be modeled on hotel/motel spaces, and the Reach Code Team integrated estimated savings outside of modeling software based on SWH savings in residential scenarios. Please see *Appendix Section 6.3* for details on energy savings analysis.
- **VAV box minimum flow**: Reduce VAV box minimum airflows from the current T24 prescriptive requirement of 20 percent of maximum (design) airflow to the T24 zone ventilation minimums.
- **Economizers on small capacity systems**: Require economizers and staged fan control in units with cooling capacity ≥ 33,000 Btu/hr and ≤ 54,000 Btu/hr, which matches the requirement in the 2018 International Green Construction Code and adopts ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1. This measure reduces the T24 prescriptive threshold on air handling units that are required to have economizers, which is > 54,000 Btu/hr.
- **Solar thermal hot water:** For all-electric hotel only, add solar thermal water heating to supply the following portions of the water heating load, measured in solar savings fraction (SSF):
  - 20 percent SSF in CZs 2, 3, and 5-9
  - 25 percent in CZ4
  - 35 percent SSF in CZs 1 and 10-16.

3.1.3 Lighting

- **Interior lighting reduced lighting power density (LPD)**: Reduce LPD by 15 percent for Medium Office, 10 percent for Medium Retail and by 10 percent for the nonresidential areas of the Small Hotel.
- **Institutional tuning**: Limit the maximum output or maximum power draw of lighting to 85 percent of full light output or full power draw.
- **Daylight dimming plus off**: Turn daylight-controlled lights completely off when the daylight available in the daylit zone is greater than 150 percent of the illuminance received from the general lighting system at full power. There is no associated cost with this measure, as the 2019 T24 Standards already require multilevel lighting and daylight sensors in primary and secondary daylit spaces. This measure is simply a revised control strategy and does not increase the number of sensors required or labor to install and program a sensor.
- **Occupant sensing in open plan offices**: In an open plan office area greater than 250 ft^2, control lighting based on occupant sensing controls. Two workstations per occupancy sensor.

Details on the applicability and impact of each measure by building type and by space function can be found in *Appendices 6.2*. The appendix also includes the resulting LPD that is modeled as the proposed by building type and by space function.

Figure 4. Energy Efficiency Measures - Specification and Cost

Measure	Baseline T24 Requirement	Measure Applicability ● Included in Packages 1A, 1B, 3A, 3C – Not applicable				Incremental Cost	Sources & Notes
				Small Hotel			
		Med Office	Med Retail	Guest rooms	Comm Spaces		
Envelope							
Modify SHGC Fenestration	SHGC of 0.25	●	●	●	●	$1.60 /ft^2 window for SHGC decreases, $0/ft^2 for SHGC increases	Costs from one manufacturer.
Fenestration as a Function of Orientation	Limit on total window area and west-facing window area as a function of wall area.	●	–	–	–	$0	No additional cost associated with the measure which is a design consideration not an equipment cost.
HVAC and SHW							
Drain Water Heat Recovery	No heat recovery required	–	–	●	–	$841 /unit	Assume 1 heat recovery unit for every 3 guestrooms. Costs from three manufacturers.
VAV Box Minimum Flow	20 percent of maximum (design) airflow	●	–	–	●	$0	No additional cost associated with the measure which is a design consideration not an equipment cost.
Economizers on Small Capacity Systems	Economizers required for units > 54,000 Btu/hr	–	●	–	–	$2,857 /unit	Costs from one manufacturer's representative and one mechanical contractor.

Measure	Baseline T24 Requirement	Measure Applicability ● Included in Packages 1A, 1B, 3A, 3C – Not applicable				Incremental Cost	Sources & Notes
				Small Hotel			
		Med Office	Med Retail	Guest rooms	Comm Spaces		
Solar Thermal Hot Water	For central heat pump water heaters, there is no prescriptive baseline requirement.	–	–	● (electric only)	–	$33/therm-yr	Installed costs reported in the California Solar Initiative Thermal Program Database, 2015-present.[8] Costs include tank and were only available for gas backup systems. Costs are reduced by 19 percent per federal income tax credit average through 2022.
Lighting							
Interior Lighting Reduced LPD	Per Area Category Method, varies by Primary Function Area. Office area 0.60 – 0.70 W/ft^2 depending on area of space. Hotel function area 0.85 W/ft^2. Retail Merchandise Sales 1.00 W/ft^2	●	●	–	●	$0	Industry report on LED pricing analysis shows that costs are not correlated with efficacy.[9]

[8] http://www.csithermalstats.org/download.html

[9] http://calmac.org/publications/LED_Pricing_Analysis_Report_-_Revised_1.19.2018_Final.pdf

Measure	Baseline T24 Requirement	Measure Applicability ● Included in Packages 1A, 1B, 3A, 3C – Not applicable				Incremental Cost	Sources & Notes
				Small Hotel			
		Med Office	Med Retail	Guest rooms	Comm Spaces		
Institutional Tuning	No requirement, but Power Adjustment Factor (PAF) credit of 0.10 available for luminaires in non-daylit areas and 0.05 for luminaires in daylit areas[10]	●	●	–	●	$0.06/ft^2	Industry report on institutional tuning[11]
Daylight Dimming Plus Off	No requirement, but PAF credit of 0.10 available.	●	–	–	–	$0	Given the amount of lighting controls already required, this measure is no additional cost.
Occupant Sensing in Open Plan Offices	No requirement, but PAF credit of 0.30 available.	●	–	–	–	$189 /sensor; $74 /powered relay; $108 /secondary relay	2 workstations per sensor; 1 fixture per workstation; 4 workstations per master relay; 120 ft^2/workstation in open office area, which is 53% of total floor area of the medium office

[10] Power Adjustment Factors allow designers to tradeoff increased lighting power densities for more efficient designs. In this study, PAF-related measures assume that the more efficient design is incorporated without a tradeoff for increased lighting power density.

[11] https://slipstreaminc.org/sites/default/files/2018-12/task-tuning-report-mndoc-2015.pdf

3.2 Solar Photovoltaics and Battery Measures

This section describes the PV and battery measures considered for this analysis. The Reach Code Team estimated the required PV sizes for each building prototype for the efficiency measure packages and the stand alone PV and battery options.

3.2.1 Solar Photovoltaics

2019 Title 24 requires nonresidential buildings to reserve at least 15 percent of the roof area as a "solar zone," but does not include any requirements or compliance credits for the installation of photovoltaic systems. The Reach Code Team analyzed a range of PV system sizes to determine cost effectiveness. To determine upper end of potential PV system size, the Reach Code Team assumed a PV generation capacity of either

- 15 W/ft^2 covering 50 percent of the roof area, or
- Enough to nearly offset the annual energy consumption.

The medium office and small hotel prototypes had small roof areas compared to their annual electricity demand, thus the PV system capacity at 50 percent of the roof area was less than the estimated annual usage. The medium office and small hotel had a 135 kW and 80 kW array, respectively. The medium retail building has a substantially large roof area that would accommodate a PV array that generates more than the annual electricity load of the building. The PV array for the medium retail building was sized at 110 kW to not exceed the annual electricity consumption of the building when accounting for the minimum annual energy demand across climate zones with efficiency packages.

The modeling software for nonresidential buildings does not allow auto-sizing of PV based on a desired percent offset of electricity use. Moreover, the PV size is also constrained by the availability of roof area. Hence, a common size of PV is modeled for all the packages including all electric design. Figure 5 through Figure 7 below demonstrate the percent of electricity offset by PV for both mixed fuel and all electric buildings over their respective federal minimum design package.

Figure 5. Medium Office – Annual Percent kWh Offset with 135 kW Array

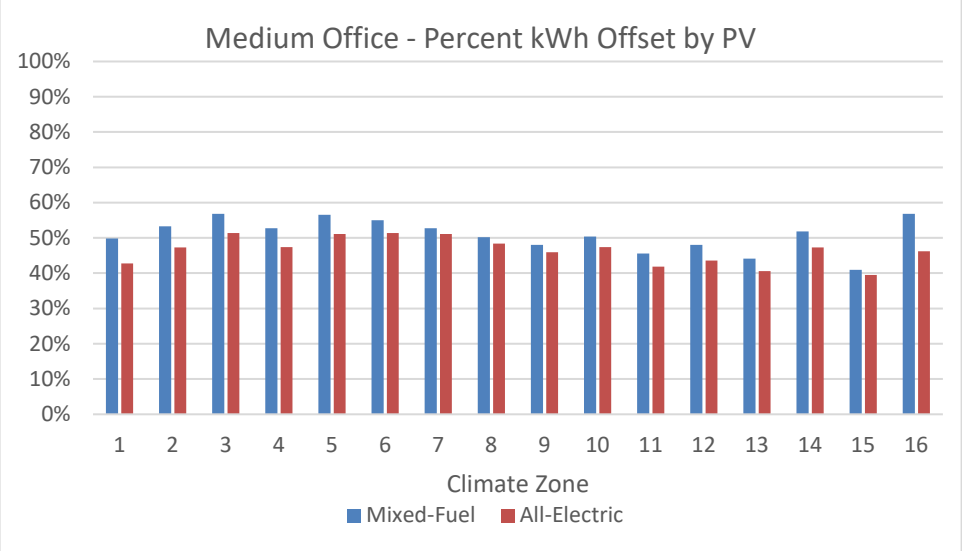


Figure 6. Medium Retail – Annual Percent kWh Offset with 110 kW Array

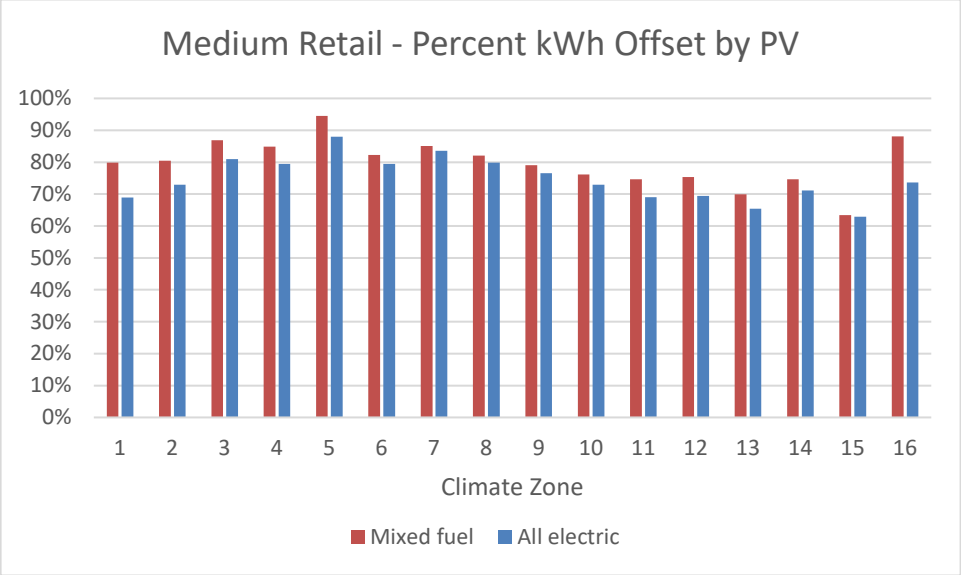
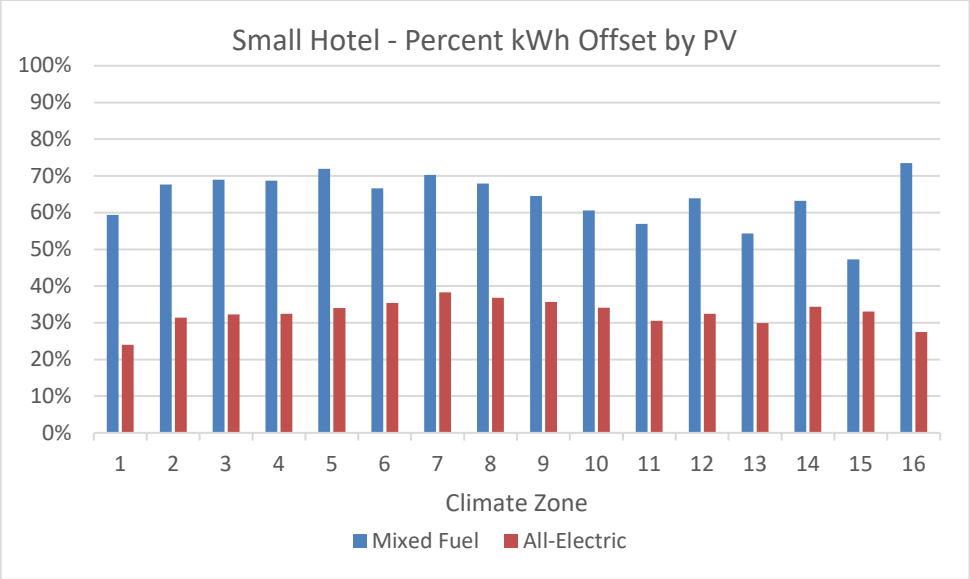


Figure 7. Small Hotel – Annual Percent kWh Offset with 80 kW Array



The costs for PV include first cost to purchase and install the system, inverter replacement costs, and annual maintenance costs. A summary of the medium office costs and sources is given in Figure 8. Upfront solar PV system costs are reduced by the federal income tax credit (ITC), approximately 19 percent due to a phased reduction in the credit through the year 2022.[12]

[12] The federal credit drops to 26% in 2020, and 22% in 2021 before dropping permanently to 10% for commercial projects and 0% for residential projects in 2022. More information on federal Investment Tax Credits available at: https://www.seia.org/initiatives/solar-investment-tax-credit-itc

Figure 8. Medium Office Upfront PV Costs

	Unit Cost	Cost	Useful Life (yrs.)	Source
Solar PV System	$2.30 / Wdc	$310,500	30	National Renewable Energy Laboratory (NREL) Q1 2016[13]
Inverter Replacement	$0.15 / Wdc	$20,250	10	E3 Rooftop Solar PV System Report[14]
Maintenance Costs	$0.02 / Wdc	$2,700	1	

PV energy output is built into CBECC-Com and is based on NREL's PVWatts calculator, which includes long term performance degradation estimates.[15]

3.2.2 Battery Storage

This measure includes installation of batteries to allow energy generated through PV to be stored and used later, providing additional energy cost benefits. This report does not focus on optimizing battery sizes or controls for each prototype and climate zone, though the Reach Code Team ran test simulations to assess the impact of battery sizes on TDV savings and found diminishing returns as the battery size increased.

The team set battery control to the Time of Use Control (TOU) method, which assumes batteries are charged anytime PV generation is greater than the building load but discharges to the electric grid beginning during the highest priced hours of the day (the "First Hour of the Summer Peak"). Because there is no default hour available in CBECC-Com, the team applied the default hour available in CBECC-Res to start discharging (hour 19 in CZs 2, 4, and 8-15, and hour 20 in other CZs). This control option is most reflective of the current products on the market. While this control strategy is being used in the analysis, there would be no mandate on the control strategy used in practice.

The current simulation software has approximations of how performance characteristics change with environmental conditions, charge/discharge rates, and degradation with age and use. More information is on the software battery control capabilities and associated qualification requirements are available in the Residential Alternative Calculation Method Reference Manual and the 2019 Reference Appendices for the 2019 Title 24 Standards.[16,17]

The Reach Code Team used costs of $558 kWh based on a 2018 IOU Codes and Standards Program report, assuming a replacement is necessary in year 15.[18] Batteries are also eligible for the ITC if they are installed at the same time as the renewable generation source and at least 75 percent of the energy used to charge

[13] Available at: https://www.nrel.gov/docs/fy16osti/66532.pdf

[14] Available at: https://efiling.energy.ca.gov/getdocument.aspx?tn=221366

[15] More information available at: https://pvwatts.nrel.gov/downloads/pvwattsv5.pdf

[16] Battery controls are discussed in Sections 2.1.5.4 and Appendix D of the Residential Alternative Calculation Method Reference Manual, available here: https://ww2.energy.ca.gov/2019publications/CEC-400-2019-005/CEC-400-2019-005-CMF.pdf

[17] Qualification Requirements for Battery Storage Systems are available in JA12 of the 2019 Reference Appendices: https://ww2.energy.ca.gov/2018publications/CEC-400-2018-021/CEC-400-2018-021-CMF.pdf

[18] Available at: http://localenergycodes.com/download/430/file_path/fieldList/PV%20Plus%20Battery%20Storage%20Report

the battery comes from a renewable source. Thus, the Reach Code Team also applied a 19 percent cost reduction to battery costs.

3.2.3 PV-only and PV+Battery Packages

The Reach Code Team analyzed solar PV and battery storage only, without other efficiency measures in both mixed-fuel and all-electric building designs. Two different sizes of solar PV and battery storage were analyzed.

- **Small PV Size**: 3 kW, assumed to be the minimal PV system considered for installation in a nonresidential building.
- **Large PV Size**: PV capacity equal to 15 W/ft^2 over 50 percent of the roof area, or sized to nearly offset annual electricity consumption, as described in Section 3.2.1.
- **Small Battery Size:** 5 kWh, assumed to be the minimal battery system considered for installation in a nonresidential building, and representative of smaller products currently available on the market.
- **Large Battery Size:** 50 kWh, assumed to be a substantially large size for a nonresidential setting. Generally, the reach code team found diminishing on-bill and TDV benefits as the battery size increased.

As described in Section 1 and Section 4.4, each PV size was run as a standalone measure. When packaged with a battery measure, the small PV size was paired with the small battery size, and the large PV size was paired with the large battery size.

3.3 All Electric Measures

The Reach Code Team investigated the cost and performance impacts and associated infrastructure costs associated with changing the baseline HVAC and water heating systems to all-electric equipment. This includes heat pump space heating, electric resistance reheat coils, electric water heater with storage tank, heat pump water heating, increasing electrical capacity, and eliminating natural gas connections that would have been present in mixed-fuel new construction. The Reach Code Team selected electric systems that would be installed instead of gas-fueled systems in each prototype.

3.3.1 HVAC and Water Heating

The nonresidential standards use a mixed-fuel baseline for the Standard Design systems. In most nonresidential occupancies, the baseline is natural gas space heating. Hotel/motels and high-rise residential occupancies also assume natural gas baseline water heating systems for the guest rooms and dwelling units. In the all-electric scenario, gas equipment serving these end-uses is replaced with electric equipment, as described in Figure 9.

Figure 9. All-Electric HVAC and Water Heating Characteristics Summary.

		Medium Office	Medium Retail	Small Hotel
HVAC System	Baseline	Packaged DX + VAV with HW reheat. Central **gas** boilers.	Single zone packaged DX with **gas** furnaces	NonRes: Packaged DX + VAV with HW reheat. Central **gas** boilers. Res: Single zone DX AC unit with **gas** furnaces
	Proposed All-Electric	Packaged DX + VAV with electric **resistance** reheat.	Single zone packaged **heat pumps**	NonRes: Packaged DX + VAV with electric **resistance** reheat Res: Single zone **heat pumps**
Water Heating System	Baseline	Electric **resistance** with storage	Electric **resistance** with storage	NonRes: **Electric** resistance storage Res: Central **gas** storage with recirculation
	Proposed All-Electric	Electric **resistance** with storage	Electric **resistance** with storage	NonRes: Electric **resistance** storage Res: Individual **heat pumps**

The Reach Code Team received cost data for baseline mixed-fuel equipment as well as electric equipment from an experienced mechanical contractor in the San Francisco Bay Area. The total construction cost includes equipment and material, labor, subcontractors (for example, HVAC and SHW control systems), and contractor overhead.

3.3.1.1 Medium Office

The baseline HVAC system includes two gas hot water boilers, three packaged rooftop units, and VAV hot water reheat boxes. The SHW design includes one 8.75 kW electric resistance hot water heater with a 30-gallon storage tank.

For the medium office all-electric HVAC design, the Reach Code Team investigated several potential all-electric design options, including variable refrigerant flow, packaged heat pumps, and variable volume and temperature systems. After seeking feedback from the design community, the Reach Code Team determined that the most feasible all-electric HVAC system, given the software modeling constraints is a VAV system with an electric resistance reheat instead of hot water reheat coil. A parallel fan-powered box (PFPB) implementation of electric resistance reheat would further improve efficiency due to reducing ventilation requirements, but an accurate implementation of PFPBs is not currently available in compliance software.

Note that the actual natural gas consumption for the VAV hot water reheat baseline may be higher than the current simulation results due to a combination of boiler and hot water distribution losses. A recent research study shows that the total losses can account for as high as 80 percent of the boiler energy use.[19]

[19] Raftery, P., A. Geronazzo, H. Cheng, and G. Paliaga. 2018. Quantifying energy losses in hot water reheat systems. Energy and Buildings, 179: 183-199. November. https://doi.org/10.1016/j.enbuild.2018.09.020. Retrieved from https://escholarship.org/uc/item/3qs8f8qx

If these losses are considered savings for the electric resistance reheat (which has zero associated distribution loss) may be higher.

The all-electric SHW system remains the same electric resistance water heater as the baseline and has no associated incremental costs.

Cost data for medium office designs are presented in Figure 10. The all-electric HVAC system presents cost savings compared to the hot water reheat system from elimination of the hot water boiler and associated hot water piping distribution. CZ10 and CZ15 all-electric design costs are slightly higher because they require larger size rooftop heat pumps than the other climate zones.

Figure 10. Medium Office HVAC System Costs

Climate Zone	Mixed Fuel Baseline	All Electric System	Incremental cost for All-Electric
CZ01	$1,202,538	$1,106,432	$(96,106)
CZ02	$1,261,531	$1,178,983	$(82,548)
CZ03	$1,205,172	$1,113,989	$(91,183)
CZ04	$1,283,300	$1,205,434	$(77,865)
CZ05	$1,207,345	$1,113,989	$(93,356)
CZ06	$1,216,377	$1,131,371	$(85,006)
CZ07	$1,227,932	$1,148,754	$(79,178)
CZ08	$1,250,564	$1,172,937	$(77,626)
CZ09	$1,268,320	$1,196,365	$(71,955)
CZ10	$1,313,580	$1,256,825	$(56,755)
CZ11	$1,294,145	$1,221,305	$(72,840)
CZ12	$1,274,317	$1,197,121	$(77,196)
CZ13	$1,292,884	$1,221,305	$(71,579)
CZ14	$1,286,245	$1,212,236	$(74,009)
CZ15	$1,357,023	$1,311,994	$(45,029)
CZ16	$1,295,766	$1,222,817	$(72,949)

3.3.1.2 Medium Retail

The baseline HVAC system includes five packaged single zone rooftop ACs with gas furnaces. Based on fan control requirements in section 140.4(m), units with cooling capacity ≥ 65,000 Btu/h have variable air volume fans, while smaller units have constant volume fans. The SHW design includes one 8.75 kW electric resistance hot water heater with a 30-gallon storage tank.

For the medium retail all-electric HVAC design, the Reach Code Team assumed packaged heat pumps instead of the packaged ACs. The all-electric SHW system remains the same electric resistance water heater as the baseline and has no associated incremental costs.

Cost data for medium retail designs are presented in Figure 11. Costs for rooftop air-conditioning systems are very similar to rooftop heat pump systems.

Figure 11. Medium Retail HVAC System Costs

Climate Zone	Mixed Fuel Baseline	All Electric System	Incremental cost for All-Electric
CZ01	$328,312	$333,291	$4,978
CZ02	$373,139	$373,702	$563
CZ03	$322,849	$326,764	$3,915
CZ04	$329,900	$335,031	$5,131
CZ05	$359,888	$362,408	$2,520
CZ06	$335,728	$341,992	$6,265
CZ07	$345,544	$349,808	$4,265
CZ08	$368,687	$369,792	$1,104
CZ09	$415,155	$411,069	$(4,087)
CZ10	$345,993	$346,748	$755
CZ11	$418,721	$414,546	$(4,175)
CZ12	$405,110	$400,632	$(4,477)
CZ13	$376,003	$375,872	$(131)
CZ14	$405,381	$406,752	$1,371
CZ15	$429,123	$427,606	$(1,517)
CZ16	$401,892	$404,147	$2,256

3.3.1.3 Small Hotel

The small hotel has two different baseline equipment systems, one for the nonresidential spaces and one for the guest rooms. The nonresidential HVAC system includes two gas hot water boilers, four packaged rooftop units and twelve VAV terminal boxes with hot water reheat coil. The SHW design includes a small electric water heater with storage tank. The residential HVAC design includes one single zone AC unit with gas furnace for each guest room and the water heating design includes one central gas storage water heater with a recirculation pump for all guest rooms.

For the small hotel all-electric design, the Reach Code Team assumed the nonresidential HVAC system to be packaged heat pumps with electric resistance VAV terminal units, and the SHW system to remain a small electric resistance water heater.

For the guest room all-electric HVAC system, the analysis used a single zone (packaged terminal) heat pump and a central heat pump water heater serving all guest rooms. Central heat pump water heating with recirculation serving guest rooms cannot yet be modeled in CBECC-Com, and energy impacts were modeled by simulating individual heat pump water heaters in each guest room. The reach code team believes this is a conservative assumption, since individual heat pump water heaters will have much higher tank standby losses. The Reach Code Team attained costs for central heat pump water heating installation including storage tanks and controls and used these costs in the study.

Cost data for small hotel designs are presented in Figure 12. The all-electric design presents substantial cost savings because there is no hot water plant or piping distribution system serving the nonresidential spaces, as well as the lower cost of packaged terminal heat pumps serving the residential spaces compared to split DX/furnace systems with individual flues.

Figure 12. Small Hotel HVAC and Water Heating System Costs

Climate Zone	Mixed Fuel Baseline	All Electric System	Incremental cost for All-Electric
CZ01	$2,337,531	$1,057,178	$(1,280,353)
CZ02	$2,328,121	$1,046,795	$(1,281,326)
CZ03	$2,294,053	$1,010,455	$(1,283,598)
CZ04	$2,302,108	$1,018,675	$(1,283,433)
CZ05	$2,298,700	$1,015,214	$(1,283,486)
CZ06	$2,295,380	$1,011,753	$(1,283,627)
CZ07	$2,308,004	$1,026,029	$(1,281,975)
CZ08	$2,333,662	$1,053,717	$(1,279,946)
CZ09	$2,312,099	$1,030,355	$(1,281,744)
CZ10	$2,354,093	$1,075,348	$(1,278,745)
CZ11	$2,347,980	$1,068,426	$(1,279,554)
CZ12	$2,328,654	$1,047,660	$(1,280,994)
CZ13	$2,348,225	$1,068,858	$(1,279,367)
CZ14	$2,345,988	$1,066,263	$(1,279,725)
CZ15	$2,357,086	$1,079,241	$(1,277,845)
CZ16	$2,304,094	$1,019,973	$(1,284,121)

3.3.2 Infrastructure Impacts

Electric heating appliances and equipment often require a larger electrical connection than an equivalent natural gas appliance because of the higher voltage and amperage necessary to electrically generate heat. Thus, many buildings may require larger electrical capacity than a comparable building with natural gas appliances. This includes:

- Electric resistance VAV space heating in the medium office and common area spaces of the small hotel.
- Heat pump water heating for the guest room spaces of the small hotel.

3.3.2.1 Electrical Panel Sizing and Wiring

This section details the additional electrical panel sizing and wiring required for all-electric measures. In an all-electric new construction scenario, heat pumps replace packaged DX units which are paired with either a gas furnace or a hot water coil (supplied by a gas boiler). The electrical requirements of the replacement heat pump would be the same as the packaged DX unit it replaces, as the electrical requirements would be driven by the cooling capacity, which would remain the same between the two units.

VAV terminal units with hot water reheat coils that are replaced with electric resistance reheat coils require additional electrical infrastructure. In the case of electric resistance coils, the Reach Code Team assumed that on average, a VAV terminal unit serves around 900 ft^2 of conditioned space and has a heating capacity of 5 kW (15 kBtu/hr/ft^2). The incremental electrical infrastructure costs were determined based on RS Means. Calculations for the medium office shown in Figure 13 include the cost to add electrical panels as well as the cost to add electrical lines to each VAV terminal unit electric resistance coil in the medium office prototype. Additionally, the Reach Code Team subtracted the electrical infrastructure costs associated with hot water pumps required in the mixed fuel baseline, which are not required in the all-electric measures.

The Reach Code Team calculated costs to increase electrical capacity for heat pump water heaters in the small hotel similarly.

Figure 13. Medium Office Electrical Infrastructure Costs for All-Electric Design

A	-	No. VAV Boxes	60
B	-	VAV box heating capacity (watts)	4,748
C	-	No. hot water pumps	2
D	-	Hot water pump power (watts)	398
E	-	Voltage	208
F	(AxB - CxD)/E	Panel ampacity required	1,366
G	F/400	Number of 400-amp panels required	4
H	-	Cost per 400-amp panel	$3,100
I	GxH	Total panel cost	$12,400
J	-	Total electrical line length required (ft)	4,320
K	-	Cost per linear foot of electrical line	$3.62
L	JxK	Total electrical line cost	$15,402
	I + L	**Total electrical infrastructure incremental cost**	**$27,802**

3.3.2.2 Natural Gas

This analysis assumes that in an all-electric new construction scenario natural gas would not be supplied to the site. Eliminating natural gas in new construction would save costs associated with connecting a service line from the street main to the building, piping distribution within the building, and monthly connection charges by the utility.

The Reach Code Team determined that for a new construction building with natural gas piping, there is a service line (branch connection) from the natural gas main to the building meter. In the medium office prototype, natural gas piping is routed to the boiler. The Reach Code Team assumed that the boiler is on the first floor, and that 30 feet of piping is required from the connection to the main to the boiler. The Reach Code Team assumed 1" corrugated stainless steel tubing (CSST) material is used for the plumbing distribution. The Reach Code Team included costs for a natural gas plan review, service extension, and a gas meter, as shown in Figure 14 below. The natural gas plan review cost is based on information received from the City of Palo Alto Utilities. The meter costs are from PG&E and include both material and labor. The service extension costs are based on guidance from PG&E, who noted that the cost range is highly varied and that there is no "typical" cost, with costs being highly dependent on length of extension, terrain, whether the building is in a developed or undeveloped area, and number of buildings to be served. While an actual service extension cost is highly uncertain, the team believes the costs assumed in this analysis are within a reasonable range based on a sample range of costs provided by PG&E. These costs assume development in a previously developed area.

Figure 14. Natural Gas Infrastructure Cost Savings for All-Electric Prototypes

Cost Type	Medium Office	Medium Retail	Small Hotel
Natural Gas Plan Review	$2,316	$2,316	$2,316
Service Extension	$13,000	$13,000	$13,000
Meter	$3,000	$3,000	$3,000
Plumbing Distribution	$633	$9,711	$37,704
Total Cost	**$18,949**	**$28,027**	**$56,020**

3.4 Preempted High Efficiency Appliances

The Reach Code Team developed a package of high efficiency (HE) space and water heating appliances based on commonly available products for both the mixed-fuel and all-electric scenarios. This package assesses the standalone contribution that high efficiency measures would make toward achieving high performance thresholds. The Reach Code Team reviewed the Air Conditioning, Heating, and Refrigeration Institute (AHRI) certified product database to estimate appropriate efficiencies.[20]

The Reach Code Team determined the efficiency increases to be appropriate based on equipment type, summarized in Figure 15, with cost premiums attained from a Bay Area mechanical contractor. The ranges in efficiency are indicative of varying federal standard requirements based on equipment size.

Figure 15. High Efficiency Appliance Assumptions

	Federal Minimum Efficiency	Preempted Efficiency	Cost Premium for HE Appliance
Gas space heating and water heating	80-82%	90-95%	10-15%
Large packaged rooftop cooling	9.8-12 EER 11.4-12.9 IEER	10.5-13 EER 15-15.5 IEER	10-15%
Single zone heat pump space heating	7.7 HSPF 3.2 COP	10 HSPF 3.5 COP	6-15%
Heat pump water heating	2.0 UEF	3.3 UEF	None (market does not carry 2.0 UEF)

3.5 Greenhouse Gas Emissions

The analysis uses the greenhouse gas (GHG) emissions estimates from Zero Code reports available in CBECC-Com.[21] Zero Code uses 8760 hourly multipliers accounting for time dependent energy use and carbon emissions based on source emissions, including renewable portfolio standard projections. Fugitive

[20] Available at: https://www.ahridirectory.org/Search/SearchHome?ReturnUrl=%2f

[21] More information available at: https://zero-code.org/wp-content/uploads/2018/11/ZERO-Code-TSD-California.pdf

emissions are not included. There are two strings of multipliers – one for Northern California climate zones, and another for Southern California climate zones.[22]

4 Results

The Reach Code Team evaluated cost effectiveness of the following measure packages over a 2019 mixed-fuel code compliant baseline for all climate zones, as detailed in Sections 4.1 -- 4.3 and reiterated in Figure 16:

- **Package 1A – Mixed-Fuel + EE:** Mixed-fuel design with energy efficiency measures and federal minimum appliance efficiencies.
- **Package 1B – Mixed-Fuel + EE + PV + B**: Same as Package 1A, plus solar PV and batteries.
- **Package 1C – Mixed-fuel + HE**: Alternative design with high efficiency appliances, triggering federal preemption.
- **Package 2 – All-Electric Federal Code-Minimum Reference**: All-electric design with federal code minimum appliance efficiency. No solar PV or battery.
- **Package 3A – All-Electric + EE**: All-electric design with energy efficiency measures and federal minimum appliance efficiencies.
- **Package 3B – All-Electric + EE + PV + B**: Same as Package 3A, plus solar PV and batteries.
- **Package 3C – All-Electric + HE**: All-electric design with high efficiency appliances, triggering federal preemption.

Figure 16. Package Summary

Package	Fuel Type		Energy Efficiency Measures	PV & Battery (PV + B)	High Efficiency Appliances (HE)
	Mixed Fuel	All-Electric			
Mixed-Fuel Code Minimum Baseline	X				
1A – Mixed-Fuel + EE	X		X		
1B – Mixed-Fuel + EE + PV + B	X		X	X	
1C – Mixed-fuel + HE	X				X
2 – All-Electric Federal Code-Minimum Reference		X			
3A – All-Electric + EE		X	X		
3B – All-Electric + EE + PV + B		X	X	X	
3C – All-Electric + HE		X			X

[22] CBECC-Com documentation does not state which climate zones fall under which region. CBECC-Res multipliers are the same for CZs 1-5 and 11-13 (presumed to be Northern California), while there is another set of multipliers for CZs 6-10 and 14-16 (assumed to be Southern California).

Section 4.4 presents the results of the PV-only and PV+Battery analysis.

The TDV and on-bill based cost effectiveness results are presented in terms of B/C ratio and NPV in this section. What constitutes a 'benefit' or a 'cost' varies with the scenarios because both energy savings and incremental construction costs may be negative depending on the package. Typically, utility bill savings are categorized as a 'benefit' while incremental construction costs are treated as 'costs.' In cases where both construction costs are negative and utility bill savings are negative, the construction cost savings are treated as the 'benefit' while the utility bill negative savings are as the 'cost.'

Overarching factors to keep in mind when reviewing the results include:

- To pass the Energy Commission's application process, local reach codes must both be cost effective and exceed the energy performance budget using TDV (i.e., have a positive compliance margin). To emphasize these two important factors, the figures in this Section highlight in green the modeling results that have **either** a positive compliance margin or are cost effective. This will allow readers to identify whether a scenario is fully or partially supportive of a reach code, and the opportunities/challenges that the scenario presents. Conversely, Section 4.4 only highlights results that **both** have a positive compliance margin and are cost effective, to allow readers to identify reach code-ready scenarios.
  - **Note:** Compliance margin represents the proportion of energy usage that is saved compared to the baseline, measured on a TDV basis.
- The Energy Commission does not currently allow compliance credit for either solar PV or battery storage. Thus, the compliance margins in Packages 1A are the same as 1B, and Package 3A is the same as 3B. However, The Reach Code Team did include the impact of solar PV and battery when calculating TDV cost-effectiveness.
- When performance modeling residential buildings, the Energy Commission allows the Standard Design to be electric if the Proposed Design is electric, which removes TDV-related penalties and associated negative compliance margins. This essentially allows for a compliance pathway for all-electric residential buildings. Nonresidential buildings are not treated in the same way and are compared to a mixed-fuel standard design.
- Results do not include an analysis and comparison of utility rates. As mentioned in *Section 2.2*, The Reach Code Team coordinated with utilities to select tariffs for each prototype given the annual energy demand profile and the most prevalent rates in each utility territory. The Reach Code Team did not compare a variety of tariffs to determine their impact on cost effectiveness. Note that most utility time-of-use rates are continuously updated, which can affect cost effectiveness results.
- As a point of comparison, mixed-fuel baseline energy figures are provided in *Appendix 6.5*.

4.1 Cost Effectiveness Results – Medium Office

Figure 17 through Figure 23 contain the cost-effectiveness findings for the Medium Office packages. Notable findings for each package include:

- **1A – Mixed-Fuel + EE:** Packages achieve +12 to +20 percent compliance margins depending on climate zone. All packages are cost effective in all climate zones using the TDV approach. All packages are cost effective using the On-Bill approach except for LADWP territory.

- **1B – Mixed-Fuel + EE + PV + B:** All packages are cost effective using the On-Bill and TDV approaches, except On-Bill in LADWP territory. When compared to 1A, the B/C ratio changes depending on the utility and climate zone (some increase while others decrease). However, NPV savings are increased across the board, suggesting that larger investments yield larger returns.
- **1C – Mixed-Fuel + HE:** Packages achieve +3 to +5 percent compliance margins depending on climate zone, but no packages were cost effective. The incremental costs of a high efficiency condensing boiler compared to a non-condensing boiler contributes to 26-47% of total incremental cost depending on boiler size. Benefits of condensing boiler efficiency come from resetting hot water return temperature as boiler efficiency increases at lower hot water temperature. However, hot water temperature reset control cannot currently be implemented in the software. In addition, the natural gas energy cost constitutes no more than 5% of total cost for 15 climate zones, so improving boiler efficiency has limited contribution to reduction of total energy cost.
- **2 – All-Electric Federal Code-Minimum Reference:**
  - Packages achieve between -27 percent and +1 percent compliance margins depending on climate zone. This is likely because the modeled system is electric resistance, and TDV values electricity consumption more heavily than natural gas. This all-electric design without other efficiency measures does not comply with the Energy Commission's TDV performance budget.
  - All incremental costs are negative due to the elimination of natural gas infrastructure.
  - Packages achieve utility cost savings and are cost effective using the On-Bill approach in CZs 6-10 and 14-15. Packages do not achieve savings and are not cost effective using the On-Bill approach in most of PG&E territory (CZs 1,2,4, 11-13, and 16). Packages achieve savings and are cost effective using TDV in all climate zones except CZ16.
- **3A – All-Electric + EE:** Packages achieve positive compliance margins except -15 percent in CZ16, which has a higher space heating load than other climate zones. All packages are cost effective in all climate zones except CZ16.
- **3B – All-Electric + EE + PV + B:** Packages achieve positive compliance margins except -15 percent in CZ16. All packages are cost-effective from a TDV perspective in all climate zones. All packages are cost effective from an On-Bill perspective in all climate zones except in CZ 2 and CZ 16 in LADWP territory.
- **3C – All-Electric + HE:** Packages achieve between -26 percent and +2 percent compliance margins depending on climate zone. The only packages that are cost effective and with a positive compliance margin are in CZs 7-9 and 15. As described in Package 1C results, space heating is a relatively low proportion of energy costs in most climate zones, limiting the costs gains for higher efficiency equipment.

Figure 17. Cost Effectiveness for Medium Office Package 1A – Mixed-Fuel + EE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reduc-tions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1A: Mixed Fuel + EE												
CZ01	PG&E	34,421	-808	4.5	18%	$66,649	$125,902	$71,307	1.9	1.1	$59,253	$4,658
CZ02	PG&E	40,985	-505	8.1	17%	$66,649	$163,655	$99,181	2.5	1.5	$97,005	$32,532
CZ03	PG&E	36,266	-463	7.0	20%	$66,649	$141,897	$84,051	2.1	1.3	$75,248	$17,401
CZ04	PG&E	40,590	-547	7.7	14%	$66,649	$162,139	$95,410	2.4	1.4	$95,489	$28,761
CZ04-2	CPAU	40,590	-547	7.7	14%	$66,649	$85,537	$95,410	1.3	1.4	$18,887	$28,761
CZ05	PG&E	38,888	-499	7.4	18%	$66,649	$154,044	$91,115	2.3	1.4	$87,395	$24,465
CZ05-2	SCG	38,888	-499	7.4	18%	$66,649	$156,315	$91,115	2.3	1.4	$89,665	$24,465
CZ06	SCE	39,579	-305	8.7	20%	$66,649	$86,390	$100,469	1.3	1.5	$19,741	$33,820
CZ06-2	LADWP	39,579	-305	8.7	20%	$66,649	$51,828	$100,469	0.8	1.5	($14,821)	$33,820
CZ07	SDG&E	41,817	-6	11.3	20%	$66,649	$204,394	$112,497	3.1	1.7	$137,745	$45,848
CZ08	SCE	41,637	-60	10.8	18%	$66,649	$89,783	$113,786	1.3	1.7	$23,134	$47,137
CZ08-2	LADWP	41,637	-60	10.8	18%	$66,649	$54,876	$113,786	0.8	1.7	($11,773)	$47,137
CZ09	SCE	42,539	-210	10.1	16%	$66,649	$95,636	$115,647	1.4	1.7	$28,987	$48,998
CZ09-2	LADWP	42,539	-210	10.1	16%	$66,649	$58,168	$115,647	0.9	1.7	($8,481)	$48,998
CZ10	SDG&E	41,857	-216	9.8	17%	$66,649	$210,303	$108,726	3.2	1.6	$143,654	$42,077
CZ10-2	SCE	41,857	-216	9.8	17%	$66,649	$92,736	$108,726	1.4	1.6	$26,087	$42,077
CZ11	PG&E	42,523	-390	9.1	13%	$66,649	$166,951	$104,001	2.5	1.6	$100,301	$37,352
CZ12	PG&E	41,521	-466	8.4	14%	$66,649	$161,594	$100,135	2.4	1.5	$94,945	$33,486
CZ12-2	SMUD	41,521	-466	8.4	14%	$66,649	$71,734	$100,135	1.1	1.5	$5,085	$33,486
CZ13	PG&E	42,898	-434	9.0	13%	$66,649	$169,107	$99,992	2.5	1.5	$102,457	$33,343
CZ14	SDG&E	42,224	-441	8.6	14%	$66,649	$211,529	$106,913	3.2	1.6	$144,880	$40,264
CZ14-2	SCE	42,224	-441	8.6	14%	$66,649	$95,809	$106,913	1.4	1.6	$29,160	$40,264
CZ15	SCE	45,723	-147	11.2	12%	$66,649	$102,714	$118,034	1.5	1.8	$36,065	$51,384
CZ16	PG&E	37,758	-736	5.8	14%	$66,649	$145,947	$79,755	2.2	1.2	$79,297	$13,106
CZ16-2	LADWP	37,758	-736	5.8	14%	$66,649	$40,115	$79,755	0.6	1.2	($26,534)	$13,106

Figure 18. Cost Effectiveness for Medium Office Package 1B – Mixed-Fuel + EE + PV + B

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (mtons)	Comp-liance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + PV + Battery												
CZ01	PG&E	211,225	-808	39.9	18%	$397,405	$645,010	$454,284	1.6	1.1	$247,605	$56,879
CZ02	PG&E	255,787	-505	50.6	17%	$397,405	$819,307	$573,033	2.1	1.4	$421,902	$175,628
CZ03	PG&E	245,421	-463	48.8	20%	$397,405	$777,156	$536,330	2.0	1.3	$379,751	$138,925
CZ04	PG&E	267,612	-547	52.7	14%	$397,405	$836,221	$597,471	2.1	1.5	$438,816	$200,066
CZ04-2	CPAU	267,612	-547	52.7	14%	$397,405	$621,879	$597,471	1.6	1.5	$224,474	$200,066
CZ05	PG&E	264,581	-499	52.5	18%	$397,405	$897,216	$578,856	2.3	1.5	$499,811	$181,451
CZ05-2	SCG	264,581	-499	52.5	18%	$397,405	$899,487	$578,856	2.3	1.5	$502,082	$181,451
CZ06	SCE	257,474	-305	52.1	20%	$397,405	$484,229	$594,416	1.2	1.5	$86,824	$197,011
CZ06-2	LA	257,474	-305	52.1	20%	$397,405	$282,360	$594,416	0.7	1.5	($115,045)	$197,011
CZ07	SDG&E	264,530	-6	55.7	20%	$397,405	$817,528	$610,548	2.1	1.5	$420,123	$213,143
CZ08	SCE	258,348	-60	54.0	18%	$397,405	$479,073	$625,249	1.2	1.6	$81,668	$227,844
CZ08-2	LA	258,348	-60	54.0	18%	$397,405	$275,704	$625,249	0.7	1.6	($121,701)	$227,844
CZ09	SCE	262,085	-210	54.3	16%	$397,405	$480,241	$622,528	1.2	1.6	$82,836	$225,123
CZ09-2	LA	262,085	-210	54.3	16%	$397,405	$282,209	$622,528	0.7	1.6	($115,196)	$225,123
CZ10	SDG&E	258,548	-216	53.4	17%	$397,405	$839,931	$595,323	2.1	1.5	$442,526	$197,918
CZ10-2	SCE	258,548	-216	53.4	17%	$397,405	$485,523	$595,323	1.2	1.5	$88,118	$197,918
CZ11	PG&E	253,623	-390	50.9	13%	$397,405	$826,076	$585,682	2.1	1.5	$428,671	$188,277
CZ12	PG&E	252,868	-466	50.3	14%	$397,405	$802,715	$582,866	2.0	1.5	$405,310	$185,461
CZ12-2	SMUD	252,868	-466	50.3	14%	$397,405	$415,597	$582,866	1.0	1.5	$18,192	$185,461
CZ13	PG&E	250,915	-434	50.4	13%	$397,405	$806,401	$573,606	2.0	1.4	$408,996	$176,201
CZ14	SDG&E	283,684	-441	56.4	14%	$397,405	$874,753	$676,271	2.2	1.7	$477,348	$278,866
CZ14-2	SCE	283,684	-441	56.4	14%	$397,405	$493,888	$676,271	1.2	1.7	$96,483	$278,866
CZ15	SCE	274,771	-147	56.0	12%	$397,405	$476,327	$640,379	1.2	1.6	$78,922	$242,974
CZ16	PG&E	266,490	-736	51.8	14%	$397,405	$842,205	$575,563	2.1	1.4	$444,800	$178,158
CZ16-2	LA	266,490	-736	51.8	14%	$397,405	$260,372	$575,563	0.7	1.4	($137,033)	$178,158

Figure 19. Cost Effectiveness for Medium Office Package 1C – Mixed-Fuel + HE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1C: Mixed Fuel + HE												
CZ01	PG&E	288	688	4.1	3%	$61,253	$18,656	$12,314	0.3	0.2	($42,597)	($48,939)
CZ02	PG&E	3,795	550	4.3	4%	$68,937	$36,683	$24,676	0.5	0.4	($32,254)	($44,261)
CZ03	PG&E	1,241	439	2.9	3%	$57,529	$20,150	$11,885	0.4	0.2	($37,379)	($45,644)
CZ04	PG&E	5,599	529	4.7	5%	$72,074	$44,915	$30,928	0.6	0.4	($27,158)	($41,145)
CZ04-2	CPAU	5,599	529	4.7	5%	$72,074	$24,175	$30,928	0.3	0.4	($47,898)	($41,145)
CZ05	PG&E	3,470	453	3.6	4%	$60,330	$35,072	$18,232	0.6	0.3	($25,258)	($42,097)
CZ05-2	SCG	3,470	453	3.6	4%	$60,330	$32,777	$18,232	0.5	0.3	($27,553)	($42,097)
CZ06	SCE	3,374	298	2.6	3%	$55,594	$19,446	$16,132	0.3	0.3	($36,148)	($39,462)
CZ06-2	LADWP	3,374	298	2.6	3%	$55,594	$13,450	$16,132	0.2	0.3	($42,145)	($39,462)
CZ07	SDG&E	5,257	140	2.3	4%	$54,111	$41,086	$19,903	0.8	0.4	($13,025)	($34,208)
CZ08	SCE	5,921	176	2.7	4%	$60,497	$22,210	$24,055	0.4	0.4	($38,287)	($36,442)
CZ08-2	LADWP	5,921	176	2.7	4%	$60,497	$14,064	$24,055	0.2	0.4	($46,434)	($36,442)
CZ09	SCE	7,560	224	3.5	4%	$61,311	$28,576	$31,835	0.5	0.5	($32,735)	($29,476)
CZ09-2	LADWP	7,560	224	3.5	4%	$61,311	$18,262	$31,835	0.3	0.5	($43,049)	($29,476)
CZ10	SDG&E	5,786	288	3.2	4%	$62,685	$50,717	$24,628	0.8	0.4	($11,968)	($38,057)
CZ10-2	SCE	5,786	288	3.2	4%	$62,685	$24,575	$24,628	0.4	0.4	($38,110)	($38,057)
CZ11	PG&E	8,128	441	4.9	5%	$71,101	$54,188	$37,849	0.8	0.5	($16,912)	($33,252)
CZ12	PG&E	6,503	478	4.7	5%	$68,329	$47,329	$34,556	0.7	0.5	($20,999)	($33,773)
CZ12-2	SMUD	6,503	478	4.7	5%	$68,329	$24,003	$34,556	0.4	0.5	($44,325)	($33,773)
CZ13	PG&E	8,398	432	5.0	5%	$69,474	$51,347	$37,229	0.7	0.5	($18,128)	($32,246)
CZ14	SDG&E	7,927	470	5.0	5%	$69,463	$62,744	$37,133	0.9	0.5	($6,718)	($32,329)
CZ14-2	SCE	7,927	470	5.0	5%	$69,463	$32,517	$37,133	0.5	0.5	($36,946)	($32,329)
CZ15	SCE	15,140	219	5.5	5%	$66,702	$43,773	$52,359	0.7	0.8	($22,929)	($14,344)
CZ16	PG&E	3,111	912	6.3	5%	$71,765	$36,002	$24,914	0.5	0.3	($35,763)	($46,851)
CZ16-2	LADWP	3,111	912	6.3	5%	$71,765	$23,057	$24,914	0.3	0.3	($48,708)	($46,851)

Figure 20. Cost Effectiveness for Medium Office Package 2 – All-Electric Federal Code Minimum

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost*	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 2: All-Electric Federal Code Minimum												
CZ01	PG&E	-53,657	4967	10.1	-15%	($87,253)	($98,237)	($58,420)	0.9	1.5	($10,984)	$28,833
CZ02	PG&E	-49,684	3868	5.0	-7%	($73,695)	($101,605)	($41,429)	0.7	1.8	($27,910)	$32,266
CZ03	PG&E	-35,886	3142	5.6	-7%	($82,330)	($57,345)	($29,592)	1.4	2.8	$24,986	$52,738
CZ04	PG&E	-48,829	3759	4.7	-6%	($69,012)	($90,527)	($40,570)	0.8	1.7	($21,515)	$28,443
CZ04-2	CPAU	-48,829	3759	4.7	-6%	($69,012)	($19,995)	($40,570)	3.5	1.7	$49,018	$28,443
CZ05	PG&E	-40,531	3240	4.5	-8%	($84,503)	($63,663)	($39,997)	1.3	2.1	$20,840	$44,506
CZ06	SCE	-26,174	2117	3.1	-4%	($76,153)	$24,908	($20,571)	>1	3.7	$101,061	$55,581
CZ06-2	LADWP	-26,174	2117	3.1	-4%	($76,153)	$26,366	($20,571)	>1	3.7	$102,518	$55,581
CZ07	SDG&E	-12,902	950	0.9	-2%	($70,325)	$46,879	($11,407)	>1	6.2	$117,204	$58,918
CZ08	SCE	-15,680	1219	1.5	-2%	($68,774)	$17,859	($12,648)	>1	5.4	$86,633	$56,125
CZ08-2	LADWP	-15,680	1219	1.5	-2%	($68,774)	$18,603	($12,648)	>1	5.4	$87,376	$56,125
CZ09	SCE	-19,767	1605	2.4	-2%	($63,102)	$20,920	($14,462)	>1	4.4	$84,022	$48,640
CZ09-2	LADWP	-19,767	1605	2.4	-2%	($63,102)	$21,929	($14,462)	>1	4.4	$85,030	$48,640
CZ10	SDG&E	-27,414	2053	2.2	-4%	($47,902)	$38,918	($23,339)	>1	2.1	$86,820	$24,562
CZ10-2	SCE	-27,414	2053	2.2	-4%	($47,902)	$20,765	($23,339)	>1	2.1	$68,666	$24,562
CZ11	PG&E	-40,156	3062	3.6	-4%	($63,987)	($72,791)	($32,837)	0.9	1.9	($8,804)	$31,150
CZ12	PG&E	-43,411	3327	4.1	-5%	($68,343)	($85,856)	($35,463)	0.8	1.9	($17,512)	$32,880
CZ12-2	SMUD	-43,411	3327	4.1	-5%	($68,343)	($5,109)	($35,463)	13.4	1.9	$63,234	$32,880
CZ13	PG&E	-39,649	3063	3.8	-4%	($62,726)	($70,705)	($32,408)	0.9	1.9	($7,980)	$30,318
CZ14	SDG&E	-44,322	3266	3.4	-5%	($65,156)	$6,043	($38,422)	>1	1.7	$71,199	$26,735
CZ14-2	SCE	-44,322	3266	3.4	-5%	($65,156)	$4,798	($38,422)	>1	1.7	$69,954	$26,735
CZ15	SCE	-19,917	1537	1.8	-2%	($36,176)	$12,822	($15,464)	>1	2.3	$48,998	$20,711
CZ16	PG&E	-94,062	6185	5.6	-27%	($64,096)	($212,158)	($150,871)	0.3	0.4	($148,062)	($86,775)
CZ16-2	LADWP	-94,062	6185	5.6	-27%	($64,096)	$1,493	($150,871)	>1	0.4	$65,589	($86,775)

*The Incremental Package Cost is equal to the sum of the incremental HVAC and water heating equipment costs from Figure 10, the electrical infrastructure incremental cost of $27,802 (see section 3.3.2.1), and the natural gas infrastructure incremental costs of $(18,949) (see section 3.3.2.2).

Figure 21. Cost Effectiveness for Medium Office Package 3A – All-Electric + EE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3A: All-Electric + EE												
CZ01	PG&E	-19,115	4967	19.4	7%	($20,604)	$20,630	$28,112	>1	>1	$41,234	$48,716
CZ02	PG&E	-11,811	3868	15.2	10%	($7,046)	$39,260	$58,563	>1	>1	$46,306	$65,609
CZ03	PG&E	2,530	3142	16.2	16%	($15,681)	$85,241	$68,682	>1	>1	$100,922	$84,363
CZ04	PG&E	-10,839	3759	14.8	9%	($2,363)	$59,432	$58,420	>1	>1	$61,795	$60,783
CZ04-2	CPAU	-10,839	3759	14.8	9%	($2,363)	$70,680	$58,420	>1	>1	$73,043	$60,783
CZ05	PG&E	-2,316	3240	14.6	12%	($17,854)	$85,380	$58,802	>1	>1	$103,234	$76,656
CZ06	SCE	15,399	2117	14.3	18%	($9,503)	$114,962	$89,921	>1	>1	$124,466	$99,425
CZ06-2	LADWP	15,399	2117	14.3	18%	($9,503)	$82,389	$89,921	>1	>1	$91,893	$99,425
CZ07	SDG&E	33,318	950	13.8	20%	($3,676)	$256,704	$111,399	>1	>1	$260,380	$115,076
CZ08	SCE	30,231	1219	14.2	18%	($2,124)	$110,144	$111,781	>1	>1	$112,268	$113,906
CZ08-2	LADWP	30,231	1219	14.2	18%	($2,124)	$76,069	$111,781	>1	>1	$78,194	$113,906
CZ09	SCE	24,283	1605	14.3	15%	$3,547	$119,824	$108,249	33.8	30.5	$116,277	$104,702
CZ09-2	LADWP	24,283	1605	14.3	15%	$3,547	$83,549	$108,249	23.6	30.5	$80,001	$104,702
CZ10	SDG&E	12,344	2053	12.6	13%	$18,748	$230,553	$82,905	12.3	4.4	$211,806	$64,158
CZ10-2	SCE	12,344	2053	12.6	13%	$18,748	$105,898	$82,905	5.6	4.4	$87,150	$64,158
CZ11	PG&E	929	3062	14.5	10%	$2,662	$85,988	$75,030	32.3	28.2	$83,326	$72,368
CZ12	PG&E	-3,419	3327	14.8	10%	($1,694)	$68,866	$69,589	>1	>1	$70,560	$71,283
CZ12-2	SMUD	-3,419	3327	14.8	10%	($1,694)	$71,761	$69,589	>1	>1	$73,455	$71,283
CZ13	PG&E	1,398	3063	14.8	9%	$3,923	$89,799	$71,307	22.9	18.2	$85,875	$67,384
CZ14	SDG&E	-5,469	3266	13.5	9%	$1,493	$206,840	$69,016	138.6	46.2	$205,347	$67,523
CZ14-2	SCE	-5,469	3266	13.5	9%	$1,493	$94,143	$69,016	63.1	46.2	$92,650	$67,523
CZ15	SCE	25,375	1537	13.7	10%	$30,474	$114,909	$104,335	3.8	3.4	$84,435	$73,862
CZ16	PG&E	-65,877	6185	12.7	-15%	$2,553	($91,477)	($85,673)	-35.8	-33.6	($94,030)	($88,226)
CZ16-2	LADWP	-65,877	6185	12.7	-15%	$2,553	$72,780	($85,673)	28.5	-33.6	$70,227	($88,226)

Figure 22. Cost Effectiveness for Medium Office Package 3B – All-Electric + EE + PV + B

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (mtons)	Compliance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + PV + B												
CZ01	PG&E	157,733	4967	54.9	7%	$310,152	$518,421	$410,946	1.7	1.3	$208,269	$100,794
CZ02	PG&E	203,026	3868	57.8	10%	$323,710	$692,336	$532,273	2.1	1.6	$368,626	$208,563
CZ03	PG&E	211,706	3142	58.0	16%	$315,075	$708,235	$520,866	2.2	1.7	$393,160	$205,791
CZ04	PG&E	216,204	3759	59.9	9%	$328,393	$741,382	$560,576	2.3	1.7	$412,989	$232,183
CZ04-2	CPAU	216,204	3759	59.9	9%	$328,393	$607,074	$560,576	1.8	1.7	$278,681	$232,183
CZ05	PG&E	223,399	3240	59.8	12%	$312,902	$799,992	$546,592	2.6	1.7	$487,090	$233,690
CZ06	SCE	233,299	2117	57.7	18%	$321,252	$509,969	$583,963	1.6	1.8	$188,716	$262,711
CZ06-2	LA	233,299	2117	57.7	18%	$321,252	$311,931	$583,963	1.0	1.8	($9,322)	$262,711
CZ07	SDG&E	256,034	950	58.3	20%	$327,079	$870,156	$609,498	2.7	1.9	$543,076	$282,419
CZ08	SCE	246,944	1219	57.4	18%	$328,631	$499,506	$623,292	1.5	1.9	$170,874	$294,661
CZ08-2	LA	246,944	1219	57.4	18%	$328,631	$296,991	$623,292	0.9	1.9	($31,640)	$294,661
CZ09	SCE	243,838	1605	58.5	15%	$334,303	$504,498	$615,178	1.5	1.8	$170,195	$280,875
CZ09-2	LA	243,838	1605	58.5	15%	$334,303	$307,626	$615,178	0.9	1.8	($26,677)	$280,875
CZ10	SDG&E	229,044	2053	56.2	13%	$349,503	$851,810	$569,549	2.4	1.6	$502,306	$220,046
CZ10-2	SCE	229,044	2053	56.2	13%	$349,503	$491,383	$569,549	1.4	1.6	$141,880	$220,046
CZ11	PG&E	212,047	3062	56.4	10%	$333,418	$743,403	$556,758	2.2	1.7	$409,985	$223,340
CZ12	PG&E	207,955	3327	56.7	10%	$329,062	$713,054	$552,415	2.2	1.7	$383,993	$223,353
CZ12-2	SMUD	207,955	3327	56.7	10%	$329,062	$414,371	$552,415	1.3	1.7	$85,310	$223,353
CZ13	PG&E	209,431	3063	56.3	9%	$334,679	$728,822	$544,969	2.2	1.6	$394,143	$210,289
CZ14	SDG&E	236,002	3266	61.3	9%	$332,249	$865,181	$638,517	2.6	1.9	$532,933	$306,269
CZ14-2	SCE	236,002	3266	61.3	9%	$332,249	$488,163	$638,517	1.5	1.9	$155,914	$306,269
CZ15	SCE	254,426	1537	58.5	10%	$361,229	$487,715	$626,728	1.4	1.7	$126,486	$265,499
CZ16	PG&E	162,915	6185	58.6	-15%	$333,309	$580,353	$406,746	1.7	1.2	$247,044	$73,437
CZ16-2	LA	162,915	6185	58.6	-15%	$333,309	$290,566	$406,746	0.9	1.2	($42,742)	$73,437

Figure 23. Cost Effectiveness for Medium Office Package 3C – All-Electric + HE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3C: All-Electric + HE												
CZ01	PG&E	-53,390	4967	10.2	-14%	($43,987)	($93,740)	($57,752)	0.5	0.8	($49,753)	($13,765)
CZ02	PG&E	-45,916	3868	6.1	-5%	($22,722)	($77,212)	($26,394)	0.3	0.9	($54,490)	($3,672)
CZ03	PG&E	-34,656	3142	6.0	-6%	($38,261)	($45,796)	($25,153)	0.8	1.5	($7,535)	$13,108
CZ04	PG&E	-43,248	3759	6.3	-3%	($15,229)	($56,932)	($18,996)	0.3	0.8	($41,703)	($3,767)
CZ04-2	CPAU	-43,248	3759	6.3	-3%	($15,229)	($5,298)	($18,996)	2.9	0.8	$9,932	($3,767)
CZ05	PG&E	-37,068	3240	5.4	-6%	($40,434)	($38,330)	($29,544)	1.1	1.4	$2,104	$10,890
CZ06	SCE	-22,805	2117	4.0	-2%	($30,237)	$39,812	($9,594)	>1	3.2	$70,050	$20,644
CZ06-2	LADWP	-22,805	2117	4.0	-2%	($30,237)	$35,414	($9,594)	>1	3.2	$65,651	$20,644
CZ07	SDG&E	-7,646	950	2.5	1%	($22,564)	$86,159	$6,062	>1	>1	$108,722	$28,625
CZ08	SCE	-9,761	1219	3.2	1%	($18,443)	$37,375	$8,305	>1	>1	$55,818	$26,748
CZ08-2	LADWP	-9,761	1219	3.2	1%	($18,443)	$29,973	$8,305	>1	>1	$48,416	$26,748
CZ09	SCE	-12,211	1605	4.5	2%	($10,282)	$46,335	$13,364	>1	>1	$56,617	$23,646
CZ09-2	LADWP	-12,211	1605	4.5	2%	($10,282)	$37,030	$13,364	>1	>1	$47,313	$23,646
CZ10	SDG&E	-21,642	2053	3.7	-1%	$11,340	$84,901	($3,818)	7.5	-0.3	$73,561	($15,158)
CZ10-2	SCE	-21,642	2053	3.7	-1%	$11,340	$40,659	($3,818)	3.6	-0.3	$29,319	($15,158)
CZ11	PG&E	-32,052	3062	5.9	0%	($8,519)	($29,013)	($3,007)	0.3	2.8	($20,495)	$5,512
CZ12	PG&E	-36,926	3327	6.0	-1%	($15,443)	($48,955)	($9,546)	0.3	1.6	($33,511)	$5,898
CZ12-2	SMUD	-36,926	3327	6.0	-1%	($15,443)	$9,916	($9,546)	>1	1.6	$25,359	$5,898
CZ13	PG&E	-31,253	3063	6.3	0%	($7,257)	($27,782)	($3,055)	0.3	2.4	($20,525)	$4,202
CZ14	SDG&E	-36,402	3266	5.7	-1%	($10,651)	$61,605	($9,832)	>1	1.1	$72,256	$819
CZ14-2	SCE	-36,402	3266	5.7	-1%	($10,651)	$30,625	($9,832)	>1	1.1	$41,276	$819
CZ15	SCE	-4,775	1537	6.0	3%	$28,927	$52,955	$32,790	1.8	1.1	$24,028	$3,863
CZ16	PG&E	-90,949	6185	6.5	-26%	($8,467)	($194,115)	($142,041)	0.0	0.1	($185,648)	($133,574)
CZ16-2	LADWP	-90,949	6185	6.5	-26%	($8,467)	$37,127	($142,041)	>1	0.1	$45,594	($133,574)

4.2 Cost Effectiveness Results – Medium Retail

Figure 24 through Figure 30 contain the cost-effectiveness findings for the Medium Retail packages. Notable findings for each package include:

- **1A – Mixed-Fuel + EE:**
  - Packages achieve +9% to +18% compliance margins depending on climate zone, and all packages are cost effective in all climate zones.
  - Incremental package costs vary across climate zones because of the HVAC system size in some climate zones are small enough (<54 kBtu/h) to have the economizers measure applied.
  - B/C ratios are high compared to other prototypes because the measures applied are primarily low-cost lighting measures. This suggests room for the inclusion of other energy efficiency measures with lower cost-effectiveness to achieve even higher compliance margins for a cost effective package.
- **1B – Mixed-Fuel + EE + PV + B:** All packages are cost effective using both the On-Bill and TDV approach, except On-Bill in LADWP territory. Adding PV and battery to the efficiency packages reduces the B/C ratio but increases overall NPV savings.
- **1C – Mixed-fuel + HE:** Packages achieve +1 to +4% compliance margins depending on climate zone, and packages are cost effective in all climate zones except CZs 1, 3 and 5 using the TDV approach.
- **2 – All-Electric Federal Code-Minimum Reference:**
  - Packages achieve between -12% and +1% compliance margins depending on climate zone.
  - Packages achieve positive savings using both the On-Bill and TDV approaches in CZs 6-10 and 14-15. Packages do not achieve On-Bill or TDV savings in most of PG&E territory (CZs 1, 2, 4, 5, 12-13, and 16).
  - Packages are cost effective in all climate zones except CZ16.
  - All incremental costs are negative primarily due to elimination of natural gas infrastructure.
- **3A – All-Electric + EE:** Packages achieve between +3% and +16% compliance margins depending on climate zone. All packages are cost effective in all climate zones.
- **3B – All-Electric + EE + PV + B:** All packages are cost effective using both the On-Bill and TDV approaches, except On-Bill in LADWP territory. Adding PV and Battery to the efficiency package reduces the B/C ratio but increases overall NPV savings.
- **3C – All-Electric + HE:** Packages achieve between -8% and +5% compliance margins depending on climate zone, and packages are cost effective using both On-Bill and TDV approaches in all CZs except CZs 1 and 16.

Figure 24. Cost Effectiveness for Medium Retail Package 1A – Mixed-Fuel + EE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1A: Mixed Fuel + EE												
CZ01	PG&E	15,210	1209	11.10	18%	$2,712	$68,358	$60,189	25.2	22.2	$65,646	$57,478
CZ02	PG&E	18,885	613	8.73	13%	$5,569	$76,260	$59,135	13.7	10.6	$70,691	$53,566
CZ03	PG&E	18,772	462	7.87	16%	$5,569	$66,813	$57,135	12.0	10.3	$61,244	$51,566
CZ04	PG&E	19,100	439	7.84	14%	$5,569	$75,989	$58,036	13.6	10.4	$70,420	$52,467
CZ04-2	CPAU	19,100	439	7.84	14%	$5,569	$51,556	$58,036	9.3	10.4	$45,987	$52,467
CZ05	PG&E	17,955	415	7.41	16%	$5,569	$63,182	$55,003	11.3	9.9	$57,613	$49,435
CZ05-2	SCG	17,955	415	7.41	16%	$5,569	$61,810	$55,003	11.1	9.9	$56,241	$49,435
CZ06	SCE	12,375	347	5.54	10%	$2,712	$31,990	$41,401	11.8	15.3	$29,278	$38,689
CZ06-2	LADWP	12,375	347	5.54	10%	$2,712	$21,667	$41,401	8.0	15.3	$18,956	$38,689
CZ07	SDG&E	17,170	136	5.65	13%	$5,569	$73,479	$49,883	13.2	9.0	$67,910	$44,314
CZ08	SCE	12,284	283	5.15	10%	$2,712	$30,130	$41,115	11.1	15.2	$27,419	$38,403
CZ08-2	LADWP	12,284	283	5.15	10%	$2,712	$20,243	$41,115	7.5	15.2	$17,531	$38,403
CZ09	SCE	13,473	302	5.51	10%	$5,569	$32,663	$46,126	5.9	8.3	$27,094	$40,557
CZ09-2	LADWP	13,473	302	5.51	10%	$5,569	$22,435	$46,126	4.0	8.3	$16,866	$40,557
CZ10	SDG&E	19,873	267	6.99	12%	$5,569	$83,319	$58,322	15.0	10.5	$77,751	$52,753
CZ10-2	SCE	19,873	267	6.99	12%	$5,569	$39,917	$58,322	7.2	10.5	$34,348	$52,753
CZ11	PG&E	21,120	578	9.14	13%	$5,569	$86,663	$67,485	15.6	12.1	$81,095	$61,916
CZ12	PG&E	20,370	562	8.85	13%	$5,569	$81,028	$64,409	14.6	11.6	$75,459	$58,840
CZ12-2	SMUD	20,370	562	8.85	13%	$5,569	$44,991	$64,409	8.1	11.6	$39,422	$58,840
CZ13	PG&E	22,115	620	9.98	15%	$2,712	$109,484	$83,109	40.4	30.6	$106,772	$80,398
CZ14	SDG&E	25,579	406	9.38	13%	$2,712	$116,354	$80,055	42.9	29.5	$113,643	$77,343
CZ14-2	SCE	26,327	383	9.42	13%	$2,712	$57,290	$83,065	21.1	30.6	$54,578	$80,354
CZ15	SCE	26,433	169	8.35	12%	$2,712	$57,152	$79,506	21.1	29.3	$54,440	$76,794
CZ16	PG&E	15,975	752	8.72	13%	$2,712	$72,427	$55,025	26.7	20.3	$69,715	$52,314
CZ16-2	LADWP	15,975	752	8.72	13%	$2,712	$31,906	$55,025	11.8	20.3	$29,194	$52,314

Figure 25. Cost Effectiveness for Medium Retail Package 1B – Mixed-Fuel + EE + PV + B

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Compliance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + PV + Battery												
CZ01	PG&E	158,584	1209	40.79	18%	$277,383	$509,092	$383,683	1.8	1.4	$231,709	$106,300
CZ02	PG&E	189,400	613	43.75	13%	$280,240	$590,043	$465,474	2.1	1.7	$309,803	$185,234
CZ03	PG&E	191,016	462	43.52	16%	$280,240	$578,465	$452,795	2.1	1.6	$298,224	$172,554
CZ04	PG&E	195,014	439	44.14	14%	$280,240	$605,369	$480,989	2.2	1.7	$325,129	$200,748
CZ04-2	CPAU	195,014	439	44.14	14%	$280,240	$451,933	$480,989	1.6	1.7	$171,693	$200,748
CZ05	PG&E	196,654	415	44.30	16%	$280,240	$589,771	$464,749	2.1	1.7	$309,530	$184,509
CZ05-2	SCG	196,654	415	44.30	16%	$280,240	$588,407	$464,749	2.1	1.7	$308,167	$184,509
CZ06	SCE	185,903	347	41.61	10%	$277,383	$322,495	$456,596	1.2	1.6	$45,111	$179,213
CZ06-2	LA	185,903	347	41.61	10%	$277,383	$191,428	$456,596	0.7	1.6	($85,955)	$179,213
CZ07	SDG&E	197,650	136	43.24	13%	$280,240	$496,786	$477,582	1.8	1.7	$216,545	$197,342
CZ08	SCE	187,869	283	41.48	10%	$277,383	$326,810	$478,132	1.2	1.7	$49,427	$200,749
CZ08-2	LA	187,869	283	41.48	10%	$277,383	$190,379	$478,132	0.7	1.7	($87,004)	$200,749
CZ09	SCE	191,399	302	42.32	10%	$280,240	$334,869	$472,770	1.2	1.7	$54,629	$192,530
CZ09-2	LA	191,399	302	42.32	10%	$280,240	$201,759	$472,770	0.7	1.7	($78,481)	$192,530
CZ10	SDG&E	200,033	267	44.01	12%	$280,240	$547,741	$472,880	2.0	1.7	$267,501	$192,640
CZ10-2	SCE	200,033	267	44.01	12%	$280,240	$340,822	$472,880	1.2	1.7	$60,582	$192,640
CZ11	PG&E	192,846	578	44.07	13%	$280,240	$582,969	$490,855	2.1	1.8	$302,728	$210,615
CZ12	PG&E	191,720	562	43.70	13%	$280,240	$586,836	$485,076	2.1	1.7	$306,596	$204,836
CZ12-2	SMUD	191,720	562	43.70	13%	$280,240	$319,513	$485,076	1.1	1.7	$39,273	$204,836
CZ13	PG&E	195,031	620	45.19	15%	$277,383	$605,608	$486,285	2.2	1.8	$328,225	$208,901
CZ14	SDG&E	217,183	406	47.86	13%	$277,383	$559,148	$534,915	2.0	1.9	$281,765	$257,532
CZ14-2	SCE	217,927	383	47.91	14%	$277,383	$354,757	$538,058	1.3	1.9	$77,373	$260,674
CZ15	SCE	208,662	169	44.51	12%	$277,383	$338,772	$496,107	1.2	1.8	$61,389	$218,724
CZ16	PG&E	210,242	752	48.76	13%	$277,383	$608,779	$490,262	2.2	1.8	$331,395	$212,879
CZ16-2	LA	210,242	752	48.76	13%	$277,383	$207,160	$490,262	0.7	1.8	($70,223)	$212,879

Figure 26. Cost Effectiveness for Medium Retail Package 1C – Mixed-Fuel + HE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1C: Mixed Fuel + HE												
CZ01	PG&E	57	346	2.04	2%	$9,006	$6,301	$6,065	0.7	0.7	($2,705)	($2,941)
CZ02	PG&E	2,288	229	2.01	3%	$9,726	$23,016	$13,998	2.4	1.4	$13,291	$4,273
CZ03	PG&E	1,087	171	1.31	2%	$9,063	$6,782	$7,186	0.7	0.8	($2,282)	($1,877)
CZ04	PG&E	1,862	159	1.46	3%	$9,004	$17,891	$10,878	2.0	1.2	$8,887	$1,874
CZ04-2	CPAU	1,862	159	1.46	3%	$9,004	$7,821	$10,878	0.9	1.2	($1,182)	$1,874
CZ05	PG&E	664	162	1.11	1%	$9,454	$5,119	$4,725	0.5	0.5	($4,335)	($4,729)
CZ05-2	SCG	664	162	1.11	1%	$9,454	$4,558	$4,725	0.5	0.5	($4,896)	($4,729)
CZ06	SCE	2,648	90	1.24	3%	$8,943	$11,646	$11,427	1.3	1.3	$2,703	$2,484
CZ06-2	LADWP	2,648	90	1.24	3%	$8,943	$7,329	$11,427	0.8	1.3	($1,614)	$2,484
CZ07	SDG&E	2,376	49	0.95	2%	$9,194	$20,103	$9,779	2.2	1.1	$10,909	$585
CZ08	SCE	2,822	72	1.20	3%	$9,645	$11,989	$12,877	1.2	1.3	$2,344	$3,233
CZ08-2	LADWP	2,822	72	1.20	3%	$9,645	$7,427	$12,877	0.8	1.3	($2,218)	$3,233
CZ09	SCE	4,206	88	1.73	4%	$10,446	$16,856	$18,745	1.6	1.8	$6,410	$8,299
CZ09-2	LADWP	4,206	88	1.73	4%	$10,446	$10,604	$18,745	1.0	1.8	$158	$8,299
CZ10	SDG&E	4,226	119	1.88	4%	$9,514	$36,412	$19,008	3.8	2.0	$26,898	$9,494
CZ10-2	SCE	4,226	119	1.88	4%	$9,514	$17,094	$19,008	1.8	2.0	$7,580	$9,494
CZ11	PG&E	4,188	225	2.56	4%	$10,479	$31,872	$22,393	3.0	2.1	$21,392	$11,913
CZ12	PG&E	3,675	214	2.34	4%	$10,409	$29,653	$20,525	2.8	2.0	$19,243	$10,115
CZ12-2	SMUD	3,675	214	2.34	4%	$10,409	$12,823	$20,525	1.2	2.0	$2,414	$10,115
CZ13	PG&E	4,818	180	2.46	4%	$9,809	$34,149	$23,623	3.5	2.4	$24,340	$13,814
CZ14	SDG&E	6,439	153	2.71	4%	$12,103	$44,705	$26,348	3.7	2.2	$32,601	$14,245
CZ14-2	SCE	6,439	153	2.71	4%	$12,103	$22,032	$26,348	1.8	2.2	$9,929	$14,245
CZ15	SCE	8,802	48	2.76	5%	$12,534	$25,706	$31,402	2.1	2.5	$13,171	$18,868
CZ16	PG&E	2,316	390	2.97	3%	$11,999	$22,663	$13,888	1.9	1.2	$10,665	$1,890
CZ16-2	LADWP	2,316	390	2.97	3%	$11,999	$11,921	$13,888	1.0	1.2	($78)	$1,890

Figure 27. Cost Effectiveness for Medium Retail Package 2 – All-Electric Federal Code Minimum

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost*	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 2: All-Electric Federal Code Minimum												
CZ01	PG&E	-29,155	3893	13.85	-4.1%	($23,048)	($8,333)	($13,910)	2.8	1.7	$14,715	$9,138
CZ02	PG&E	-21,786	2448	7.49	-1.0%	($27,464)	($16,476)	($4,483)	1.7	6.1	$10,987	$22,981
CZ03	PG&E	-14,583	1868	6.26	-0.4%	($24,111)	$263	($1,450)	>1	16.6	$24,374	$22,661
CZ04	PG&E	-14,186	1706	5.30	-0.1%	($22,896)	($8,753)	($220)	2.6	104.2	$14,143	$22,676
CZ04-2	CPAU	-14,186	1706	5.30	-0.1%	($22,896)	$12,493	($220)	>1	104.2	$35,389	$22,676
CZ05	PG&E	-14,334	1746	5.47	-1.2%	($25,507)	($1,567)	($4,197)	16.3	6.1	$23,940	$21,309
CZ06	SCE	-7,527	1002	3.32	0.5%	($21,762)	$18,590	$1,868	>1	>1	$40,351	$23,630
CZ06-2	LADWP	-7,527	1002	3.32	0.5%	($21,762)	$19,309	$1,868	>1	>1	$41,071	$23,630
CZ07	SDG&E	-3,812	522	1.76	0.3%	($23,762)	$54,345	$1,318	>1	>1	$78,107	$25,080
CZ08	SCE	-5,805	793	2.70	0.4%	($26,922)	$16,735	$1,846	>1	>1	$43,658	$28,768
CZ08-2	LADWP	-5,805	793	2.70	0.4%	($26,922)	$17,130	$1,846	>1	>1	$44,052	$28,768
CZ09	SCE	-7,241	970	3.32	0.4%	($32,113)	$18,582	$1,978	>1	>1	$50,695	$34,091
CZ09-2	LADWP	-7,241	970	3.32	0.4%	($32,113)	$19,089	$1,978	>1	>1	$51,202	$34,091
CZ10	SDG&E	-10,336	1262	3.99	0.1%	($27,272)	$54,453	$505	>1	>1	$81,724	$27,777
CZ10-2	SCE	-10,336	1262	3.99	0.1%	($27,272)	$20,996	$505	>1	>1	$48,268	$27,777
CZ11	PG&E	-19,251	2415	7.95	0.5%	($32,202)	($7,951)	$2,615	4.1	>1	$24,251	$34,817
CZ12	PG&E	-19,471	2309	7.28	-0.1%	($32,504)	($14,153)	($461)	2.3	70.4	$18,351	$32,042
CZ12-2	SMUD	-19,471	2309	7.28	-0.1%	($32,504)	$12,939	($461)	>1	70.4	$45,443	$32,042
CZ13	PG&E	-16,819	1983	6.15	-0.4%	($28,158)	($10,575)	($2,022)	2.7	13.9	$17,582	$26,136
CZ14	SDG&E	-13,208	1672	5.44	0.7%	($26,656)	$41,117	$4,461	>1	>1	$67,772	$31,117
CZ14-2	SCE	-13,208	1672	5.44	0.7%	($26,656)	$18,467	$4,461	>1	>1	$45,123	$31,117
CZ15	SCE	-2,463	518	2.14	0.9%	($29,544)	$16,796	$5,823	>1	>1	$46,339	$35,367
CZ16	PG&E	-41,418	4304	13.23	-12.2%	($25,771)	($49,862)	($52,542)	0.5	0.5	($24,091)	($26,771)
CZ16-2	LADWP	-41,418	4304	13.23	-12.2%	($25,771)	$39,319	($52,542)	>1	0.5	$65,090	($26,771)

* The Incremental Package Cost is the addition of the incremental HVAC and water heating equipment costs from Figure 11 and the natural gas infrastructure incremental cost savings of $28,027 (see section 3.3.2.2).

Figure 28. Cost Effectiveness for Medium Retail Package 3A – All-Electric + EE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3A: All-Electric + EE												
CZ01	PG&E	-5,478	3893	20.64	15%	($20,336)	$63,593	$51,224	>1	>1	$83,929	$71,560
CZ02	PG&E	2,843	2448	14.58	13%	($21,895)	$74,997	$56,893	>1	>1	$96,892	$78,788
CZ03	PG&E	7,791	1868	12.73	16%	($18,542)	$68,968	$56,586	>1	>1	$87,511	$75,128
CZ04	PG&E	8,572	1706	11.89	14%	($17,327)	$81,957	$57,904	>1	>1	$99,284	$75,231
CZ04-2	CPAU	8,572	1706	11.89	14%	($17,327)	$63,082	$57,904	>1	>1	$80,408	$75,231
CZ05	PG&E	6,973	1746	11.68	15%	($19,938)	$63,677	$51,949	>1	>1	$83,615	$71,887
CZ06	SCE	7,431	1002	7.72	11%	($19,050)	$47,072	$42,610	>1	>1	$66,122	$61,660
CZ06-2	LADWP	7,431	1002	7.72	11%	($19,050)	$37,078	$42,610	>1	>1	$56,128	$61,660
CZ07	SDG&E	14,350	522	6.98	13%	($18,193)	$127,461	$50,828	>1	>1	$145,654	$69,021
CZ08	SCE	8,524	793	6.90	10%	($24,210)	$43,679	$42,258	>1	>1	$67,890	$66,468
CZ08-2	LADWP	8,524	793	6.90	10%	($24,210)	$34,038	$42,258	>1	>1	$58,248	$66,468
CZ09	SCE	8,403	970	7.81	10%	($26,545)	$47,819	$47,356	>1	>1	$74,364	$73,901
CZ09-2	LADWP	8,403	970	7.81	10%	($26,545)	$37,934	$47,356	>1	>1	$64,478	$73,901
CZ10	SDG&E	11,737	1262	10.23	12%	($21,703)	$137,436	$58,761	>1	>1	$159,139	$80,464
CZ10-2	SCE	11,737	1262	10.23	12%	($21,703)	$58,257	$58,761	>1	>1	$79,959	$80,464
CZ11	PG&E	5,892	2415	15.13	12%	($26,633)	$85,256	$65,859	>1	>1	$111,889	$92,492
CZ12	PG&E	5,548	2309	14.46	12%	($26,935)	$80,631	$63,903	>1	>1	$107,566	$90,838
CZ12-2	SMUD	5,548	2309	14.46	12%	($26,935)	$59,311	$63,903	>1	>1	$86,246	$90,838
CZ13	PG&E	10,184	1983	14.15	14%	($25,446)	$110,105	$80,604	>1	>1	$135,551	$106,050
CZ14	SDG&E	16,583	1672	13.83	15%	($23,944)	$171,200	$88,471	>1	>1	$195,145	$112,415
CZ14-2	SCE	16,583	1672	13.83	15%	($23,944)	$656,178	$159,604	>1	>1	$680,122	$183,548
CZ15	SCE	23,642	518	9.44	12%	($26,832)	$65,573	$76,781	>1	>1	$92,404	$103,612
CZ16	PG&E	-18,232	4304	19.80	3%	($23,059)	$38,796	$14,152	>1	>1	$61,855	$37,211
CZ16-2	LADWP	-18,232	4304	19.80	3%	($23,059)	$67,793	$14,152	>1	>1	$90,852	$37,211

Figure 29. Cost Effectiveness for Medium Retail Package 3B – All-Electric + EE + PV + B

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Compliance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + PV + B												
CZ01	PG&E	137,956	3893	50.51	15%	$254,335	$510,831	$374,432	2.0	1.5	$256,496	$120,097
CZ02	PG&E	173,387	2448	49.87	13%	$252,777	$590,112	$463,431	2.3	1.8	$337,336	$210,654
CZ03	PG&E	180,055	1868	48.55	16%	$256,129	$585,861	$452,399	2.3	1.8	$329,732	$196,270
CZ04	PG&E	184,499	1706	48.38	14%	$257,345	$608,814	$481,011	2.4	1.9	$351,470	$223,666
CZ04-2	CPAU	184,499	1706	48.38	14%	$257,345	$465,690	$481,011	1.8	1.9	$208,345	$223,666
CZ05	PG&E	185,690	1746	48.84	15%	$254,734	$600,933	$461,804	2.4	1.8	$346,199	$207,071
CZ06	SCE	180,968	1002	43.91	11%	$255,621	$335,909	$457,959	1.3	1.8	$80,288	$202,337
CZ06-2	LADWP	180,968	1002	43.91	11%	$255,621	$206,021	$457,959	0.8	1.8	($49,601)	$202,337
CZ07	SDG&E	194,837	522	44.67	13%	$256,478	$550,714	$478,637	2.1	1.9	$294,236	$222,159
CZ08	SCE	184,120	793	43.32	10%	$250,461	$340,301	$479,406	1.4	1.9	$89,840	$228,945
CZ08-2	LADWP	184,120	793	43.32	10%	$250,461	$203,813	$479,406	0.8	1.9	($46,648)	$228,945
CZ09	SCE	186,346	970	44.77	10%	$248,127	$349,524	$474,176	1.4	1.9	$101,397	$226,049
CZ09-2	LADWP	186,346	970	44.77	10%	$248,127	$216,654	$474,176	0.9	1.9	($31,473)	$226,049
CZ10	SDG&E	191,923	1262	47.46	12%	$252,969	$593,514	$473,605	2.3	1.9	$340,545	$220,636
CZ10-2	SCE	191,923	1262	47.46	12%	$252,969	$356,958	$473,605	1.4	1.9	$103,989	$220,636
CZ11	PG&E	177,639	2415	50.26	12%	$248,039	$585,689	$489,317	2.4	2.0	$337,650	$241,278
CZ12	PG&E	176,919	2309	49.46	12%	$247,736	$591,104	$484,702	2.4	2.0	$343,368	$236,966
CZ12-2	SMUD	176,919	2309	49.46	12%	$247,736	$335,286	$484,702	1.4	2.0	$87,550	$236,966
CZ13	PG&E	183,129	1983	49.48	14%	$249,226	$608,560	$483,670	2.4	1.9	$359,334	$234,444
CZ14	SDG&E	208,183	1672	52.54	15%	$250,727	$593,232	$544,079	2.4	2.2	$342,505	$293,351
CZ14-2	SCE	264,589	1672	80.97	15%	$250,727	$656,178	$580,403	2.6	2.3	$405,450	$329,676
CZ15	SCE	205,869	518	45.67	12%	$247,840	$347,125	$493,339	1.4	2.0	$99,285	$245,499
CZ16	PG&E	176,114	4304	60.13	3%	$251,612	$567,822	$446,795	2.3	1.8	$316,210	$195,183
CZ16-2	LADWP	176,114	4304	60.13	3%	$251,612	$241,757	$446,795	1.0	1.8	($9,856)	$195,183

Figure 30. Cost Effectiveness for Medium Retail Package 3C – All-Electric + HE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3C: All-Electric + HE												
CZ01	PG&E	-26,199	3893	14.76	-2%	($587)	$369	($5,757)	>1	0.1	$956	($5,170)
CZ02	PG&E	-16,989	2448	8.95	3%	($4,211)	$12,323	$11,251	>1	>1	$16,534	$15,463
CZ03	PG&E	-11,703	1868	7.15	2%	($2,213)	$9,159	$6,944	>1	>1	$11,372	$9,157
CZ04	PG&E	-10,675	1706	6.37	3%	($316)	$14,317	$11,383	>1	>1	$14,633	$11,700
CZ04-2	CPAU	-10,675	1706	6.37	3%	($316)	$20,599	$11,383	>1	>1	$20,915	$11,700
CZ05	PG&E	-11,969	1746	6.19	1%	($2,298)	$5,592	$1,824	>1	>1	$7,890	$4,122
CZ06	SCE	-3,919	1002	4.35	3%	$1,418	$29,751	$13,734	21.0	9.7	$28,333	$12,316
CZ06-2	LADWP	-3,919	1002	4.35	3%	$1,418	$25,891	$13,734	18.3	9.7	$24,473	$12,316
CZ07	SDG&E	-955	522	2.59	3%	($710)	$74,518	$11,229	>1	>1	$75,227	$11,939
CZ08	SCE	-2,224	793	3.74	4%	($3,719)	$28,067	$15,075	>1	>1	$31,785	$18,793
CZ08-2	LADWP	-2,224	793	3.74	4%	($3,719)	$23,848	$15,075	>1	>1	$27,566	$18,793
CZ09	SCE	-2,089	970	4.84	4%	($8,268)	$34,648	$21,162	>1	>1	$42,916	$29,430
CZ09-2	LADWP	-2,089	970	4.84	4%	($8,268)	$28,837	$21,162	>1	>1	$37,105	$29,430
CZ10	SDG&E	-4,868	1262	5.58	4%	($5,222)	$91,136	$20,041	>1	>1	$96,358	$25,263
CZ10-2	SCE	-4,868	1262	5.58	4%	($5,222)	$37,200	$20,041	>1	>1	$42,422	$25,263
CZ11	PG&E	-12,651	2415	9.95	5%	($8,217)	$29,015	$26,172	>1	>1	$37,232	$34,389
CZ12	PG&E	-13,479	2309	9.10	4%	($9,239)	$20,839	$21,228	>1	>1	$30,078	$30,466
CZ12-2	SMUD	-13,479	2309	9.10	4%	($9,239)	$26,507	$21,228	>1	>1	$35,746	$30,466
CZ13	PG&E	-9,935	1983	8.23	4%	($4,975)	$30,123	$24,063	>1	>1	$35,097	$29,037
CZ14	SDG&E	-5,407	1672	7.71	5%	$121	$88,669	$31,029	732.5	256.3	$88,547	$30,908
CZ14-2	SCE	-5,407	1672	7.71	5%	$121	$40,709	$31,029	336.3	256.3	$40,588	$30,908
CZ15	SCE	6,782	518	4.77	6%	($2,508)	$42,238	$37,379	>1	>1	$44,745	$39,887
CZ16	PG&E	-35,297	4304	15.03	-8%	$1,102	($21,384)	($33,754)	-19.4	-30.6	($22,486)	($34,856)
CZ16-2	LADWP	-35,297	4304	15.03	-8%	$1,102	$48,625	($33,754)	44.1	-30.6	$47,523	($34,856)

4.3 Cost Effectiveness Results – Small Hotel

The following issues must be considered when reviewing the Small Hotel results:

- The Small Hotel is a mix of residential and nonresidential space types, which results in different occupancy and load profiles than the office and retail prototypes.
- A potential laundry load has not been examined for the Small Hotel. The Reach Code Team attempted to characterize and apply the energy use intensity of laundry loads in hotels but did not find readily available data for use. Thus, cost effectiveness including laundry systems has not been examined.
- Contrary to the office and retail prototypes, the Small Hotel baseline water heater is a central gas storage type. Current compliance software cannot model central heat pump water heater systems with recirculation serving guest rooms.[23] The only modeling option for heat pump water heating is individual water heaters at each guest room even though this is a very uncommon configuration. TRC modeled individual heat pump water heaters but as a proxy for central heat pump water heating performance, but integrated costs associated with tank and controls for central heat pump water heating into cost effectiveness calculations.
- Assuming central heat pump water heating also enabled the inclusion of a solar hot water thermal collection system, which was a key efficiency measure to achieving compliance in nearly all climate zones.

Figure 31 through Figure 37 contain the cost-effectiveness findings for the Small Hotel packages. Notable findings for each package include:

- **1A – Mixed-Fuel + EE:**
  - Packages achieve +3 to +10% compliance margins depending on climate zone.
  - Packages are cost effective using either the On-Bill or TDV approach in all CZs except 12 (using SMUD rates), 14 (using SCE rates), and 15 (with SCE rates).
  - The hotel is primarily guest rooms with a smaller proportion of nonresidential space. Thus, the inexpensive VAV minimum flow measure and lighting measures that have been applied to the entirety of the Medium Office and Medium Retail prototypes have a relatively small impact in the Small Hotel.[24]
- **1B – Mixed-Fuel + EE + PV + B:** Packages are cost effective using either the On-Bill or TDV approach in all CZs. Solar PV generally increases cost effectiveness compared to efficiency-only, particularly when using an NPV metric.
- **1C – Mixed-Fuel + HE:** Packages achieve +2 to +5% compliance margins depending on climate zone. The package is cost effective using the On-Bill approach in a minority of climate zones, and cost effective using TDV approach only in CZ15.

[23] The IOUs and CEC are actively working on including central heat pump water heater modeling with recirculation systems in early 2020.

[24] Title 24 requires that hotel/motel guest room lighting design comply with the residential lighting standards, which are all mandatory and are not awarded compliance credit for improved efficacy.

- **2 – All-Electric Federal Code-Minimum Reference:**
  - This all-electric design does not comply with the Energy Commission's TDV performance budget. Packages achieve between -50% and -4% compliance margins depending on climate zone. This may be because the modeled HW system is constrained to having an artificially low efficiency to avoid triggering federal pre-emption, and the heat pump space heating systems must operate overnight when operation is less efficient.
  - All packages are cost effective in all climate zones.
- **3A – All-Electric + EE:** Packages achieve positive compliance margins in all CZs ranging from 0% to +17%, except CZ16 which had a -18% compliance margin. All packages are cost effective in all climate zones. The improved degree of cost effectiveness outcomes in Package 3A compared to Package 1A appear to be due to the significant incremental package cost savings.
- **3B – All-Electric + EE + PV + B:** All packages are cost effective. Packages improve in B/C ratio when compared to 3A and increase in magnitude of overall NPV savings. PV appears to be more cost-effective with higher building electricity loads.
- **3C – All-Electric + HE:**
  - Packages do not comply with Title 24 in all CZs except CZ15 which resulted in a +0.04% compliance margin.
  - All packages are cost effective.

Figure 31. Cost Effectiveness for Small Hotel Package 1A – Mixed-Fuel + EE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1A: Mixed Fuel + EE												
CZ01	PG&E	3,855	1288	5.65	9%	$20,971	$34,339	$36,874	1.6	1.8	$13,368	$15,903
CZ02	PG&E	3,802	976	3.91	7%	$20,971	$26,312	$29,353	1.3	1.4	$5,341	$8,381
CZ03	PG&E	4,153	1046	4.48	10%	$20,971	$31,172	$35,915	1.5	1.7	$10,201	$14,944
CZ04	PG&E	5,007	395	0.85	6%	$21,824	$24,449	$24,270	1.1	1.1	$2,625	$2,446
CZ04-2	CPAU	4,916	422	0.98	6%	$21,824	$18,713	$24,306	0.9	1.1	($3,111)	$2,483
CZ05	PG&E	3,530	1018	4.13	9%	$20,971	$28,782	$34,448	1.4	1.6	$7,810	$13,477
CZ05-2	SCG	3,530	1018	4.13	9%	$20,971	$23,028	$34,448	1.1	1.6	$2,057	$13,477
CZ06	SCE	5,137	418	1.16	8%	$21,824	$16,001	$26,934	0.7	1.2	($5,823)	$5,110
CZ06-2	LADWP	5,137	418	1.16	8%	$21,824	$11,706	$26,934	0.5	1.2	($10,118)	$5,110
CZ07	SDG&E	5,352	424	1.31	8%	$21,824	$26,699	$27,975	1.2	1.3	$4,876	$6,152
CZ08	SCE	5,151	419	1.21	7%	$21,824	$15,931	$23,576	0.7	1.1	($5,893)	$1,752
CZ08-2	LADWP	5,151	419	1.21	7%	$21,824	$11,643	$23,576	0.5	1.1	($10,180)	$1,752
CZ09	SCE	5,229	406	1.16	6%	$21,824	$15,837	$22,365	0.7	1.0	($5,987)	$541
CZ09-2	LADWP	5,229	406	1.16	6%	$21,824	$11,632	$22,365	0.5	1.0	($10,192)	$541
CZ10	SDG&E	4,607	342	0.92	5%	$21,824	$25,506	$22,219	1.2	1.0	$3,683	$396
CZ10-2	SCE	4,607	342	0.92	5%	$21,824	$13,868	$22,219	0.6	1.0	($7,956)	$396
CZ11	PG&E	4,801	325	0.87	4%	$21,824	$22,936	$19,503	1.1	0.9	$1,112	($2,321)
CZ12	PG&E	5,276	327	0.90	5%	$21,824	$22,356	$21,305	1.0	0.98	$532	($519)
CZ12-2	SMUD	5,276	327	0.90	5%	$21,824	$15,106	$21,305	0.7	0.98	($6,717)	($519)
CZ13	PG&E	4,975	310	0.87	4%	$21,824	$23,594	$19,378	1.1	0.9	$1,770	($2,445)
CZ14	SDG&E	4,884	370	0.82	4%	$21,824	$24,894	$21,035	1.1	0.96	$3,070	($789)
CZ14-2	SCE	4,884	370	0.82	4%	$21,824	$14,351	$21,035	0.7	0.96	($7,473)	($789)
CZ15	SCE	5,187	278	1.23	3%	$21,824	$13,645	$18,089	0.6	0.8	($8,178)	($3,735)
CZ16	PG&E	2,992	1197	4.95	6%	$20,971	$27,813	$30,869	1.3	1.5	$6,842	$9,898
CZ16-2	LADWP	2,992	1197	4.95	6%	$20,971	$19,782	$30,869	0.9	1.5	($1,190)	$9,898

Figure 32. Cost Effectiveness for Small Hotel Package 1B – Mixed-Fuel + EE + PV + B

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1B: Mixed Fuel + EE + PV + B												
CZ01	PG&E	107,694	1288	28.73	9%	$228,341	$366,509	$295,731	1.6	1.3	$138,168	$67,390
CZ02	PG&E	130,144	976	31.14	7%	$228,341	$359,248	$336,575	1.6	1.5	$130,907	$108,233
CZ03	PG&E	129,107	1046	31.57	10%	$228,341	$430,737	$335,758	1.9	1.5	$202,396	$107,416
CZ04	PG&E	132,648	395	28.46	6%	$229,194	$355,406	$338,455	1.6	1.5	$126,212	$109,262
CZ04-2	CPAU	132,556	422	28.59	6%	$229,194	$322,698	$338,492	1.4	1.5	$93,504	$109,298
CZ05	PG&E	136,318	1018	32.73	9%	$228,341	$452,611	$352,342	2.0	1.5	$224,269	$124,001
CZ05-2	SCG	136,318	1018	32.73	9%	$228,341	$446,858	$352,342	2.0	1.5	$218,516	$124,001
CZ06	SCE	131,051	418	28.47	8%	$229,194	$217,728	$336,843	0.9	1.5	($11,466)	$107,649
CZ06-2	LADWP	131,051	418	28.47	8%	$229,194	$131,052	$336,843	0.6	1.5	($98,142)	$107,649
CZ07	SDG&E	136,359	424	29.63	8%	$229,194	$306,088	$345,378	1.3	1.5	$76,894	$116,184
CZ08	SCE	132,539	419	28.85	7%	$229,194	$227,297	$353,013	1.0	1.5	($1,897)	$123,819
CZ08-2	LADWP	132,539	419	28.85	7%	$229,194	$134,739	$353,013	0.6	1.5	($94,455)	$123,819
CZ09	SCE	131,422	406	28.82	6%	$229,194	$230,791	$343,665	1.0	1.5	$1,597	$114,471
CZ09-2	LADWP	131,422	406	28.82	6%	$229,194	$136,024	$343,665	0.6	1.5	($93,170)	$114,471
CZ10	SDG&E	134,146	342	29.05	5%	$229,194	$339,612	$342,574	1.5	1.5	$110,418	$113,380
CZ10-2	SCE	134,146	342	29.05	5%	$229,194	$226,244	$342,574	1.0	1.5	($2,949)	$113,380
CZ11	PG&E	128,916	325	27.62	4%	$229,194	$352,831	$337,208	1.5	1.5	$123,637	$108,014
CZ12	PG&E	131,226	327	28.04	5%	$229,194	$425,029	$338,026	1.9	1.5	$195,835	$108,832
CZ12-2	SMUD	131,226	327	28.04	5%	$229,194	$213,176	$338,026	0.9	1.5	($16,018)	$108,832
CZ13	PG&E	127,258	310	27.33	4%	$229,194	$351,244	$324,217	1.5	1.4	$122,050	$95,023
CZ14	SDG&E	147,017	370	30.96	4%	$229,194	$861,445	$217,675	3.8	0.9	$632,251	($11,518)
CZ14-2	SCE	147,017	370	30.96	4%	$229,194	$244,100	$381,164	1.1	1.7	$14,906	$151,970
CZ15	SCE	137,180	278	29.12	3%	$229,194	$225,054	$348,320	1.0	1.5	($4,140)	$119,127
CZ16	PG&E	141,478	1197	34.60	6%	$228,341	$377,465	$357,241	1.7	1.6	$149,124	$128,899
CZ16-2	LADWP	141,478	1197	34.60	6%	$228,341	$136,563	$357,241	0.6	1.6	($91,778)	$128,899

Figure 33. Cost Effectiveness for Small Hotel Package 1C – Mixed-Fuel + HE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 1C: Mixed Fuel + HE												
CZ01	PG&E	10	632	3.76	2%	$22,839	$11,015	$10,218	0.5	0.4	($11,823)	($12,621)
CZ02	PG&E	981	402	2.69	3%	$23,092	$16,255	$11,808	0.7	0.5	($6,837)	($11,284)
CZ03	PG&E	81	383	2.30	2%	$20,510	$7,066	$6,850	0.3	0.3	($13,444)	($13,660)
CZ04	PG&E	161	373	2.26	2%	$22,164	$8,593	$7,645	0.4	0.3	($13,571)	($14,519)
CZ04-2	CPAU	161	373	2.26	2%	$22,164	$7,097	$7,645	0.3	0.3	($15,067)	($14,519)
CZ05	PG&E	154	361	2.19	2%	$21,418	$6,897	$6,585	0.3	0.3	($14,521)	($14,833)
CZ05-2	SCG	154	361	2.19	2%	$21,418	$4,786	$6,585	0.2	0.3	($16,632)	($14,833)
CZ06	SCE	237	201	1.27	2%	$20,941	$3,789	$4,882	0.2	0.2	($17,152)	($16,059)
CZ06-2	LADWP	237	201	1.27	2%	$20,941	$3,219	$4,882	0.2	0.2	($17,722)	($16,059)
CZ07	SDG&E	1,117	158	1.28	2%	$19,625	$13,771	$7,342	0.7	0.4	($5,854)	($12,283)
CZ08	SCE	1,302	169	1.39	2%	$20,678	$8,378	$8,591	0.4	0.4	($12,300)	($12,088)
CZ08-2	LADWP	1,302	169	1.39	2%	$20,678	$5,802	$8,591	0.3	0.4	($14,877)	($12,088)
CZ09	SCE	1,733	178	1.56	3%	$20,052	$10,489	$11,164	0.5	0.6	($9,563)	($8,888)
CZ09-2	LADWP	1,733	178	1.56	3%	$20,052	$7,307	$11,164	0.4	0.6	($12,745)	($8,888)
CZ10	SDG&E	3,170	220	2.29	4%	$22,682	$35,195	$19,149	1.6	0.8	$12,513	($3,533)
CZ10-2	SCE	3,170	220	2.29	4%	$22,682	$16,701	$19,149	0.7	0.8	($5,981)	($3,533)
CZ11	PG&E	3,343	323	2.96	4%	$23,344	$27,633	$20,966	1.2	0.9	$4,288	($2,379)
CZ12	PG&E	1,724	320	2.44	4%	$22,302	$11,597	$15,592	0.5	0.7	($10,705)	($6,710)
CZ12-2	SMUD	1,724	320	2.44	4%	$22,302	$11,156	$15,592	0.5	0.7	($11,146)	($6,710)
CZ13	PG&E	3,083	316	2.81	3%	$22,882	$23,950	$17,068	1.0	0.7	$1,068	($5,814)
CZ14	SDG&E	3,714	312	2.99	4%	$23,299	$35,301	$21,155	1.5	0.9	$12,002	($2,144)
CZ14-2	SCE	3,714	312	2.99	4%	$23,299	$18,460	$21,155	0.8	0.9	($4,839)	($2,144)
CZ15	SCE	8,684	97	3.21	5%	$20,945	$26,738	$31,600	1.3	1.5	$5,792	$10,655
CZ16	PG&E	836	700	4.42	3%	$24,616	$18,608	$14,494	0.8	0.6	($6,007)	($10,121)
CZ16-2	LADWP	836	700	4.42	3%	$24,616	$15,237	$14,494	0.6	0.6	($9,378)	($10,121)

Figure 34. Cost Effectiveness for Small Hotel Package 2 – All-Electric Federal Code Minimum

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost*	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 2: All-Electric Federal Code Minimum												
CZ01	PG&E	-159,802	16917	53.92	-28%	($1,296,784)	($582,762)	($115,161)	2.2	11.3	$714,022	$1,181,623
CZ02	PG&E	-118,739	12677	40.00	-12%	($1,297,757)	($245,434)	($51,620)	5.3	25.1	$1,052,322	$1,246,137
CZ03	PG&E	-110,595	12322	40.48	-14%	($1,300,029)	($326,633)	($51,166)	4.0	25.4	$973,396	$1,248,863
CZ04	PG&E	-113,404	11927	36.59	-13%	($1,299,864)	($225,307)	($53,134)	5.8	24.5	$1,074,556	$1,246,730
CZ04-2	CPAU	-113,404	11927	36.59	-13%	($1,299,864)	($17,768)	($53,134)	73.2	24.5	$1,282,096	$1,246,730
CZ05	PG&E	-108,605	11960	38.34	-15%	($1,299,917)	($350,585)	($54,685)	3.7	23.8	$949,332	$1,245,232
CZ06	SCE	-78,293	8912	29.36	-5%	($1,300,058)	($61,534)	($28,043)	21.1	46.4	$1,238,524	$1,272,015
CZ06-2	LA	-78,293	8912	29.36	-5%	($1,300,058)	$43,200	($28,043)	>1	46.4	$1,343,258	$1,272,015
CZ07	SDG&E	-69,819	8188	28.04	-7%	($1,298,406)	($137,638)	($23,199)	9.4	56.0	$1,160,768	$1,275,207
CZ08	SCE	-71,914	8353	28.21	-6%	($1,296,376)	($53,524)	($22,820)	24.2	56.8	$1,242,852	$1,273,556
CZ08-2	LA	-71,914	8353	28.21	-6%	($1,296,376)	$42,841	($22,820)	>1	56.8	$1,339,217	$1,273,556
CZ09	SCE	-72,262	8402	28.38	-6%	($1,298,174)	($44,979)	($21,950)	28.9	59.1	$1,253,196	$1,276,224
CZ09-2	LA	-72,262	8402	28.38	-6%	($1,298,174)	$46,679	($21,950)	>1	59.1	$1,344,853	$1,276,224
CZ10	SDG&E	-80,062	8418	26.22	-8%	($1,295,176)	($172,513)	($36,179)	7.5	35.8	$1,122,663	$1,258,997
CZ10-2	SCE	-80,062	8418	26.22	-8%	($1,295,176)	($63,974)	($36,179)	20.2	35.8	$1,231,202	$1,258,997
CZ11	PG&E	-99,484	10252	30.99	-10%	($1,295,985)	($186,037)	($49,387)	7.0	26.2	$1,109,948	$1,246,598
CZ12	PG&E	-99,472	10403	32.08	-10%	($1,297,425)	($340,801)	($45,565)	3.8	28.5	$956,624	$1,251,860
CZ12-2	SMUD	-99,067	10403	32.21	-10%	($1,297,425)	$5,794	($44,354)	>1	29.3	$1,303,219	$1,253,071
CZ13	PG&E	-96,829	10029	30.60	-10%	($1,295,797)	($184,332)	($50,333)	7.0	25.7	$1,111,465	$1,245,464
CZ14	SDG&E	-101,398	10056	29.68	-11%	($1,296,156)	($325,928)	($56,578)	4.0	22.9	$970,228	$1,239,578
CZ14-2	SCE	-101,398	10056	29.68	-11%	($1,296,156)	($121,662)	($56,578)	10.7	22.9	$1,174,494	$1,239,578
CZ15	SCE	-49,853	5579	18.07	-4%	($1,294,276)	$209	($21,420)	>1	60.4	$1,294,485	$1,272,856
CZ16	PG&E	-216,708	17599	41.89	-50%	($1,300,552)	($645,705)	($239,178)	2.0	5.4	$654,847	$1,061,374
CZ16-2	LA	-216,708	17599	41.89	-50%	($1,300,552)	$30,974	($239,178)	>1	5.4	$1,331,526	$1,061,374

* The Incremental Package Cost is the addition of the incremental HVAC and water heating equipment costs from Figure 12, the electrical infrastructure incremental cost of $26,800 (see section 3.3.2.1), and the natural gas infrastructure incremental cost savings of $56,020 (see section 3.3.2.2).

Figure 35. Cost Effectiveness for Small Hotel Package 3A – All-Electric + EE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3A: All-Electric + EE												
CZ01	PG&E	-113,259	16917	62.38	1.3%	($1,251,544)	($200,367)	$5,460	6.2	>1	$1,051,177	$1,257,005
CZ02	PG&E	-90,033	12677	45.46	4%	($1,265,064)	($108,075)	$15,685	11.7	>1	$1,156,989	$1,280,749
CZ03	PG&E	-83,892	12322	45.93	6%	($1,267,509)	($198,234)	$20,729	6.4	>1	$1,069,274	$1,288,237
CZ04	PG&E	-91,197	11927	40.36	0.2%	($1,263,932)	($112,892)	$703	11.2	>1	$1,151,041	$1,264,635
CZ04-2	CPAU	-90,981	11927	40.42	0.2%	($1,263,932)	$32,557	$918	>1	>1	$1,296,489	$1,264,850
CZ05	PG&E	-82,491	11960	43.62	5%	($1,267,355)	($221,492)	$18,488	5.7	>1	$1,045,863	$1,285,843
CZ06	SCE	-61,523	8912	32.45	7%	($1,267,916)	($33,475)	$15,142	37.9	>1	$1,234,441	$1,283,057
CZ06-2	LADWP	-61,523	8912	32.45	7%	($1,267,916)	$57,215	$15,142	>1	>1	$1,325,130	$1,283,057
CZ07	SDG&E	-53,308	8188	31.22	7%	($1,266,354)	($81,338)	$22,516	15.6	>1	$1,185,015	$1,288,870
CZ08	SCE	-55,452	8353	31.33	3%	($1,264,408)	($23,893)	$9,391	52.9	>1	$1,240,515	$1,273,800
CZ08-2	LADWP	-55,452	8353	31.33	3%	($1,264,408)	$57,058	$9,391	>1	>1	$1,321,466	$1,273,800
CZ09	SCE	-55,887	8402	31.40	2%	($1,266,302)	($19,887)	$9,110	63.7	>1	$1,246,415	$1,275,412
CZ09-2	LADWP	-55,887	8402	31.40	2%	($1,266,302)	$60,441	$9,110	>1	>1	$1,326,743	$1,275,412
CZ10	SDG&E	-60,239	8418	29.96	2%	($1,256,002)	($126,072)	$7,365	10.0	>1	$1,129,930	$1,263,367
CZ10-2	SCE	-60,239	8418	29.96	2%	($1,256,002)	($33,061)	$7,365	38.0	>1	$1,222,940	$1,263,367
CZ11	PG&E	-77,307	10252	35.12	1%	($1,256,149)	($80,187)	$3,114	15.7	>1	$1,175,962	$1,259,263
CZ12	PG&E	-75,098	10403	36.73	2%	($1,256,824)	($234,275)	$9,048	5.4	>1	$1,022,550	$1,265,872
CZ12-2	SMUD	-75,098	10403	36.73	2%	($1,256,824)	$54,941	$9,048	>1	>1	$1,311,765	$1,265,872
CZ13	PG&E	-75,052	10029	34.72	0.3%	($1,256,109)	($79,378)	$1,260	15.8	>1	$1,176,731	$1,257,369
CZ14	SDG&E	-76,375	10056	34.28	0.1%	($1,255,704)	($170,975)	$543	7.3	>1	$1,084,729	$1,256,247
CZ14-2	SCE	-76,375	10056	34.28	0.1%	($1,255,704)	($34,418)	$543	36.5	>1	$1,221,286	$1,256,247
CZ15	SCE	-33,722	5579	21.43	2%	($1,257,835)	$26,030	$12,262	>1	>1	$1,283,864	$1,270,097
CZ16	PG&E	-139,676	17599	55.25	-14%	($1,255,364)	($197,174)	($66,650)	6.4	18.8	$1,058,190	$1,188,714
CZ16-2	LADWP	-139,676	17599	55.25	-14%	($1,255,364)	$165,789	($66,650)	>1	18.8	$1,421,153	$1,188,714

Figure 36. Cost Effectiveness for Small Hotel Package 3B – All-Electric + EE + PV + B

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3B: All-Electric + EE + PV + B												
CZ01	PG&E	-8,900	16917	87.15	1%	($1,044,174)	$90,964	$324,376	>1	>1	$1,135,139	$1,368,551
CZ02	PG&E	36,491	12677	73.03	4%	($1,057,694)	$242,514	$313,711	>1	>1	$1,300,208	$1,371,405
CZ03	PG&E	41,239	12322	73.43	6%	($1,060,139)	$155,868	$308,385	>1	>1	$1,216,007	$1,368,524
CZ04	PG&E	36,628	11927	69.70	0.2%	($1,056,562)	$240,799	$308,682	>1	>1	$1,297,361	$1,365,244
CZ04-2	CPAU	36,844	11927	69.76	0.2%	($1,056,562)	$336,813	$418,836	>1	>1	$1,393,375	$1,475,398
CZ05	PG&E	36,365	11960	73.11	5%	($1,059,985)	$119,173	$317,952	>1	>1	$1,179,158	$1,377,937
CZ06	SCE	64,476	8912	60.47	7%	($1,060,545)	$156,327	$311,730	>1	>1	$1,216,872	$1,372,275
CZ06-2	LADWP	64,476	8912	60.47	7%	($1,060,545)	$180,648	$311,730	>1	>1	$1,241,193	$1,372,275
CZ07	SDG&E	77,715	8188	60.45	7%	($1,058,983)	$197,711	$330,458	>1	>1	$1,256,694	$1,389,441
CZ08	SCE	71,990	8353	59.49	3%	($1,057,038)	$165,393	$320,814	>1	>1	$1,222,432	$1,377,852
CZ08-2	LADWP	71,990	8353	60.24	3%	($1,057,038)	$180,367	$443,809	>1	>1	$1,237,405	$1,500,847
CZ09	SCE	70,465	8402	59.29	2%	($1,058,932)	$175,602	$301,459	>1	>1	$1,234,534	$1,360,391
CZ09-2	LADWP	70,465	8402	59.29	2%	($1,058,932)	$183,220	$301,459	>1	>1	$1,242,152	$1,360,391
CZ10	SDG&E	69,581	8418	58.04	2%	($1,048,632)	$161,513	$294,530	>1	>1	$1,210,145	$1,343,162
CZ10-2	SCE	69,581	8418	58.04	2%	($1,048,632)	$164,837	$294,530	>1	>1	$1,213,469	$1,343,162
CZ11	PG&E	47,260	10252	61.57	1%	($1,048,779)	$253,717	$286,797	>1	>1	$1,302,496	$1,335,576
CZ12	PG&E	51,115	10403	64.07	2%	($1,049,454)	$104,523	$305,446	>1	>1	$1,153,977	$1,354,900
CZ12-2	SMUD	51,115	10403	64.99	2%	($1,049,454)	$253,197	$430,977	>1	>1	$1,302,651	$1,480,431
CZ13	PG&E	47,757	10029	60.77	0.3%	($1,048,739)	$251,663	$281,877	>1	>1	$1,300,402	$1,330,616
CZ14	SDG&E	66,084	10056	64.54	0.1%	($1,048,334)	$148,510	$334,938	>1	>1	$1,196,844	$1,383,272
CZ14-2	SCE	66,084	10056	64.54	0.1%	($1,048,334)	$185,018	$334,938	>1	>1	$1,233,352	$1,383,272
CZ15	SCE	98,755	5579	49.04	2.1%	($1,050,465)	$233,308	$311,121	>1	>1	$1,283,772	$1,361,585
CZ16	PG&E	-873	17599	84.99	-14%	($1,047,994)	$191,994	$240,724	>1	>1	$1,239,987	$1,288,718
CZ16-2	LADWP	-873	17599	84.99	-14%	($1,047,994)	$291,279	$240,724	>1	>1	$1,339,273	$1,288,718



Figure 37. Cost Effectiveness for Small Hotel Package 3C – All-Electric + HE

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Comp-liance Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Package 3C: All-Electric + HE												
CZ01	PG&E	-154,840	16917	56.24	-24%	($1,281,338)	($606,619)	($101,272)	2.1	12.7	$674,719	$1,180,066
CZ02	PG&E	-118,284	12677	41.18	-11%	($1,283,243)	($395,641)	($44,505)	3.2	28.8	$887,602	$1,238,738
CZ03	PG&E	-113,413	12322	40.80	-14%	($1,288,782)	($522,458)	($51,582)	2.5	25.0	$766,324	$1,237,200
CZ04	PG&E	-115,928	11927	37.09	-13%	($1,287,878)	($383,177)	($53,285)	3.4	24.2	$904,701	$1,234,593
CZ04-2	CPAU	-115,928	11927	37.09	-13%	($1,287,878)	($24,170)	($53,285)	53.3	24.2	$1,263,708	$1,234,593
CZ05	PG&E	-111,075	11960	38.75	-15%	($1,288,242)	($530,740)	($56,124)	2.4	23.0	$757,502	$1,232,119
CZ06	SCE	-83,000	8912	29.41	-15%	($1,288,695)	($154,625)	($32,244)	8.3	40.0	$1,134,069	$1,256,451
CZ06-2	LADWP	-83,000	8912	29.41	-15%	($1,288,695)	($17,626)	($32,244)	73.1	40.0	$1,271,068	$1,256,451
CZ07	SDG&E	-73,823	8188	28.32	-7%	($1,285,759)	($268,207)	($24,069)	4.8	53.4	$1,017,552	$1,261,690
CZ08	SCE	-75,573	8353	28.56	-6%	($1,281,241)	($157,393)	($21,912)	8.1	58.5	$1,123,848	$1,259,329
CZ08-2	LADWP	-75,573	8353	28.56	-6%	($1,281,241)	($18,502)	($21,912)	69.2	58.5	$1,262,739	$1,259,329
CZ09	SCE	-74,790	8402	29.04	-4%	($1,285,139)	($138,746)	($16,992)	9.3	75.6	$1,146,393	$1,268,147
CZ09-2	LADWP	-74,790	8402	29.04	-4%	($1,285,139)	($6,344)	($16,992)	202.6	75.6	$1,278,794	$1,268,147
CZ10	SDG&E	-80,248	8418	27.57	-5%	($1,278,097)	($235,479)	($24,107)	5.4	53.0	$1,042,617	$1,253,990
CZ10-2	SCE	-80,248	8418	27.57	-5%	($1,278,097)	($123,371)	($24,107)	10.4	53.0	$1,154,726	$1,253,990
CZ11	PG&E	-98,041	10252	32.73	-7%	($1,279,528)	($278,242)	($35,158)	4.6	36.4	$1,001,286	$1,244,370
CZ12	PG&E	-100,080	10403	33.24	-9%	($1,282,834)	($480,347)	($38,715)	2.7	33.1	$802,487	$1,244,119
CZ12-2	SMUD	-100,080	10403	33.24	-9%	($1,282,834)	($23,362)	($38,715)	54.9	33.1	$1,259,472	$1,244,119
CZ13	PG&E	-94,607	10029	32.47	-7%	($1,279,301)	($276,944)	$244,552	4.6	>1	$1,002,357	$1,523,853
CZ14	SDG&E	-97,959	10056	31.91	-7%	($1,279,893)	($302,123)	($37,769)	4.2	33.9	$977,770	$1,242,124
CZ14-2	SCE	-97,959	10056	31.91	-7%	($1,279,893)	($129,082)	($37,769)	9.9	33.9	$1,150,811	$1,242,124
CZ15	SCE	-45,226	5579	20.17	0.04%	($1,276,847)	($6,533)	$227	195.4	>1	$1,270,314	$1,277,074
CZ16	PG&E	-198,840	17599	47.73	-39%	($1,288,450)	($605,601)	($185,438)	2.1	6.9	$682,848	$1,103,011
CZ16-2	LADWP	-198,840	17599	47.73	-39%	($1,288,450)	$40,268	($185,438)	>1	6.9	$1,328,718	$1,103,011

4.4 Cost Effectiveness Results – PV-only and PV+Battery

The Reach Code Team ran packages of PV-only and PV+Battery measures, without any additional efficiency measures, to assess cost effectiveness on top of the mixed-fuel baseline building and the all-electric federal code minimum reference (Package 2 in Sections 4.1 – 4.3).

Jurisdictions interested in adopting PV-only reach codes should reference the mixed-fuel cost effectiveness results because a mixed-fuel building is the baseline for the nonresidential prototypes analyzed in this study. PV or PV+Battery packages are added to all-electric federal code minimum reference which (in many scenarios) do not have a positive compliance margin compared to the mixed-fuel baseline model, and are solely provided for informational purposes. Jurisdictions interested in reach codes requiring all-electric+PV or all-electric+PV+battery should reference package 3B results in Sections 4.1 – 4.3.[25]

Each of the following eight packages were evaluated against a mixed fuel baseline designed as per 2019 Title 24 Part 6 requirements.

- **Mixed-Fuel + 3 kW PV Only:**
- **Mixed-Fuel + 3 kW PV + 5 kWh battery**
- **Mixed-Fuel + PV Only**: PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller
- **Mixed-Fuel + PV + 50 kWh Battery:** PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller, along with 50 kWh battery
- **All-Electric + 3 kW PV Only**
- **All-Electric + 3 kW PV + 5 kWh Battery**
- **All-Electric + PV Only**: PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller
- **All-Electric + PV + 50 kWh Battery:** PV sized per the roof size of the building, or to offset the annual electricity consumption, whichever is smaller, along with 50 kWh battery

Figure 38 through Figure 40 summarize the on-bill and TDV B/C ratios for each prototype for the two PV only packages and the two PV plus battery packages. Compliance margins are 0 percent for all mixed-fuel packages. For all-electric packages, compliance margins are equal to those found in Package 2 for each prototype in Sections 4.1 – 4.3. The compliance margins are not impacted by renewables and battery storage measures and hence not shown in the tables. These figures are formatted in the following way:

- Cells highlighted in green have a B/C ratio greater than 1 and are cost-effective. The shade of green gets darker as cost effectiveness increases.
- Cells not highlighted have a B/C ratio less than one and are not cost effective.

[25] Because this study shows that the addition of battery generally reduces cost effectiveness, removing a battery measure would only increase cost effectiveness. Thus, a jurisdiction can apply the EE+PV+Battery cost effectiveness findings to support EE+PV reach codes, because EE+PV would still remain cost effective without a battery.

Please see Appendix 6.7 for results in full detail. Generally, for mixed-fuel packages across all prototypes, all climate zones were proven to have cost effective outcomes using TDV except in CZ1 with a 3 kW PV + 5 kWh Battery scenario. Most climate zones also had On-Bill cost effectiveness. The addition of a battery slightly reduces cost effectiveness.

In all-electric packages, the results for most climate zones were found cost effective using both TDV and On-Bill approaches with larger PV systems or PV+Battery systems. Most 3 kW PV systems were also found to be cost effective except in some scenarios analyzing the Medium Office using the On-Bill method. CZ16 results continue to show challenges being cost effective with all electric buildings, likely due to the high heating loads in this climate. The addition of a battery slightly reduces the cost effectiveness for all-electric buildings with PV.

Figure 38. Cost Effectiveness for Medium Office - PV and Battery

		Mixed Fuel								All-Electric							
	PV	3kW		3kW		135kW		135kW		3kW		3kW		135kW		135kW	
	Battery	0		5kWh		0		50kWh		0		5kWh		0		50kWh	
CZ	Utility	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV
CZ01	PG&E	2.8	1.5	1.7	0.9	1.7	1.3	1.6	1.2	0.9	1.6	0.9	1.6	2.5	2.0	2.1	1.7
CZ02	PG&E	3.7	1.9	2.1	1.1	2.2	1.6	2.0	1.4	0.8	2.2	0.9	2.6	3.2	2.4	2.7	2.1
CZ03	PG&E	3.7	1.8	2.2	1.0	2.1	1.5	1.9	1.4	1.9	3.9	2.0	4.0	3.4	2.5	2.9	2.2
CZ04	PG&E	3.6	2.0	2.1	1.2	2.3	1.6	2.1	1.5	0.9	2.1	1.1	2.7	3.3	2.5	2.9	2.2
CZ04-2	CPAU	2.1	2.0	1.3	1.2	1.8	1.6	1.6	1.5	7.7	2.1	9.8	2.7	2.9	2.5	2.5	2.2
CZ05	PG&E	4.2	1.9	2.4	1.1	2.5	1.6	2.3	1.5	1.8	2.7	1.9	2.7	4.0	2.7	3.4	2.3
CZ05-2	SCG	4.2	1.9	2.4	1.1	2.5	1.6	2.3	1.5	>1	>1	>1	>1	>1	3.0	9.4	2.6
CZ06	SCE	2.0	2.0	1.2	1.1	1.3	1.6	1.2	1.5	>1	7.2	>1	8.2	2.4	2.7	2.1	2.3
CZ06-2	LA	1.2	2.0	0.7	1.1	0.8	1.6	0.7	1.5	>1	7.2	>1	8.2	1.5	2.7	1.3	2.3
CZ07	SDG&E	3.2	2.0	1.9	1.2	2.1	1.6	1.9	1.5	>1	>1	>1	>1	3.7	2.7	3.2	2.3
CZ08	SCE	1.9	2.0	1.1	1.2	1.3	1.7	1.2	1.5	>1	>1	>1	>1	2.2	2.7	1.9	2.4
CZ08-2	LA	1.2	2.0	0.7	1.2	0.7	1.7	0.7	1.5	>1	>1	>1	>1	1.3	2.7	1.1	2.4
CZ09	SCE	1.9	2.0	1.1	1.2	1.3	1.7	1.2	1.5	>1	>1	>1	>1	2.2	2.6	1.9	2.3
CZ09-2	LA	1.1	2.0	0.7	1.2	0.7	1.7	0.7	1.5	>1	>1	>1	>1	1.3	2.6	1.2	2.3
CZ10	SDG&E	3.8	1.9	2.2	1.1	2.1	1.6	1.9	1.5	>1	3.3	>1	6.3	3.3	2.3	2.9	2.0
CZ10-2	SCE	2.1	1.9	1.2	1.1	1.3	1.6	1.2	1.5	>1	3.3	>1	6.3	2.0	2.3	1.8	2.0
CZ11	PG&E	3.6	1.9	2.1	1.1	2.2	1.6	2.0	1.5	1.1	2.6	1.5	3.6	3.2	2.4	2.8	2.1
CZ12	PG&E	3.5	1.9	2.1	1.1	2.2	1.6	2.0	1.5	0.9	2.5	1.2	3.2	3.1	2.4	2.7	2.1
CZ12-2	SMUD	1.4	1.9	0.8	1.1	1.1	1.6	1.04	1.5	>1	2.5	>1	3.2	1.9	2.4	1.6	2.1
CZ13	PG&E	3.5	1.8	2.0	1.1	2.2	1.5	2.0	1.4	1.1	2.5	1.5	3.6	3.1	2.3	2.7	2.0
CZ14	SDG&E	3.4	2.3	2.0	1.3	2.2	1.9	2.0	1.7	>1	2.3	>1	3.1	3.6	2.8	3.2	2.5
CZ14-2	SCE	1.9	2.3	1.1	1.3	1.3	1.9	1.2	1.7	>1	2.3	>1	3.1	2.2	2.8	1.9	2.5
CZ15	SCE	1.8	2.1	1.1	1.2	1.2	1.7	1.1	1.6	>1	7.5	>1	>1	1.8	2.4	1.6	2.1
CZ16	PG&E	3.9	2.0	2.3	1.1	2.3	1.6	2.1	1.5	0.3	0.4	0.4	0.6	2.5	1.8	2.2	1.6
CZ16-2	LA	1.2	2.0	0.7	1.1	0.7	1.6	0.7	1.5	>1	0.4	>1	0.6	1.3	1.8	1.2	1.6

Figure 39. Cost Effectiveness for Medium Retail - PV and Battery

		Mixed Fuel								All-Electric							
	PV	3kW		3kW		90 kW		90 kW		3kW		3kW		90 kW		90 kW	
	Battery	0		5kWh		0		50kWh		0		5kWh		0		50kWh	
CZ	Utility	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV
CZ01	PG&E	2.3	1.5	1.3	0.9	1.8	1.3	1.6	1.2	>1	3.0	>1	2.7	2.5	1.6	2.2	1.5
CZ02	PG&E	3.2	1.8	1.9	1.1	1.9	1.5	1.8	1.5	>1	>1	>1	>1	2.7	2.1	2.3	1.9
CZ03	PG&E	2.7	1.8	1.6	1.1	2.2	1.5	2.0	1.4	>1	>1	>1	>1	3.0	2.1	2.6	1.9
CZ04	PG&E	3.3	1.9	1.9	1.1	2.0	1.6	1.9	1.5	>1	>1	>1	>1	2.7	2.1	2.5	2.0
CZ04-2	CPAU	2.1	1.9	1.2	1.1	1.7	1.6	1.5	1.5	>1	>1	>1	>1	2.4	2.1	2.1	2.0
CZ05	PG&E	2.8	1.9	1.6	1.1	2.3	1.6	2.0	1.5	>1	>1	>1	>1	3.2	2.1	2.7	2.0
CZ05-2	SCG	2.8	1.9	1.6	1.1	2.3	1.6	2.0	1.5	>1	>1	>1	>1	3.7	1.9	3.2	1.6
CZ06	SCE	2.0	1.9	1.2	1.1	1.2	1.6	1.1	1.5	>1	>1	>1	>1	1.7	2.2	1.5	2.0
CZ06-2	LA	1.3	1.9	0.7	1.1	0.7	1.6	0.6	1.5	>1	>1	>1	>1	1.01	2.2	0.9	2.0
CZ07	SDG&E	4.0	2.0	2.4	1.2	1.5	1.6	1.6	1.6	>1	>1	>1	>1	2.4	2.3	2.3	2.1
CZ08	SCE	2.1	2.0	1.2	1.2	1.2	1.7	1.1	1.6	>1	>1	>1	>1	1.7	2.4	1.5	2.1
CZ08-2	LA	1.3	2.0	0.8	1.2	0.7	1.7	0.6	1.6	>1	>1	>1	>1	1.01	2.4	0.9	2.1
CZ09	SCE	2.0	2.0	1.2	1.2	1.2	1.7	1.1	1.5	>1	>1	>1	>1	1.8	2.4	1.6	2.1
CZ09-2	LA	1.2	2.0	0.7	1.2	0.7	1.7	0.7	1.5	>1	>1	>1	>1	1.1	2.4	0.99	2.1
CZ10	SDG&E	3.8	2.0	2.2	1.2	1.7	1.6	1.7	1.5	>1	>1	>1	>1	2.6	2.3	2.5	2.0
CZ10-2	SCE	2.0	2.0	1.2	1.2	1.2	1.6	1.1	1.5	>1	>1	>1	>1	1.8	2.3	1.6	2.0
CZ11	PG&E	2.8	1.9	1.6	1.1	1.9	1.6	1.8	1.5	>1	>1	>1	>1	2.7	2.3	2.5	2.1
CZ12	PG&E	3.0	1.9	1.7	1.1	1.9	1.6	1.8	1.5	>1	>1	>1	>1	2.7	2.3	2.5	2.1
CZ12-2	SMUD	1.5	1.9	0.9	1.1	1.1	1.6	0.997	1.5	>1	>1	>1	>1	1.7	2.3	1.4	2.1
CZ13	PG&E	3.0	1.9	1.7	1.1	1.9	1.6	1.8	1.4	>1	>1	>1	>1	2.7	2.2	2.4	1.9
CZ14	SDG&E	3.5	2.2	2.1	1.3	1.6	1.8	1.5	1.6	>1	>1	>1	>1	2.5	2.6	2.2	2.2
CZ14-2	SCE	1.8	2.2	1.1	1.3	1.2	1.8	1.1	1.6	>1	>1	>1	>1	1.7	2.6	1.5	2.2
CZ15	SCE	1.9	2.0	1.1	1.2	1.1	1.7	1.02	1.5	>1	>1	>1	>1	1.7	2.4	1.5	2.1
CZ16	PG&E	3.7	2.0	2.1	1.2	2.1	1.7	1.9	1.6	0.6	0.5	0.5	0.4	2.7	2.0	2.3	1.8
CZ16-2	LA	1.3	2.0	0.7	1.2	0.7	1.7	0.6	1.6	>1	0.5	>1	0.4	1.2	2.0	1.0	1.8

Figure 40. Cost Effectiveness for Small Hotel - PV and Battery

		Mixed Fuel								All-Electric							
	PV	3kW		3kW		80kW		80kW		3kW		3kW		80kW		80kW	
	Battery	0		5kWh		0		50kWh		0		5kWh		0		50kWh	
CZ	Utility	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV	On-Bill	TDV
CZ01	PG&E	2.3	1.5	1.3	0.9	1.9	1.2	1.6	1.1	2.3	>1	2.3	>1	4.8	>1	4.7	>1
CZ02	PG&E	2.3	1.9	1.3	1.1	1.8	1.5	1.6	1.4	5.6	>1	5.6	>1	>1	>1	>1	>1
CZ03	PG&E	2.7	1.8	1.6	1.05	2.3	1.5	1.9	1.4	4.2	>1	4.2	>1	>1	>1	>1	>1
CZ04	PG&E	2.4	1.9	1.4	1.1	1.8	1.6	1.6	1.5	6.2	>1	6.2	>1	>1	>1	>1	>1
CZ04-2	CPAU	2.1	1.9	1.2	1.1	1.7	1.6	1.5	1.5	>1	>1	>1	>1	>1	>1	>1	>1
CZ05	PG&E	2.9	1.9	1.7	1.1	2.4	1.6	2.0	1.5	3.9	>1	3.9	>1	>1	>1	>1	>1
CZ05-2	SCG	2.9	1.9	1.7	1.1	2.4	1.6	2.0	1.5	>1	>1	>1	>1	>1	>1	>1	>1
CZ06	SCE	1.8	1.9	1.1	1.1	1.1	1.6	0.9	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ06-2	LA	1.1	1.9	0.7	1.1	0.7	1.6	0.6	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ07	SDG&E	2.6	2.0	1.5	1.1	1.4	1.6	1.3	1.5	>1	>1	>1	>1	>1	>1	>1	>1
CZ08	SCE	1.9	2.0	1.1	1.2	1.2	1.7	1.0	1.5	>1	>1	>1	>1	>1	>1	>1	>1
CZ08-2	LA	1.2	2.0	0.7	1.2	0.7	1.7	0.6	1.5	>1	>1	>1	>1	>1	>1	>1	>1
CZ09	SCE	1.9	1.9	1.1	1.1	1.2	1.6	0.997	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ09-2	LA	1.1	1.9	0.7	1.1	0.7	1.6	0.6	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ10	SDG&E	2.9	1.9	1.7	1.1	1.5	1.6	1.4	1.4	8.2	>1	8.2	>1	>1	>1	>1	>1
CZ10-2	SCE	1.7	1.9	0.99	1.1	1.2	1.6	0.99	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ11	PG&E	2.6	1.9	1.5	1.1	1.8	1.6	1.5	1.4	7.6	>1	7.6	>1	>1	>1	>1	>1
CZ12	PG&E	2.7	1.9	1.6	1.1	2.3	1.6	1.9	1.4	4.0	>1	4.0	>1	>1	>1	>1	>1
CZ12-2	SMUD	1.4	1.9	0.8	1.1	1.1	1.6	0.95	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ13	PG&E	2.6	1.8	1.5	1.1	1.8	1.5	1.5	1.4	7.7	>1	7.7	>1	>1	>1	>1	>1
CZ14	SDG&E	3.0	2.2	1.7	1.3	1.7	1.8	1.5	1.6	4.2	>1	4.2	>1	>1	>1	>1	>1
CZ14-2	SCE	1.8	2.2	1.1	1.3	1.3	1.8	1.1	1.6	>1	>1	>1	>1	>1	>1	>1	>1
CZ15	SCE	1.7	2.0	1.002	1.2	1.2	1.7	1.003	1.4	>1	>1	>1	>1	>1	>1	>1	>1
CZ16	PG&E	2.7	2.0	1.6	1.2	1.9	1.6	1.7	1.5	2.1	5.7	2.1	5.6	5.8	>1	5.8	>1
CZ16-2	LA	1.02	2.0	0.6	1.2	0.6	1.6	0.6	1.5	>1	5.7	>1	5.6	>1	>1	>1	>1

5 Summary, Conclusions, and Further Considerations

The Reach Codes Team developed packages of energy efficiency measures as well as packages combining energy efficiency with PV generation and battery storage systems, simulated them in building modeling software, and gathered costs to determine the cost effectiveness of multiple scenarios. The Reach Codes team coordinated assumptions with multiple utilities, cities, and building community experts to develop a set of assumptions considered reasonable in the current market. Changing assumptions, such as the period of analysis, measure selection, cost assumptions, energy escalation rates, or utility tariffs are likely to change results.

5.1 Summary

Figure 41 through Figure 43 summarize results for each prototype and depict the compliance margins achieved for each climate zone and package. Because local reach codes must both exceed the Energy Commission performance budget (i.e., have a positive compliance margin) and be cost-effective, the Reach Code Team highlighted cells meeting these two requirements to help clarify the upper boundary for potential reach code policies:

- Cells highlighted in green depict a positive compliance margin and cost-effective results using both On-Bill and TDV approaches.
- Cells highlighted in yellow depict a positive compliance and cost-effective results using either the On-Bill or TDV approach.
- Cells not highlighted either depict a negative compliance margin or a package that was not cost effective using either the On-Bill or TDV approach.

For more detail on the results in the Figures, please refer to *Section 4 Results*. As described in Section 4.4, PV-only and PV+Battery packages in the mixed-fuel building were found to be cost effective across all prototypes, climate zones, and packages using the TDV approach, and results are not reiterated in the following figures.

Figure 41. Medium Office Summary of Compliance Margin and Cost Effectiveness

CZ	Utility	Mixed Fuel			All Electric			
		EE	EE + PV + B	HE	Fed Code	EE	EE + PV + B	HE
CZ01	PG&E	18%	18%	3%	-15%	7%	7%	-14%
CZ02	PG&E	17%	17%	4%	-7%	10%	10%	-5%
CZ03	PG&E	20%	20%	3%	-7%	16%	16%	-6%
CZ04	PG&E	14%	14%	5%	-6%	9%	9%	-3%
CZ04-2	CPAU	14%	14%	5%	-6%	9%	9%	-3%
CZ05	PG&E	18%	18%	4%	-8%	12%	12%	-6%
CZ05-2	SCG	18%	18%	4%	NA	NA	NA	NA
CZ06	SCE	20%	20%	3%	-4%	18%	18%	-2%
CZ06-2	LADWP	20%	20%	3%	-4%	18%	18%	-2%
CZ07	SDG&E	20%	20%	4%	-2%	20%	20%	1%
CZ08	SCE	18%	18%	4%	-2%	18%	18%	1%
CZ08-2	LADWP	18%	18%	4%	-2%	18%	18%	1%
CZ09	SCE	16%	16%	4%	-2%	15%	15%	2%
CZ09-2	LADWP	16%	16%	4%	-2%	15%	15%	2%
CZ10	SDG&E	17%	17%	4%	-4%	13%	13%	-1%
CZ10-2	SCE	17%	17%	4%	-4%	13%	13%	-1%
CZ11	PG&E	13%	13%	5%	-4%	10%	10%	0%
CZ12	PG&E	14%	14%	5%	-5%	10%	10%	-1%
CZ12-2	SMUD	14%	14%	5%	-5%	10%	10%	-1%
CZ13	PG&E	13%	13%	5%	-4%	9%	9%	0%
CZ14	SDG&E	14%	14%	5%	-5%	9%	9%	-1%
CZ14-2	SCE	14%	14%	5%	-5%	9%	9%	-1%
CZ15	SCE	12%	12%	5%	-2%	10%	10%	3%
CZ16	PG&E	14%	14%	5%	-27%	-15%	-15%	-26%
CZ16-2	LADWP	14%	14%	5%	-27%	-15%	-15%	-26%

Figure 42. Medium Retail Summary of Compliance Margin and Cost Effectiveness

CZ	Utility	Mixed Fuel			All Electric			
		EE	EE + PV + B	HE	Fed Code	EE	EE + PV + B	HE
CZ01	PG&E	18%	18%	2%	-4.1%	15%	15%	-2%
CZ02	PG&E	13%	13%	3%	-1.0%	13%	13%	3%
CZ03	PG&E	16%	16%	2%	-0.4%	16%	16%	2%
CZ04	PG&E	14%	14%	3%	-0.1%	14%	14%	3%
CZ04-2	CPAU	14%	14%	3%	-0.1%	14%	14%	3%
CZ05	PG&E	16%	16%	1%	-1.2%	15%	15%	1%
CZ05-2	SCG	16%	16%	1%	NA	NA	NA	NA
CZ06	SCE	10%	10%	3%	0.5%	11%	11%	3%
CZ06-2	LADWP	10%	10%	3%	0.5%	11%	11%	3%
CZ07	SDG&E	13%	13%	2%	0.3%	13%	13%	3%
CZ08	SCE	10%	10%	3%	0.4%	10%	10%	4%
CZ08-2	LADWP	10%	10%	3%	0.4%	10%	10%	4%
CZ09	SCE	10%	10%	4%	0.4%	10%	10%	4%
CZ09-2	LADWP	10%	10%	4%	0.4%	10%	10%	4%
CZ10	SDG&E	12%	12%	4%	0.1%	12%	12%	4%
CZ10-2	SCE	12%	12%	4%	0.1%	12%	12%	4%
CZ11	PG&E	13%	13%	4%	0.5%	12%	12%	5%
CZ12	PG&E	13%	13%	4%	-0.1%	12%	12%	4%
CZ12-2	SMUD	13%	13%	4%	-0.1%	12%	12%	4%
CZ13	PG&E	15%	15%	4%	-0.4%	14%	14%	4%
CZ14	SDG&E	13%	13%	4%	0.7%	15%	15%	5%
CZ14-2	SCE	13%	13%	4%	0.7%	15%	15%	5%
CZ15	SCE	12%	12%	5%	0.9%	12%	12%	6%
CZ16	PG&E	13%	13%	3%	-12.2%	3%	3%	-8%
CZ16-2	LADWP	13%	13%	3%	-12.2%	3%	3%	-8%



Figure 43. Small Hotel Summary of Compliance Margin and Cost Effectiveness

CZ	Utility	Mixed Fuel			All Electric			
		EE	EE + PV + B	HE	Fed Code	EE	EE + PV + B	HE
CZ01	PG&E	9%	9%	2%	-28%	1%	1%	-24%
CZ02	PG&E	7%	7%	3%	-12%	4%	4%	-11%
CZ03	PG&E	10%	10%	2%	-14%	6%	6%	-14%
CZ04	PG&E	6%	6%	2%	-13%	0.2%	0.2%	-13%
CZ04-2	CPAU	6%	6%	2%	-13%	0.2%	0.2%	-13%
CZ05	PG&E	9%	9%	2%	-15%	5%	5%	-15%
CZ05-2	SCG	9%	9%	2%	NA	NA	NA	NA
CZ06	SCE	8%	8%	2%	-5%	7%	7%	-15%
CZ06-2	LADWP	8%	8%	2%	-5%	7%	7%	-15%
CZ07	SDG&E	8%	8%	2%	-7%	7%	7%	-7%
CZ08	SCE	7%	7%	2%	-6%	3%	3%	-6%
CZ08-2	LADWP	7%	7%	2%	-6%	3%	3%	-6%
CZ09	SCE	6%	6%	3%	-6%	2%	2%	-4%
CZ09-2	LADWP	6%	6%	3%	-6%	2%	2%	-4%
CZ10	SDG&E	5%	5%	4%	-8%	2%	2%	-5%
CZ10-2	SCE	5%	5%	4%	-8%	2%	2%	-5%
CZ11	PG&E	4%	4%	4%	-10%	1%	1%	-7%
CZ12	PG&E	5%	5%	4%	-10%	2%	2%	-9%
CZ12-2	SMUD	5%	5%	4%	-10%	2%	2%	-9%
CZ13	PG&E	4%	4%	3%	-10%	0.3%	0.3%	-7%
CZ14	SDG&E	4%	4%	4%	-11%	0.1%	0.1%	-7%
CZ14-2	SCE	4%	4%	4%	-11%	0.1%	0.1%	-7%
CZ15	SCE	3%	3%	5%	-4%	2%	2%	0.04%
CZ16	PG&E	6%	6%	3%	-50%	-14%	-14%	-39%
CZ16-2	LADWP	6%	6%	3%	-50%	-14%	-14%	-39%

5.2 Conclusions and Further Considerations

Findings are specific to the scenarios analyzed under this specific methodology, and largely pertain to office, retail, and hotel-type occupancies. Nonresidential buildings constitute a wide variety of occupancy profiles and process loads, making findings challenging to generalize across multiple building types.

Findings indicate the following overall conclusions:

1. This study assumed that electrifying space heating and service water heating could eliminate natural gas infrastructure alone, because these were the only gas end-uses included the prototypes. Avoiding the installation of natural gas infrastructure results in significant cost savings and is a primary factor toward cost-effective outcomes in all-electric designs, even with necessary increases in electrical capacity.
2. There is ample opportunity for cost effective energy efficiency improvements, as demonstrated by the compliance margins achieved in many of the efficiency-only and efficiency + PV packages. Though much of the energy savings are attributable to lighting measures, efficiency measures selected for these prototypes are confined to the building systems that can be modeled. There is

likely further opportunity for energy savings through measures that cannot be currently demonstrated in compliance software, such as high-performance control sequences or variable speed parallel fan powered boxes.

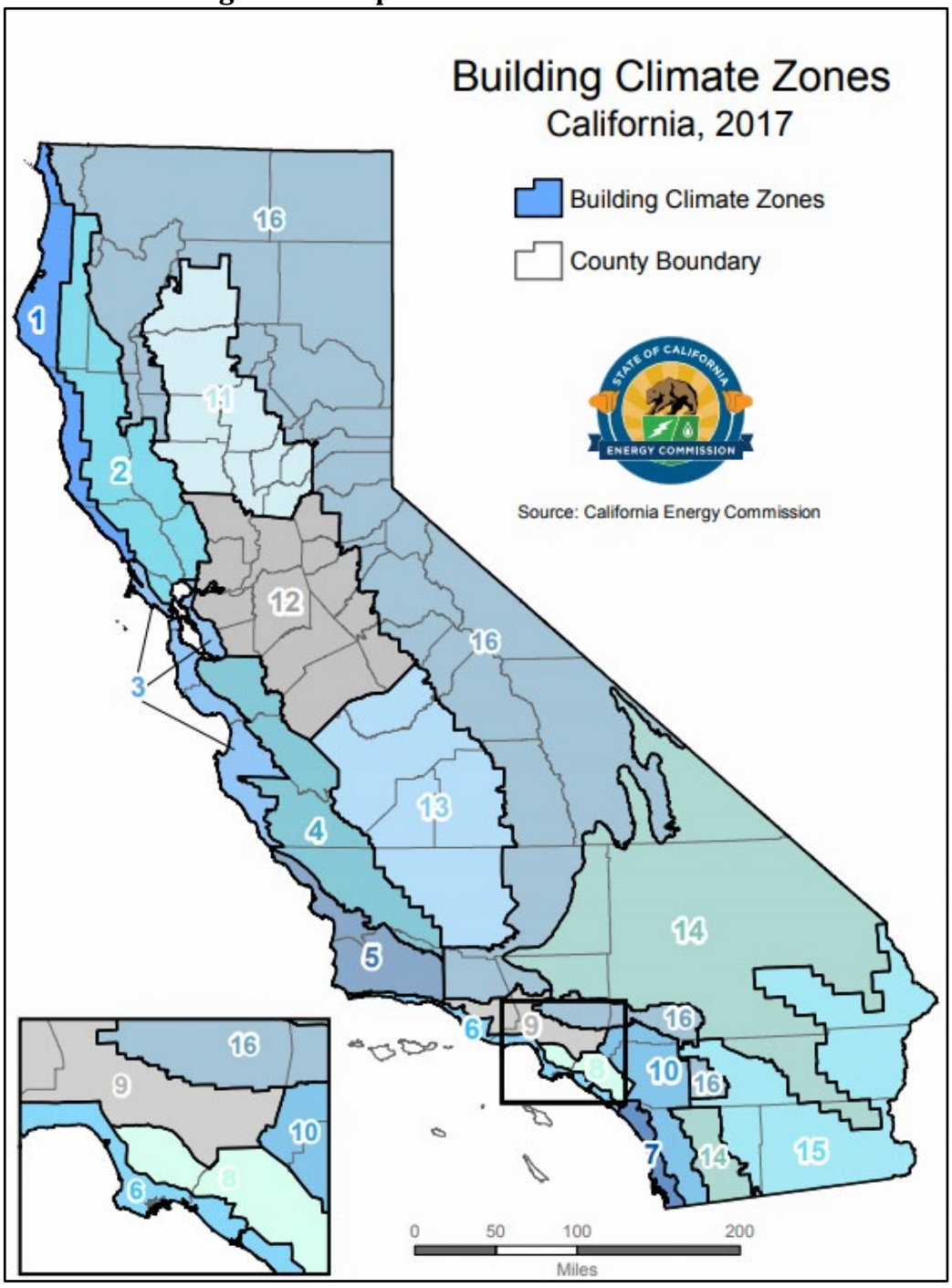
3. High efficiency appliances triggering federal preemption do not achieve as high compliance margins as the other efficiency measures analyzed in this study. Cost effectiveness appears to be dependent on the system type and building type. Nonetheless, specifying high efficiency equipment will always be a key feature in integrated design.
4. Regarding the Small Hotel prototype:
    a. The Small Hotel presents a challenging prototype to cost-effectively exceed the state's energy performance budget without efficiency measures. The Reach Code Team is uncertain of the precision of the results due to the inability to directly model either drain water heat recovery or a central heat pump water heater with a recirculation loop.
    b. Hotel results may be applicable to high-rise (4 or more stories) multifamily buildings. Both hotel and multifamily buildings have the same or similar mandatory and prescriptive compliance options for hot water systems, lighting, and envelope. Furthermore, the Alternate Calculation Method Reference Manual specifies the same baseline HVAC system for both building types.
    c. Hotel compliance margins were the lowest among the three building types analyzed, and thus the most conservative performance thresholds applicable to other nonresidential buildings not analyzed in this study. As stated previously, the varying occupancy and energy profiles of nonresidential buildings makes challenging to directly apply these results across all buildings.
5. Many all-electric and solar PV packages demonstrated greater GHG reductions than their mixed-fuel counterparts, contrary to TDV-based performance, suggesting a misalignment among the TDV metric and California's long-term GHG-reduction goals. The Energy Commission has indicated that they are aware of this issue and are seeking to address it.
6. Changes to the Nonresidential Alternative Calculation Method (ACM) Reference Manual can drastically impact results. Two examples include:
    a. When performance modeling residential buildings, the Standard Design is electric if the Proposed Design is electric, which removes TDV-related penalties and associated negative compliance margins. This essentially allows for a compliance pathway for all-electric residential buildings. If nonresidential buildings were treated in the same way, all-electric cost effectiveness using the TDV approach would improve.
    b. The baseline mixed-fuel system for a hotel includes a furnace in each guest room, which carries substantial plumbing costs and labor costs for assembly. A change in the baseline system would lead to different base case costs and different cost effectiveness outcomes.
7. All-electric federal code-minimum packages appear to be cost effective, largely due to avoided natural gas infrastructure, but in most cases do not comply with the Energy Commission's minimum performance budget (as described in item 7a above). For most cases it appears that adding cost-effective efficiency measures achieves compliance. All-electric nonresidential projects can leverage the initial cost savings of avoiding natural gas infrastructure by adding energy efficiency measures that would not be cost effective independently.

6 Appendices

6.1 Map of California Climate Zones

Climate zone geographical boundaries are depicted in Figure 44. The map in Figure 44 along with a zip-code search directory is available at:
https://ww2.energy.ca.gov/maps/renewable/building_climate_zones.html

Figure 44. Map of California Climate Zones



6.2 Lighting Efficiency Measures

Figure 45 details the applicability and impact of each lighting efficiency measure by prototype and space function and includes the resulting LPD that is modeled as the proposed by building type and by space function.

Figure 45. Impact of Lighting Measures on Proposed LPDs by Space Function

	Baseline	Impact				Modeled Proposed
Space Function	LPD (W/ft2)	Interior Lighting Reduced LPD	Institutional Tuning	Daylight Dimming Plus OFF	Occupant Sensing in Open Office Plan	LPD (W/ft^2)
Medium Office						
Office Area (Open plan office) - Interior	0.65	15%	10%	-	17%	0.429
Office Area (Open plan office) - Perimeter	0.65	15%	5%	10%	30%	0.368
Medium Retail						
Commercial/Industrial Storage (Warehouse)	0.45	10%	5%	-	-	0.386
Main Entry Lobby	0.85	10%	5%	-	-	0.729
Retail Sales Area (Retail Merchandise Sales)	0.95	5%	5%	-	-	0.857
Small Hotel						
Commercial/Industrial Storage (Warehouse)	0.45	10%	5%	-	-	0.386
Convention, Conference, Multipurpose, and Meeting	0.85	10%	5%	-	-	0.729
Corridor Area	0.60	10%	5%	-	-	0.514
Exercise/Fitness Center and Gymnasium Areas	0.50	10%	-	-	-	0.450
Laundry Area	0.45	10%	-	-	-	0.405
Lounge, Breakroom, or Waiting Area	0.65	10%	5%	-	-	0.557
Mechanical	0.40	10%	-	-	-	0.360
Office Area (>250 ft^2)	0.65	10%	5%	-	-	0.557

6.3 Drain Water Heat Recovery Measure Analysis

To support potential DWHR savings in the Small Hotel prototype, the Reach Code Team modeled the drain water heat recovery measure in CBECC-Res 2019 in the all-electric and mixed fuel 6,960 ft2 prototype residential buildings. The Reach Code Team assumed one heat recovery device for every three showers assuming unequal flow to the shower. Based on specifications from three different drain water heat recovery device manufacturers for device effectiveness in hotel applications, the team assumed a heat recovery efficiency of 50 percent.

The Reach Code Team modeled mixed fuel and all-electric residential prototype buildings both with and without heat recovery in each climate zone. Based on these model results, the Reach Code Team determined the percentage savings of domestic water heating energy in terms of gas, electricity, and TDV for mixed fuel and all-electric, in each climate zone. The Reach Code Team then applied the savings

percentages to the Small Hotel prototype domestic water heating energy in both the mixed-fuel and all-electric to determine energy savings for the drain water heat recovery measure in the Small Hotel. The Reach Code Team applied volumetric energy rates to estimate on-bill cost impacts from this measure.

6.4 Utility Rate Schedules

The Reach Codes Team used the IOU and POU rates depicted in Figure 46 to determine the On-Bill savings for each prototype.

Figure 46. Utility Tariffs Analyzed Based on Climate Zone – Detailed View

Climate Zones	Electric / Gas Utility	Electricity (Time-of-use)			Natural Gas
		Medium Office	Medium Retail	Small Hotel	All Prototypes
CZ01	PG&E	A-10	A-1	A-1 or A-10	G-NR1
CZ02	PG&E	A-10	A-10	A-1 or A-10	G-NR1
CZ03	PG&E	A-10	A-1 or A-10	A-1 or A-10	G-NR1
CZ04	PG&E	A-10	A-10	A-1 or A-10	G-NR1
CZ04-2	CPAU/PG&E	E-2	E-2	E-2	G-NR1
CZ05	PG&E	A-10	A-1	A-1 or A-10	G-NR1
CZ05-2	PG&E/SCG	A-10	A-1	A-1 or A-10	G-10 (GN-10)
CZ06	SCE/SCG	TOU-GS-2	TOU-GS-2	TOU-GS-2 or TOU-GS-3	G-10 (GN-10)
CZ06	LADWP/SCG	TOU-GS-2	TOU-GS-2	TOU-GS-2 or TOU-GS-3	G-10 (GN-10)
CZ07	SDG&E	AL-TOU+EECC (AL-TOU)	AL-TOU+EECC (AL-TOU)	AL-TOU+EECC (AL-TOU)	GN-3
CZ08	SCE/SCG	TOU-GS-2	TOU-GS-2	TOU-GS-2 or TOU-GS-3	G-10 (GN-10)
CZ08-2	LADWP/SCG	A-2 (B)	A-2 (B)	A-2 (B)	G-10 (GN-10)
CZ09	SCE/SCG	TOU-GS-2	TOU-GS-2	TOU-GS-2 or TOU-GS-3	G-10 (GN-10)
CZ09-2	LADWP/SCG	A-2 (B)	A-2 (B)	A-2 (B)	G-10 (GN-10)
CZ10	SCE/SCG	TOU-GS-2	TOU-GS-2	TOU-GS-2	G-10 (GN-10)
CZ10-2	SDG&E	AL-TOU+EECC (AL-TOU)	AL-TOU+EECC (AL-TOU)	AL-TOU+EECC (AL-TOU)	GN-3
CZ11	PG&E	A-10	A-10	A-10	G-NR1
CZ12	PG&E	A-10	A-10	A-1 or A-10	G-NR1
CZ12-2	SMUD/PG&E	GS	GS	GS	G-NR1
CZ13	PG&E	A-10	A-10	A-10	G-NR1
CZ14	SCE/SCG	TOU-GS-3	TOU-GS-3	TOU-GS-3	G-10 (GN-10)
CZ14-2	SDG&E	AL-TOU+EECC (AL-TOU)	AL-TOU+EECC (AL-TOU)	AL-TOU+EECC (AL-TOU)	GN-3
CZ15	SCE/SCG	TOU-GS-3	TOU-GS-2	TOU-GS-2	G-10 (GN-10)
CZ16	PG&E	A-10	A-10	A-1 or A-10	G-NR1
CZ16-2	LADWP/SCG	A-2 (B)	A-2 (B)	A-2 (B)	G-10 (GN-10)

6.5 Mixed Fuel Baseline Energy Figures

Figures 47 to 49 show the annual electricity and natural gas consumption and cost, compliance TDV, and GHG emissions for each prototype under the mixed fuel design baseline.

Figure 47. Medium Office – Mixed Fuel Baseline

Climate Zone	Utility	Electricity Consumption (kWh)	Natural Gas Consumption (Therms)	Electricity Cost	Natural Gas Cost	Compliance TDV	GHG Emissions (lbs)
Medium Office Mixed Fuel Baseline							
CZ01	PG&E	358,455	4,967	$109,507	$6,506	84	266,893
CZ02	PG&E	404,865	3,868	$130,575	$5,256	122	282,762
CZ03	PG&E	370,147	3,142	$116,478	$4,349	88	251,759
CZ04	PG&E	431,722	3,759	$140,916	$5,144	141	299,993
CZ04-2	CPAU	431,722	3,759	$75,363	$5,144	141	299,993
CZ05	PG&E	400,750	3,240	$131,277	$4,481	106	269,768
CZ05-2	SCG	400,750	3,240	$131,277	$3,683	106	269,768
CZ06	SCE	397,441	2,117	$74,516	$2,718	105	253,571
CZ06-2	LA	397,441	2,117	$44,311	$2,718	105	253,571
CZ07	SDG&E	422,130	950	$164,991	$4,429	118	257,324
CZ08	SCE	431,207	1,219	$79,181	$1,820	132	265,179
CZ08-2	LA	431,207	1,219	$46,750	$1,820	132	265,179
CZ09	SCE	456,487	1,605	$86,190	$2,196	155	287,269
CZ09-2	LA	456,487	1,605	$51,111	$2,196	155	287,269
CZ10	SDG&E	431,337	2,053	$173,713	$5,390	130	272,289
CZ10-2	SCE	431,337	2,053	$80,636	$2,603	130	272,289
CZ11	PG&E	464,676	3,062	$150,520	$4,333	163	310,307
CZ12	PG&E	441,720	3,327	$142,902	$4,647	152	299,824
CZ12-2	SMUD	441,720	3,327	$65,707	$4,647	152	299,824
CZ13	PG&E	471,540	3,063	$150,919	$4,345	161	316,228
CZ14	SDG&E	467,320	3,266	$185,812	$6,448	165	314,258
CZ14-2	SCE	467,320	3,266	$92,071	$3,579	165	314,258
CZ15	SCE	559,655	1,537	$105,388	$2,058	211	347,545
CZ16	PG&E	405,269	6,185	$127,201	$8,056	116	312,684
CZ16-2	LA	405,269	6,185	$43,115	$8,056	116	312,684

Figure 48. Medium Retail – Mixed Fuel Baseline

Climate Zone	Utility	Electricity Consumption (kWh)	Natural Gas Consumption (Therms)	Electricity Cost	Natural Gas Cost	Compliance TDV	GHG Emissions (lbs)
Medium Retail Mixed Fuel Baseline							
CZ01	PG&E	184,234	3,893	$43,188	$5,247	155	156,972
CZ02	PG&E	214,022	2,448	$70,420	$3,572	202	157,236
CZ03	PG&E	199,827	1,868	$47,032	$2,871	165	140,558
CZ04	PG&E	208,704	1,706	$66,980	$2,681	187	143,966
CZ04-2	CPAU	208,704	1,706	$36,037	$2,681	187	143,966
CZ05	PG&E	195,864	1,746	$45,983	$2,697	155	135,849
CZ05-2	SCG	195,864	1,746	$45,983	$2,342	155	135,849
CZ06	SCE	211,123	1,002	$36,585	$1,591	183	135,557
CZ06-2	LA	211,123	1,002	$21,341	$1,591	183	135,557
CZ07	SDG&E	211,808	522	$75,486	$4,055	178	130,436
CZ08	SCE	212,141	793	$36,758	$1,373	190	133,999
CZ08-2	LA	212,141	793	$21,436	$1,373	190	133,999
CZ09	SCE	227,340	970	$40,083	$1,560	218	146,680
CZ09-2	LA	227,340	970	$23,487	$1,560	218	146,680
CZ10	SDG&E	235,465	1,262	$87,730	$4,700	228	154,572
CZ10-2	SCE	235,465	1,262	$41,000	$1,853	228	154,572
CZ11	PG&E	234,560	2,415	$76,670	$3,547	244	170,232
CZ12	PG&E	228,958	2,309	$75,084	$3,426	234	165,133
CZ12-2	SMUD	228,958	2,309	$32,300	$3,426	234	165,133
CZ13	PG&E	242,927	1,983	$81,995	$3,034	258	170,345
CZ14	SDG&E	264,589	1,672	$97,581	$5,059	277	178,507
CZ14-2	SCE	264,589	1,672	$46,217	$2,172	277	178,507
CZ15	SCE	290,060	518	$50,299	$1,083	300	179,423
CZ16	PG&E	212,204	4,304	$67,684	$5,815	197	180,630
CZ16-2	LA	212,204	4,304	$20,783	$5,815	197	180,630

Figure 49. Small Hotel – Mixed Fuel Baseline

Climate Zone	Utility	Electricity Consumption (kWh)	Natural Gas Consumption (Therms)	Electricity Cost	Natural Gas Cost	Compliance TDV	GHG Emissions (lbs)
Small Hotel Mixed Fuel Baseline							
CZ01	PG&E	177,734	16,936	40,778	20,465	110	340,491
CZ02	PG&E	189,319	12,696	53,396	15,664	110	293,056
CZ03	PG&E	183,772	12,341	42,325	15,210	98	284,217
CZ04	PG&E	187,482	11,945	52,118	14,806	106	281,851
CZ04-2	CPAU	187,482	11,945	32,176	14,806	106	281,851
CZ05	PG&E	187,150	11,979	43,182	14,733	98	281,183
CZ05-2	SCG	187,150	11,979	43,182	10,869	98	281,183
CZ06	SCE	191,764	8,931	28,036	8,437	98	244,664
CZ06-2	LA	191,764	8,931	16,636	8,437	98	244,664
CZ07	SDG&E	189,174	8,207	58,203	10,752	90	233,884
CZ08	SCE	190,503	8,372	27,823	7,991	94	236,544
CZ08-2	LA	190,503	8,372	16,555	7,991	94	236,544
CZ09	SCE	198,204	8,421	30,262	8,030	103	242,296
CZ09-2	LA	198,204	8,421	17,951	8,030	103	242,296
CZ10	SDG&E	215,364	8,437	71,713	10,926	122	255,622
CZ10-2	SCE	215,364	8,437	33,736	8,043	122	255,622
CZ11	PG&E	219,852	10,271	63,724	12,882	131	282,232
CZ12	PG&E	199,499	10,422	46,245	13,022	115	270,262
CZ12-2	SMUD	199,499	10,422	26,872	13,022	115	270,262
CZ13	PG&E	226,925	10,048	65,559	12,629	132	284,007
CZ14	SDG&E	226,104	10,075	73,621	12,167	134	283,287
CZ14-2	SCE	226,104	10,075	35,187	9,350	134	283,287
CZ15	SCE	280,595	5,598	42,852	5,777	152	260,378
CZ16	PG&E	191,231	17,618	51,644	21,581	127	358,590
CZ16-2	LA	191,231	17,618	16,029	21,581	127	358,590

6.6 Hotel TDV Cost Effectiveness with Propane Baseline

The Reach Codes Team further analyzed TDV cost effectiveness of the all-electric packages with a mixed-fuel design baseline using propane instead of natural gas. Results for each package are shown in Figure 50. through Figure 53. below.

All electric models compared to a propane baseline have positive compliance margins in all climate zones when compared to results using a natural gas baseline. Compliance margin improvement is roughly 30 percent, which also leads to improved cost effectiveness for the all-electric packages. These outcomes are likely due to the TDV penalty associated with propane when compared to natural gas.

Across packages, TDV cost effectiveness with a propane baseline follows similar trends as the natural gas baseline. Adding efficiency measures increased compliance margins by 3 to 10 percent depending on climate zone, while adding high efficiency HVAC and SHW equipment alone increased compliance margins by smaller margins of about 2 to 4 percent compared to the All-Electric package.

Figure 50. TDV Cost Effectiveness for Small Hotel, Propane Baseline – Package 2 All-Electric Federal Code Minimum

Climate Zone	Compliance Margin (%)	Incremental Package Cost	$-TDV Savings	B/C Ratio (TDV)	NPV (TDV)
CZ01	-4%	($1,271,869)	($28,346)	44.9	$1,243,523
CZ02	27%	($1,272,841)	$170,263	>1	$1,443,104
CZ03	-3%	($1,275,114)	($16,425)	77.6	$1,258,689
CZ04	26%	($1,274,949)	$155,466	>1	$1,430,414
CZ05	27%	($1,275,002)	$154,709	>1	$1,429,710
CZ06	17%	($1,275,143)	$126,212	>1	$1,401,355
CZ07	25%	($1,273,490)	$117,621	>1	$1,391,111
CZ08	24%	($1,271,461)	$122,087	>1	$1,393,548
CZ09	23%	($1,273,259)	$123,525	>1	$1,396,784
CZ10	18%	($1,270,261)	$109,522	>1	$1,379,783
CZ11	19%	($1,271,070)	$129,428	>1	$1,400,498
CZ12	-4%	($1,272,510)	($26,302)	48.4	$1,246,208
CZ13	18%	($1,270,882)	$124,357	>1	$1,395,239
CZ14	17%	($1,271,241)	$117,621	>1	$1,388,861
CZ15	-7%	($1,269,361)	($45,338)	28.0	$1,224,023
CZ16	9%	($1,275,637)	$68,272	>1	$1,343,908

Figure 51. TDV Cost Effectiveness for Small Hotel, Propane Baseline – Package 3A (All-Electric + EE)

Climate Zone	Compliance Margin (%)	Incremental Package Cost	$-TDV Savings	B/C Ratio (TDV)	NPV (TDV)
CZ01	35%	($1,250,898)	$252,831	>1	$1,503,729
CZ02	34%	($1,251,870)	$217,238	>1	$1,469,108
CZ03	37%	($1,254,142)	$218,642	>1	$1,472,784
CZ04	31%	($1,250,769)	$191,393	>1	$1,442,162
CZ05	36%	($1,254,031)	$208,773	>1	$1,462,804
CZ06	25%	($1,250,964)	$159,714	>1	$1,410,677
CZ07	32%	($1,249,311)	$154,111	>1	$1,403,422
CZ08	29%	($1,247,282)	$146,536	>1	$1,393,818
CZ09	27%	($1,249,080)	$146,671	>1	$1,395,751
CZ10	22%	($1,246,081)	$134,477	>1	$1,380,559
CZ11	23%	($1,246,891)	$157,138	>1	$1,404,029
CZ12	27%	($1,248,330)	$167,945	>1	$1,416,276
CZ13	22%	($1,246,703)	$149,270	>1	$1,395,973
CZ14	21%	($1,247,061)	$145,269	>1	$1,392,331
CZ15	14%	($1,245,182)	$93,647	>1	$1,338,829
CZ16	20%	($1,254,665)	$154,035	>1	$1,408,701

Figure 52. TDV Cost Effectiveness for Small Hotel, Propane Baseline – Package 3B (All-Electric + EE + PV)

Climate Zone	Compliance Margin (%)	Incremental Package Cost	$-TDV Savings	B/C Ratio (TDV)	NPV (TDV)
CZ01	35%	($1,043,528)	$511,688	>1	$1,555,215
CZ02	34%	($1,044,500)	$524,460	>1	$1,568,960
CZ03	37%	($1,046,772)	$518,485	>1	$1,565,257
CZ04	31%	($1,043,399)	$505,579	>1	$1,548,978
CZ05	36%	($1,046,660)	$526,668	>1	$1,573,328
CZ06	25%	($1,043,594)	$469,623	>1	$1,513,216
CZ07	32%	($1,041,941)	$471,513	>1	$1,513,454
CZ08	29%	($1,039,912)	$475,973	>1	$1,515,885
CZ09	27%	($1,041,710)	$467,971	>1	$1,509,681
CZ10	22%	($1,038,711)	$454,832	>1	$1,493,543
CZ11	23%	($1,039,521)	$474,844	>1	$1,514,364
CZ12	27%	($1,040,960)	$484,667	>1	$1,525,627
CZ13	22%	($1,039,333)	$454,108	>1	$1,493,441
CZ14	21%	($1,039,691)	$505,398	>1	$1,545,090
CZ15	14%	($1,037,811)	$423,879	>1	$1,461,691
CZ16	20%	($1,047,295)	$480,407	>1	$1,527,702

Figure 53. TDV Cost Effectiveness for Small Hotel, Propane Baseline – Package 3C (All Electric + HE)

Climate Zone	Compliance Margin (%)	Incremental Package Cost	$-TDV Savings	B/C Ratio (TDV)	NPV (TDV)
CZ01	27%	($1,256,423)	$194,975	>1	$1,451,398
CZ02	28%	($1,258,328)	$177,378	>1	$1,435,706
CZ03	28%	($1,263,867)	$164,094	>1	$1,427,961
CZ04	26%	($1,262,963)	$155,314	>1	$1,418,277
CZ05	26%	($1,263,327)	$153,271	>1	$1,416,598
CZ06	17%	($1,263,779)	$122,011	>1	$1,385,790
CZ07	24%	($1,260,844)	$116,751	>1	$1,377,594
CZ08	25%	($1,256,326)	$122,995	>1	$1,379,321
CZ09	24%	($1,260,223)	$128,482	>1	$1,388,706
CZ10	20%	($1,253,181)	$121,595	>1	$1,374,776
CZ11	21%	($1,254,613)	$143,658	>1	$1,398,271
CZ12	23%	($1,257,919)	$142,901	>1	$1,400,820
CZ13	21%	($1,254,386)	$138,625	>1	$1,393,011
CZ14	20%	($1,254,978)	$136,430	>1	$1,391,407
CZ15	14%	($1,251,932)	$96,087	>1	$1,348,019
CZ16	15%	($1,263,534)	$122,011	>1	$1,385,545

6.7 PV-only and PV+Battery-only Cost Effectiveness Results Details

The Reach Code Tea evaluated cost effectiveness of installing a PV system and battery storage in six different measure combinations over a 2019 code-compliant baseline for all climate zones. The baseline for all nonresidential buildings is a mixed-fuel design.

All mixed fuel models are compliant with 2019 Title24, whereas all electric models can show negative compliance. The compliance margin is the same as that of their respective federal minimum design and is not affected by addition of solar PV or battery. These scenarios evaluate the cost effectiveness of PV and/or battery measure individually. The climate zones where all-electric design is not compliant will have the flexibility to ramp up the efficiency of appliance or add another measure to be code compliant, as per package 1B and 3B in main body of the report. The large negative lifecycle costs in all electric packages are due to lower all-electric HVAC system costs and avoided natural gas infrastructure costs. This is commonly applied across all climate zones and packages over any additional costs for PV and battery.

6.7.1 Cost Effectiveness Results – Medium Office

Figure 54 through Figure 61 contain the cost-effectiveness findings for the Medium Office packages. Notable findings for each package include:

- **Mixed-Fuel + 3 kW PV Only:** All packages are cost effective using the On-Bill and TDV approaches.
- **Mixed-Fuel + 3 kW PV + 5 kWh Battery:** The packages are mostly cost effective on a TDV basis except in CZ1. As compared to the 3 kW PV only package, battery reduces cost effectiveness. This package is not cost effective for LADWP and SMUD territories using an On-Bill approach.
- **Mixed-Fuel + PV only:** The packages are less cost effective as compared to 3 kW PV packages in most climate zones. In areas served by LADWP, the B/C ratio is narrowly less than 1 and not cost effective.
- **Mixed-Fuel + PV + 50 kWh Battery:** The packages are cost effective in all climate zones except for in the areas served by LADWP. On-Bill and TDV B/C ratios are slightly lower compared to the PV only package.
- **All-Electric + 3 kW PV:** Packages are on-bill cost effective in ten of sixteen climate zones. Climate zones 1,2,4,12, and 16 were not found to be cost-effective from an on-bill perspective. These zones are within PG&E's service area. Packages are cost effective using TDV in all climate zones except CZ16.
- **All-Electric + 3 kW PV + 5 kWh Battery**: Packages are slightly more cost effective than the previous minimal PV only package. Packages are on-bill cost effective in most climate zones except for 1,2 and 16 from an on-bill perspective. These zones are within PG&E's service area. Packages are cost effective using TDV in all climate zones except CZ16.
- **All-Electric + PV only:** All packages are cost effective and achieve savings using the On-Bill and TDV approaches.

- **All-Electric + PV + 50 kWh Battery**: All packages are cost effective and achieve savings using the On-Bill and TDV approaches. On-Bill and TDV B/C ratios are slightly lower compared to the PV only package.

Figure 54. Cost Effectiveness for Medium Office - Mixed Fuel + 3kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle $- TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 3kW PV											
CZ01	PG&E	3,941	0	0.8	$5,566	$15,743	$8,448	2.8	1.5	$10,177	$2,882
CZ02	PG&E	4,785	0	0.9	$5,566	$20,372	$10,500	3.7	1.9	$14,806	$4,934
CZ03	PG&E	4,660	0	0.9	$5,566	$20,603	$9,975	3.7	1.8	$15,037	$4,409
CZ04	PG&E	5,056	0	1.0	$5,566	$20,235	$11,073	3.6	2.0	$14,669	$5,507
CZ04-2	CPAU	5,056	0	1.0	$5,566	$11,945	$11,073	2.1	2.0	$6,379	$5,507
CZ05	PG&E	5,027	0	1.0	$5,566	$23,159	$10,834	4.2	1.9	$17,593	$5,268
CZ06	SCE	4,853	0	0.9	$5,566	$10,968	$10,930	2.0	2.0	$5,402	$5,364
CZ06-2	LADWP	4,853	0	0.9	$5,566	$6,575	$10,930	1.2	2.0	$1,009	$5,364
CZ07	SDG&E	4,960	0	1.0	$5,566	$17,904	$11,025	3.2	2.0	$12,338	$5,459
CZ08	SCE	4,826	0	0.9	$5,566	$10,768	$11,359	1.9	2.0	$5,202	$5,793
CZ08-2	LADWP	4,826	0	0.9	$5,566	$6,503	$11,359	1.2	2.0	$937	$5,793
CZ09	SCE	4,889	0	1.0	$5,566	$10,622	$11,216	1.9	2.0	$5,056	$5,650
CZ09-2	LADWP	4,889	0	1.0	$5,566	$6,217	$11,216	1.1	2.0	$651	$5,650
CZ10	SDG&E	4,826	0	0.9	$5,566	$21,280	$10,787	3.8	1.9	$15,714	$5,221
CZ10-2	SCE	4,826	0	0.9	$5,566	$11,598	$10,787	2.1	1.9	$6,032	$5,221
CZ11	PG&E	4,701	0	0.9	$5,566	$19,869	$10,644	3.6	1.9	$14,303	$5,078
CZ12	PG&E	4,707	0	0.9	$5,566	$19,643	$10,644	3.5	1.9	$14,077	$5,078
CZ12-2	SMUD	4,707	0	0.9	$5,566	$8,005	$10,644	1.4	1.9	$2,439	$5,078
CZ13	PG&E	4,633	0	0.9	$5,566	$19,231	$10,262	3.5	1.8	$13,665	$4,696
CZ14	SDG&E	5,377	0	1.0	$5,566	$18,789	$12,600	3.4	2.3	$13,223	$7,034
CZ14-2	SCE	5,377	0	1.0	$5,566	$10,512	$12,600	1.9	2.3	$4,946	$7,034
CZ15	SCE	5,099	0	1.0	$5,566	$10,109	$11,550	1.8	2.1	$4,543	$5,984
CZ16	PG&E	5,096	0	1.0	$5,566	$21,836	$10,882	3.9	2.0	$16,270	$5,316
CZ16-2	LADWP	5,096	0	1.0	$5,566	$6,501	$10,882	1.2	2.0	$935	$5,316

Figure 55. Cost Effectiveness for Medium Office – Mixed Fuel + 3kW PV + 5 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 3kW PV + 5kWh Battery											
CZ01	PG&E	3,941	0	0.8	$9,520	$15,743	$8,448	1.7	0.9	$6,223	($1,072)
CZ02	PG&E	4,785	0	0.9	$9,520	$20,372	$10,500	2.1	1.1	$10,852	$980
CZ03	PG&E	4,660	0	0.9	$9,520	$20,603	$9,975	2.2	1.0	$11,083	$455
CZ04	PG&E	5,056	0	1.0	$9,520	$20,235	$11,073	2.1	1.2	$10,714	$1,553
CZ04-2	CPAU	5,056	0	1.0	$9,520	$11,945	$11,073	1.3	1.2	$2,425	$1,553
CZ05	PG&E	5,027	0	1.0	$9,520	$23,159	$10,834	2.4	1.1	$13,639	$1,314
CZ06	SCE	4,853	0	0.9	$9,520	$10,968	$10,930	1.2	1.1	$1,448	$1,410
CZ06-2	LADWP	4,853	0	0.9	$9,520	$6,575	$10,930	0.7	1.1	($2,945)	$1,410
CZ07	SDG&E	4,960	0	1.0	$9,520	$17,904	$11,025	1.9	1.2	$8,384	$1,505
CZ08	SCE	4,826	0	0.9	$9,520	$10,768	$11,359	1.1	1.2	$1,248	$1,839
CZ08-2	LADWP	4,826	0	0.9	$9,520	$6,503	$11,359	0.7	1.2	($3,017)	$1,839
CZ09	SCE	4,889	0	1.0	$9,520	$10,622	$11,216	1.1	1.2	$1,102	$1,696
CZ09-2	LADWP	4,889	0	1.0	$9,520	$6,217	$11,216	0.7	1.2	($3,303)	$1,696
CZ10	SDG&E	4,826	0	0.9	$9,520	$21,280	$10,787	2.2	1.1	$11,760	$1,267
CZ10-2	SCE	4,826	0	0.9	$9,520	$11,598	$10,787	1.2	1.1	$2,078	$1,267
CZ11	PG&E	4,701	0	0.9	$9,520	$19,869	$10,644	2.1	1.1	$10,349	$1,123
CZ12	PG&E	4,707	0	0.9	$9,520	$19,643	$10,644	2.1	1.1	$10,123	$1,123
CZ12-2	SMUD	4,707	0	0.9	$9,520	$8,005	$10,644	0.8	1.1	($1,515)	$1,123
CZ13	PG&E	4,633	0	0.9	$9,520	$19,231	$10,262	2.0	1.1	$9,711	$742
CZ14	SDG&E	5,377	0	1.0	$9,520	$18,789	$12,600	2.0	1.3	$9,269	$3,080
CZ14-2	SCE	5,377	0	1.0	$9,520	$10,512	$12,600	1.1	1.3	$992	$3,080
CZ15	SCE	5,099	0	1.0	$9,520	$10,109	$11,550	1.1	1.2	$589	$2,030
CZ16	PG&E	5,096	0	1.0	$9,520	$21,836	$10,882	2.3	1.1	$12,316	$1,362
CZ16-2	LADWP	5,096	0	1.0	$9,520	$6,501	$10,882	0.7	1.1	($3,019)	$1,362

Figure 56. Cost Effectiveness for Medium Office – Mixed Fuel + 135kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel +135kW PV											
CZ01	PG&E	177,340	0	34.3	$302,856	$526,352	$380,399	1.7	1.3	$223,497	$77,544
CZ02	PG&E	215,311	0	41.5	$302,856	$666,050	$471,705	2.2	1.6	$363,194	$168,849
CZ03	PG&E	209,717	0	40.7	$302,856	$645,010	$449,797	2.1	1.5	$342,154	$146,942
CZ04	PG&E	227,535	0	44.0	$302,856	$686,434	$497,431	2.3	1.6	$383,578	$194,575
CZ04-2	CPAU	227,535	0	44.0	$302,856	$537,521	$497,431	1.8	1.6	$234,665	$194,575
CZ05	PG&E	226,195	0	44.1	$302,856	$753,230	$486,596	2.5	1.6	$450,374	$183,741
CZ06	SCE	218,387	0	42.3	$302,856	$401,645	$492,515	1.3	1.6	$98,789	$189,659
CZ06-2	LADWP	218,387	0	42.3	$302,856	$233,909	$492,515	0.8	1.6	($68,947)	$189,659
CZ07	SDG&E	223,185	0	43.3	$302,856	$623,078	$496,667	2.1	1.6	$320,223	$193,811
CZ08	SCE	217,171	0	42.0	$302,856	$389,435	$510,270	1.3	1.7	$86,579	$207,414
CZ08-2	LADWP	217,171	0	42.0	$302,856	$222,066	$510,270	0.7	1.7	($80,790)	$207,414
CZ09	SCE	220,010	0	43.2	$302,856	$387,977	$505,783	1.3	1.7	$85,122	$202,928
CZ09-2	LADWP	220,010	0	43.2	$302,856	$226,516	$505,783	0.7	1.7	($76,340)	$202,928
CZ10	SDG&E	217,148	0	42.5	$302,856	$632,726	$485,451	2.1	1.6	$329,870	$182,595
CZ10-2	SCE	217,148	0	42.5	$302,856	$394,884	$485,451	1.3	1.6	$92,028	$182,595
CZ11	PG&E	211,556	0	40.9	$302,856	$671,691	$478,912	2.2	1.6	$368,835	$176,056
CZ12	PG&E	211,824	0	40.9	$302,856	$653,242	$478,101	2.2	1.6	$350,386	$175,245
CZ12-2	SMUD	211,824	0	40.9	$302,856	$345,255	$478,101	1.1	1.6	$42,399	$175,245
CZ13	PG&E	208,465	0	40.5	$302,856	$651,952	$462,732	2.2	1.5	$349,096	$159,876
CZ14	SDG&E	241,965	0	46.7	$302,856	$659,487	$566,351	2.2	1.9	$356,632	$263,496
CZ14-2	SCE	241,965	0	46.7	$302,856	$401,712	$566,351	1.3	1.9	$98,856	$263,496
CZ15	SCE	229,456	0	43.9	$302,856	$378,095	$520,102	1.2	1.7	$75,239	$217,246
CZ16	PG&E	229,317	0	44.8	$302,856	$707,095	$489,508	2.3	1.6	$404,239	$186,652
CZ16-2	LADWP	229,317	0	44.8	$302,856	$223,057	$489,508	0.7	1.6	($79,799)	$186,652

Figure 57. Cost Effectiveness for Medium Office – Mixed Fuel + 135kW PV + 50 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 135kW PV + 50 kWh Battery											
CZ01	PG&E	176,903	0	35.3	$330,756	$525,948	$381,450	1.6	1.2	$195,192	$50,694
CZ02	PG&E	214,861	0	42.6	$330,756	$665,864	$472,898	2.0	1.4	$335,108	$142,142
CZ03	PG&E	209,255	0	41.8	$330,756	$644,170	$451,611	1.9	1.4	$313,414	$120,855
CZ04	PG&E	227,076	0	45.0	$330,756	$685,605	$502,108	2.1	1.5	$354,849	$171,352
CZ04-2	CPAU	227,076	0	45.0	$330,756	$536,463	$502,108	1.6	1.5	$205,707	$171,352
CZ05	PG&E	225,752	0	45.1	$330,756	$753,558	$487,742	2.3	1.5	$422,803	$156,986
CZ06	SCE	217,939	0	43.4	$330,756	$401,356	$494,042	1.2	1.5	$70,601	$163,286
CZ06-2	LADWP	217,939	0	43.4	$330,756	$233,673	$494,042	0.7	1.5	($97,083)	$163,286
CZ07	SDG&E	222,746	0	44.4	$330,756	$628,383	$498,147	1.9	1.5	$297,627	$167,391
CZ08	SCE	216,724	0	43.1	$330,756	$389,184	$511,511	1.2	1.5	$58,428	$180,755
CZ08-2	LADWP	216,724	0	43.1	$330,756	$221,839	$511,511	0.7	1.5	($108,917)	$180,755
CZ09	SCE	219,563	0	44.2	$330,756	$387,728	$506,929	1.2	1.5	$56,972	$176,173
CZ09-2	LADWP	219,563	0	44.2	$330,756	$226,303	$506,929	0.7	1.5	($104,453)	$176,173
CZ10	SDG&E	216,700	0	43.5	$330,756	$638,040	$486,644	1.9	1.5	$307,284	$155,888
CZ10-2	SCE	216,700	0	43.5	$330,756	$394,633	$486,644	1.2	1.5	$63,877	$155,888
CZ11	PG&E	211,129	0	41.9	$330,756	$670,932	$481,298	2.0	1.5	$340,177	$150,543
CZ12	PG&E	211,386	0	41.9	$330,756	$652,465	$482,826	2.0	1.5	$321,709	$152,070
CZ12-2	SMUD	211,386	0	41.9	$330,756	$344,668	$482,826	1.0	1.5	$13,913	$152,070
CZ13	PG&E	208,045	0	41.5	$330,756	$651,191	$473,280	2.0	1.4	$320,435	$142,524
CZ14	SDG&E	241,502	0	47.7	$330,756	$672,601	$569,454	2.0	1.7	$341,846	$238,698
CZ14-2	SCE	241,502	0	47.7	$330,756	$401,450	$569,454	1.2	1.7	$70,694	$238,698
CZ15	SCE	229,062	0	44.8	$330,756	$377,827	$521,963	1.1	1.6	$47,071	$191,208
CZ16	PG&E	228,825	0	45.9	$330,756	$706,201	$496,190	2.1	1.5	$375,445	$165,434
CZ16-2	LADWP	228,825	0	45.9	$330,756	$222,802	$496,190	0.7	1.5	($107,953)	$165,434

Figure 58. Cost Effectiveness for Medium Office– All-Electric + 3kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 3kW PV											
CZ01	PG&E	-49,716	4967	10.9	($80,523)	($84,765)	($49,972)	0.9	1.6	($4,242)	$30,551
CZ02	PG&E	-44,899	3868	6.0	($66,965)	($83,115)	($30,928)	0.8	2.2	($16,150)	$36,037
CZ03	PG&E	-31,226	3142	6.5	($75,600)	($39,441)	($19,617)	1.9	3.9	$36,159	$55,983
CZ04	PG&E	-43,772	3759	5.7	($62,282)	($70,999)	($29,496)	0.9	2.1	($8,717)	$32,786
CZ04-2	CPAU	-43,772	3759	5.7	($62,282)	($8,050)	($29,496)	7.7	2.1	$54,232	$32,786
CZ05	PG&E	-35,504	3240	5.5	($77,773)	($42,559)	($29,162)	1.8	2.7	$35,214	$48,611
CZ06	SCE	-21,321	2117	4.0	($69,422)	$35,862	($9,641)	>1	7.2	$105,284	$59,781
CZ06-2	LADWP	-21,321	2117	4.0	($69,422)	$32,936	($9,641)	>1	7.2	$102,358	$59,781
CZ07	SDG&E	-7,943	950	1.9	($63,595)	$64,781	($382)	>1	166.6	$128,376	$63,214
CZ08	SCE	-10,854	1219	2.5	($62,043)	$28,651	($1,289)	>1	48.1	$90,694	$60,755
CZ08-2	LADWP	-10,854	1219	2.5	($62,043)	$25,122	($1,289)	>1	48.1	$87,165	$60,755
CZ09	SCE	-14,878	1605	3.3	($56,372)	$31,542	($3,246)	>1	17.4	$87,913	$53,126
CZ09-2	LADWP	-14,878	1605	3.3	($56,372)	$28,145	($3,246)	>1	17.4	$84,517	$53,126
CZ10	SDG&E	-22,588	2053	3.1	($41,171)	$59,752	($12,553)	>1	3.3	$100,924	$28,619
CZ10-2	SCE	-22,588	2053	3.1	($41,171)	$32,039	($12,553)	>1	3.3	$73,211	$28,619
CZ11	PG&E	-35,455	3062	4.5	($57,257)	($53,776)	($22,194)	1.1	2.6	$3,481	$35,063
CZ12	PG&E	-38,704	3327	5.0	($61,613)	($66,808)	($24,819)	0.9	2.5	($5,195)	$36,794
CZ12-2	SMUD	-38,704	3327	5.0	($61,613)	$2,897	($24,819)	>1	2.5	$64,510	$36,794
CZ13	PG&E	-35,016	3063	4.7	($55,996)	($52,159)	($22,146)	1.1	2.5	$3,836	$33,849
CZ14	SDG&E	-38,945	3266	4.5	($58,426)	$24,867	($25,821)	>1	2.3	$83,293	$32,605
CZ14-2	SCE	-38,945	3266	4.5	($58,426)	$15,338	($25,821)	>1	2.3	$73,764	$32,605
CZ15	SCE	-14,818	1537	2.8	($29,445)	$22,852	($3,914)	>1	7.5	$52,298	$25,532
CZ16	PG&E	-88,966	6185	6.6	($57,366)	($193,368)	($139,989)	0.3	0.4	($136,002)	($82,623)
CZ16-2	LADWP	-88,966	6185	6.6	($57,366)	$36,354	($139,989)	>1	0.4	$93,720	($82,623)

Figure 59. Cost Effectiveness for Medium Office – All-Electric + 3kW PV + 5 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 3kW PV + 5 kWh Battery											
CZ01	PG&E	-49,716	4967	10.9	($78,897)	($84,765)	($49,972)	0.9	1.6	($5,868)	$28,925
CZ02	PG&E	-44,899	3868	6.0	($78,897)	($83,115)	($30,928)	0.9	2.6	($4,218)	$47,969
CZ03	PG&E	-31,226	3142	6.5	($78,897)	($39,441)	($19,617)	2.0	4.0	$39,456	$59,280
CZ04	PG&E	-43,772	3759	5.7	($78,897)	($70,999)	($29,496)	1.1	2.7	$7,898	$49,400
CZ04-2	CPAU	-43,772	3759	5.7	($78,897)	($8,050)	($29,496)	9.8	2.7	$70,847	$49,400
CZ05	PG&E	-35,504	3240	5.5	($78,897)	($42,559)	($29,162)	1.9	2.7	$36,338	$49,735
CZ06	SCE	-21,321	2117	4.0	($78,897)	$35,862	($9,641)	>1	8.2	$114,759	$69,256
CZ06-2	LADWP	-21,321	2117	4.0	($78,897)	$32,936	($9,641)	>1	8.2	$111,833	$69,256
CZ07	SDG&E	-7,943	950	1.9	($78,897)	$64,781	($382)	>1	206.6	$143,678	$78,515
CZ08	SCE	-10,854	1219	2.5	($78,897)	$28,651	($1,289)	>1	61.2	$107,548	$77,608
CZ08-2	LADWP	-10,854	1219	2.5	($78,897)	$25,122	($1,289)	>1	61.2	$104,019	$77,608
CZ09	SCE	-14,878	1605	3.3	($78,897)	$31,542	($3,246)	>1	24.3	$110,439	$75,651
CZ09-2	LADWP	-14,878	1605	3.3	($78,897)	$28,145	($3,246)	>1	24.3	$107,042	$75,651
CZ10	SDG&E	-22,588	2053	3.1	($78,897)	$59,752	($12,553)	>1	6.3	$138,649	$66,344
CZ10-2	SCE	-22,588	2053	3.1	($78,897)	$32,039	($12,553)	>1	6.3	$110,936	$66,344
CZ11	PG&E	-35,455	3062	4.5	($78,897)	($53,776)	($22,194)	1.5	3.6	$25,121	$56,703
CZ12	PG&E	-38,704	3327	5.0	($78,897)	($66,808)	($24,819)	1.2	3.2	$12,089	$54,078
CZ12-2	SMUD	-38,704	3327	5.0	($78,897)	$2,897	($24,819)	>1	3.2	$81,794	$54,078
CZ13	PG&E	-35,016	3063	4.7	($78,897)	($52,159)	($22,146)	1.5	3.6	$26,738	$56,751
CZ14	SDG&E	-38,945	3266	4.5	($78,897)	$24,867	($25,821)	>1	3.1	$103,764	$53,076
CZ14-2	SCE	-38,945	3266	4.5	($78,897)	$15,338	($25,821)	>1	3.1	$94,235	$53,076
CZ15	SCE	-14,818	1537	2.8	($78,897)	$22,852	($3,914)	>1	20.2	$101,749	$74,983
CZ16	PG&E	-88,966	6185	6.6	($78,897)	($193,368)	($139,989)	0.4	0.6	($114,472)	($61,092)
CZ16-2	LADWP	-88,966	6185	6.6	($78,897)	$36,354	($139,989)	>1	0.6	$115,250	($61,092)

Figure 60. Cost Effectiveness for Medium Office – All-Electric + 135kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 135kW PV											
CZ01	PG&E	123,683	4967	44.5	$163,217	$405,731	$321,979	2.5	2.0	$242,514	$158,762
CZ02	PG&E	165,627	3868	46.6	$176,775	$562,528	$430,276	3.2	2.4	$385,753	$253,501
CZ03	PG&E	173,831	3142	46.3	$168,140	$575,864	$420,205	3.4	2.5	$407,725	$252,066
CZ04	PG&E	178,706	3759	48.7	$181,458	$601,431	$456,861	3.3	2.5	$419,973	$275,403
CZ04-2	CPAU	178,706	3759	48.7	$181,458	$517,526	$456,861	2.9	2.5	$336,069	$275,403
CZ05	PG&E	185,664	3240	48.6	$165,967	$664,842	$446,600	4.0	2.7	$498,875	$280,633
CZ06	SCE	192,214	2117	45.3	$174,317	$423,657	$471,944	2.4	2.7	$249,340	$297,626
CZ06-2	LADWP	192,214	2117	45.3	$174,317	$259,270	$471,944	1.5	2.7	$84,953	$297,626
CZ07	SDG&E	210,282	950	44.3	$180,145	$669,979	$485,260	3.7	2.7	$489,834	$305,115
CZ08	SCE	201,491	1219	43.5	$181,696	$407,277	$497,622	2.2	2.7	$225,580	$315,925
CZ08-2	LADWP	201,491	1219	43.5	$181,696	$240,657	$497,622	1.3	2.7	$58,960	$315,925
CZ09	SCE	200,242	1605	45.6	$187,368	$408,922	$491,322	2.2	2.6	$221,554	$303,953
CZ09-2	LADWP	200,242	1605	45.6	$187,368	$248,452	$491,322	1.3	2.6	$61,084	$303,953
CZ10	SDG&E	189,734	2053	44.7	$202,568	$667,551	$462,111	3.3	2.3	$464,982	$259,543
CZ10-2	SCE	189,734	2053	44.7	$202,568	$412,659	$462,111	2.0	2.3	$210,091	$259,543
CZ11	PG&E	171,399	3062	44.5	$186,483	$597,807	$446,074	3.2	2.4	$411,324	$259,592
CZ12	PG&E	168,413	3327	45.0	$182,127	$571,758	$442,638	3.1	2.4	$389,632	$260,511
CZ12-2	SMUD	168,413	3327	45.0	$182,127	$343,602	$442,638	1.9	2.4	$161,475	$260,511
CZ13	PG&E	168,817	3063	44.3	$187,744	$581,964	$430,324	3.1	2.3	$394,220	$242,580
CZ14	SDG&E	197,643	3266	50.1	$185,314	$667,762	$527,930	3.6	2.8	$482,449	$342,616
CZ14-2	SCE	197,643	3266	50.1	$185,314	$408,424	$527,930	2.2	2.8	$223,110	$342,616
CZ15	SCE	209,539	1537	45.7	$214,294	$390,267	$504,638	1.8	2.4	$175,972	$290,343
CZ16	PG&E	135,255	6185	50.4	$186,374	$470,199	$338,637	2.5	1.8	$283,825	$152,263
CZ16-2	LADWP	135,255	6185	50.4	$186,374	$250,807	$338,637	1.3	1.8	$64,433	$152,263

Figure 61. Cost Effectiveness for Medium Office – All-Electric + 135kW PV + 50 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 135kW PV + 50 kWh Battery											
CZ01	PG&E	123,280	4967	45.4	$191,117	$404,994	$323,077	2.1	1.7	$213,877	$131,960
CZ02	PG&E	165,200	3868	47.7	$204,675	$561,747	$431,469	2.7	2.1	$357,072	$226,795
CZ03	PG&E	173,384	3142	47.4	$196,040	$575,043	$422,019	2.9	2.2	$379,003	$225,979
CZ04	PG&E	178,259	3759	49.8	$209,358	$600,621	$461,634	2.9	2.2	$391,263	$252,276
CZ04-2	CPAU	178,259	3759	49.8	$209,358	$516,495	$461,634	2.5	2.2	$307,137	$252,276
CZ05	PG&E	185,229	3240	49.7	$193,867	$664,046	$447,793	3.4	2.3	$470,179	$253,926
CZ06	SCE	191,767	2117	46.5	$202,217	$423,369	$473,519	2.1	2.3	$221,152	$271,301
CZ06-2	LADWP	191,767	2117	46.5	$202,217	$259,033	$473,519	1.3	2.3	$56,816	$271,301
CZ07	SDG&E	209,848	950	45.4	$208,045	$675,307	$486,787	3.2	2.3	$467,262	$278,743
CZ08	SCE	201,047	1219	44.7	$209,596	$407,027	$498,910	1.9	2.4	$197,430	$289,314
CZ08-2	LADWP	201,047	1219	44.7	$209,596	$240,432	$498,910	1.1	2.4	$30,835	$289,314
CZ09	SCE	199,802	1605	46.6	$215,268	$408,676	$492,515	1.9	2.3	$193,408	$277,246
CZ09-2	LADWP	199,802	1605	46.6	$215,268	$248,242	$492,515	1.2	2.3	$32,974	$277,246
CZ10	SDG&E	189,293	2053	45.7	$230,468	$672,867	$463,352	2.9	2.0	$442,399	$232,884
CZ10-2	SCE	189,293	2053	45.7	$230,468	$412,412	$463,352	1.8	2.0	$181,944	$232,884
CZ11	PG&E	170,987	3062	45.5	$214,383	$597,062	$448,509	2.8	2.1	$382,680	$234,126
CZ12	PG&E	167,995	3327	46.0	$210,027	$571,002	$447,411	2.7	2.1	$360,975	$237,384
CZ12-2	SMUD	167,995	3327	46.0	$210,027	$343,043	$447,411	1.6	2.1	$133,017	$237,384
CZ13	PG&E	168,408	3063	45.3	$215,644	$581,225	$440,920	2.7	2.0	$365,580	$225,275
CZ14	SDG&E	197,188	3266	51.2	$213,214	$680,893	$531,080	3.2	2.5	$467,679	$317,866
CZ14-2	SCE	197,188	3266	51.2	$213,214	$408,166	$531,080	1.9	2.5	$194,952	$317,866
CZ15	SCE	209,148	1537	46.6	$242,194	$390,000	$506,499	1.6	2.1	$147,806	$264,305
CZ16	PG&E	134,809	6185	51.4	$214,274	$469,378	$341,978	2.2	1.6	$255,105	$127,704
CZ16-2	LADWP	134,809	6185	51.4	$214,274	$250,580	$341,978	1.2	1.6	$36,306	$127,704

6.7.2 Cost Effectiveness Results – Medium Retail

Figure 62 through Figure 69 contain the cost-effectiveness findings for the Medium Retail packages. Notable findings for each package include:

- **Mixed-Fuel + 3 kW PV:** Packages are cost effective and achieve savings for all climate zones using the On-Bill and TDV approaches.
- **Mixed-Fuel + 3 kW PV + 5 kWh Battery:** The packages are less cost effective as compared to the 3 kW PV only package and not cost effective for LADWP and SMUD service area.
- **Mixed-Fuel + PV only:** Packages achieve positive energy cost savings and are cost effective using the On-Bill approach for all climate zones except for LADWP territory (CZs 6, 8, 9 and 16). Packages achieve positive savings and are cost effective using the TDV approach for all climate zones.
- **Mixed Fuel + PV + 5 kWh Battery:** Adding battery slightly reduces On-Bill B/C ratios but is still cost effective for all climate zones except for LADWP territory. Packages achieve savings and cost effective using the TDV approach for all climate zones.
- **All-Electric + 3 kW PV:** Packages are cost effective using the On-Bill and TDV approach for all climate zones except for CZ16 under PG&E service.
- **All-Electric + 3 kW PV + 5 kWh Battery**: Similar to minimal PV only package, adding battery is cost effective as well using the On-Bill and TDV approach for all climate zones except for CZ16 under PG&E service.
- **All-Electric + PV only:** Packages are cost effective and achieve savings in all climate zones for both the On-Bill and TDV approaches
- **All-Electric + PV + 50 kWh Battery**: Adding battery slightly reduces B/C ratios for both the On-Bill and TDV approaches. Packages are not cost effective for all climate zones except CZ6, CZ8 and CZ9 under LADWP service area.

Figure 62. Cost Effectiveness for Medium Retail – Mixed-Fuel + 3kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 3kW PV											
CZ01	PG&E	3,941	0	0.76	$5,566	$12,616	$8,460	2.3	1.5	$7,050	$2,894
CZ02	PG&E	4,685	0	0.91	$5,566	$17,635	$10,262	3.2	1.8	$12,069	$4,696
CZ03	PG&E	4,733	0	0.92	$5,566	$15,146	$10,152	2.7	1.8	$9,580	$4,586
CZ04	PG&E	4,834	0	0.94	$5,566	$18,519	$10,614	3.3	1.9	$12,953	$5,048
CZ04-2	CPAU	4,834	0	0.94	$5,566	$11,507	$10,614	2.1	1.9	$5,941	$5,048
CZ05	PG&E	4,910	0	0.95	$5,566	$15,641	$10,548	2.8	1.9	$10,075	$4,982
CZ06	SCE	4,769	0	0.93	$5,566	$11,374	$10,724	2.0	1.9	$5,808	$5,158
CZ06-2	LA	4,769	0	0.93	$5,566	$7,069	$10,724	1.3	1.9	$1,503	$5,158
CZ07	SDG&E	4,960	0	0.96	$5,566	$22,452	$11,031	4.0	2.0	$16,886	$5,465
CZ08	SCE	4,826	0	0.93	$5,566	$11,838	$11,339	2.1	2.0	$6,272	$5,773
CZ08-2	LA	4,826	0	0.93	$5,566	$7,342	$11,339	1.3	2.0	$1,776	$5,773
CZ09	SCE	4,889	0	0.96	$5,566	$11,187	$11,229	2.0	2.0	$5,621	$5,663
CZ09-2	LA	4,889	0	0.96	$5,566	$6,728	$11,229	1.2	2.0	$1,162	$5,663
CZ10	SDG&E	4,948	0	0.97	$5,566	$20,999	$10,987	3.8	2.0	$15,433	$5,421
CZ10-2	SCE	4,948	0	0.97	$5,566	$11,384	$10,987	2.0	2.0	$5,818	$5,421
CZ11	PG&E	4,718	0	0.91	$5,566	$15,381	$10,680	2.8	1.9	$9,815	$5,114
CZ12	PG&E	4,707	0	0.91	$5,566	$16,442	$10,614	3.0	1.9	$10,876	$5,048
CZ12-2	SMUD	4,707	0	0.91	$5,566	$8,247	$10,614	1.5	1.9	$2,681	$5,048
CZ13	PG&E	4,750	0	0.92	$5,566	$16,638	$10,592	3.0	1.9	$11,072	$5,026
CZ14	SDG&E	5,258	0	1.01	$5,566	$19,576	$12,218	3.5	2.2	$14,010	$6,652
CZ14-2	SCE	5,258	0	1.01	$5,566	$10,227	$12,218	1.8	2.2	$4,661	$6,652
CZ15	SCE	4,997	0	0.96	$5,566	$10,476	$11,339	1.9	2.0	$4,910	$5,773
CZ16	PG&E	5,336	0	1.04	$5,566	$20,418	$11,361	3.7	2.0	$14,852	$5,795
CZ16-2	LA	5,336	0	1.04	$5,566	$6,987	$11,361	1.3	2.0	$1,421	$5,795

Figure 63. Cost Effectiveness for Medium Retail – Mixed Fuel + 3kW PV + 5 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 3kW PV + 5 kWh Battery											
CZ01	PG&E	3,941	0	0.76	$9,520	$12,616	$8,460	1.3	0.9	$3,096	($1,060)
CZ02	PG&E	4,685	0	0.91	$9,520	$17,635	$10,262	1.9	1.1	$8,115	$742
CZ03	PG&E	4,733	0	0.92	$9,520	$15,146	$10,152	1.6	1.1	$5,626	$632
CZ04	PG&E	4,834	0	0.94	$9,520	$18,519	$10,614	1.9	1.1	$8,999	$1,094
CZ04-2	CPAU	4,834	0	0.94	$9,520	$11,507	$10,614	1.2	1.1	$1,987	$1,094
CZ05	PG&E	4,910	0	0.95	$9,520	$15,641	$10,548	1.6	1.1	$6,120	$1,028
CZ05-2	SCG	4,910	0	0.95	$9,520	$15,641	$10,548	1.6	1.1	$6,120	$1,028
CZ06	SCE	4,769	0	0.93	$9,520	$11,374	$10,724	1.2	1.1	$1,854	$1,204
CZ06-2	LA	4,769	0	0.93	$9,520	$7,069	$10,724	0.7	1.1	($2,452)	$1,204
CZ07	SDG&E	4,960	0	0.96	$9,520	$22,452	$11,031	2.4	1.2	$12,932	$1,511
CZ08	SCE	4,826	0	0.93	$9,520	$11,838	$11,339	1.2	1.2	$2,317	$1,819
CZ08-2	LA	4,826	0	0.93	$9,520	$7,342	$11,339	0.8	1.2	($2,178)	$1,819
CZ09	SCE	4,889	0	0.96	$9,520	$11,187	$11,229	1.2	1.2	$1,667	$1,709
CZ09-2	LA	4,889	0	0.96	$9,520	$6,728	$11,229	0.7	1.2	($2,792)	$1,709
CZ10	SDG&E	4,948	0	0.97	$9,520	$20,999	$10,987	2.2	1.2	$11,479	$1,467
CZ10-2	SCE	4,948	0	0.97	$9,520	$11,384	$10,987	1.2	1.2	$1,863	$1,467
CZ11	PG&E	4,718	0	0.91	$9,520	$15,381	$10,680	1.6	1.1	$5,861	$1,160
CZ12	PG&E	4,707	0	0.91	$9,520	$16,442	$10,614	1.7	1.1	$6,922	$1,094
CZ12-2	SMUD	4,707	0	0.91	$9,520	$8,247	$10,614	0.9	1.1	($1,273)	$1,094
CZ13	PG&E	4,750	0	0.92	$9,520	$16,638	$10,592	1.7	1.1	$7,117	$1,072
CZ14	SDG&E	5,258	0	1.01	$9,520	$19,576	$12,218	2.1	1.3	$10,056	$2,698
CZ14-2	SCE	5,258	0	1.01	$9,520	$10,227	$12,218	1.1	1.3	$707	$2,698
CZ15	SCE	4,997	0	0.96	$9,520	$10,476	$11,339	1.1	1.2	$956	$1,819
CZ16	PG&E	5,336	0	1.04	$9,520	$20,418	$11,361	2.1	1.2	$10,898	$1,841
CZ16-2	LA	5,336	0	1.04	$9,520	$6,987	$11,361	0.7	1.2	($2,533)	$1,841

Figure 64. Cost Effectiveness for Medium Retail – Mixed-Fuel + 110kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 110kW PV											
CZ01	PG&E	144,499	0	27.97	$201,904	$454,462	$309,935	2.3	1.5	$252,558	$108,031
CZ02	PG&E	171,790	0	33.31	$201,904	$477,584	$376,300	2.4	1.9	$275,681	$174,396
CZ03	PG&E	173,534	0	33.55	$201,904	$538,530	$372,146	2.7	1.8	$336,626	$170,243
CZ04	PG&E	177,229	0	34.42	$201,904	$489,934	$389,067	2.4	1.9	$288,030	$187,163
CZ04-2	CPAU	177,229	0	34.42	$201,904	$418,173	$389,067	2.1	1.9	$216,269	$187,163
CZ05	PG&E	180,044	0	34.84	$201,904	$556,787	$386,958	2.8	1.9	$354,883	$185,054
CZ06	SCE	174,855	0	33.92	$201,904	$288,188	$393,198	1.4	1.9	$86,284	$191,295
CZ06-2	LA	174,855	0	33.92	$201,904	$165,538	$393,198	0.8	1.9	($36,366)	$191,295
CZ07	SDG&E	181,854	0	35.32	$201,904	$373,974	$404,713	1.9	2.0	$172,070	$202,809
CZ08	SCE	176,954	0	34.23	$201,904	$284,481	$415,789	1.4	2.1	$82,577	$213,885
CZ08-2	LA	176,954	0	34.23	$201,904	$161,366	$415,789	0.8	2.1	($40,538)	$213,885
CZ09	SCE	179,267	0	35.18	$201,904	$289,050	$412,097	1.4	2.0	$87,146	$210,193
CZ09-2	LA	179,267	0	35.18	$201,904	$168,822	$412,097	0.8	2.0	($33,082)	$210,193
CZ10	SDG&E	181,443	0	35.41	$201,904	$410,310	$402,999	2.0	2.0	$208,406	$201,095
CZ10-2	SCE	181,443	0	35.41	$201,904	$291,236	$402,999	1.4	2.0	$89,332	$201,095
CZ11	PG&E	172,983	0	33.46	$201,904	$464,776	$391,550	2.3	1.9	$262,872	$189,646
CZ12	PG&E	172,597	0	33.33	$201,904	$467,870	$389,573	2.3	1.9	$265,966	$187,669
CZ12-2	SMUD	172,597	0	33.33	$201,904	$267,086	$389,573	1.3	1.9	$65,182	$187,669
CZ13	PG&E	174,151	0	33.81	$201,904	$478,857	$387,968	2.4	1.9	$276,953	$186,065
CZ14	SDG&E	192,789	0	36.97	$201,904	$396,181	$448,268	2.0	2.2	$194,277	$246,364
CZ14-2	SCE	192,789	0	36.97	$201,904	$288,782	$448,268	1.4	2.2	$86,878	$246,364
CZ15	SCE	183,214	0	35.12	$201,904	$277,867	$415,789	1.4	2.1	$75,963	$213,885
CZ16	PG&E	195,665	0	37.97	$201,904	$522,352	$416,558	2.6	2.1	$320,448	$214,654
CZ16-2	LA	195,665	0	37.97	$201,904	$171,802	$416,558	0.9	2.1	($30,101)	$214,654

Figure 65. Cost Effectiveness for Medium Retail – Mixed-Fuel + 110 kW PV + 50 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 110kW PV + 50 kWh Battery											
CZ01	PG&E	143,423	0	29.48	$229,804	$452,119	$324,373	2.0	1.4	$222,315	$94,569
CZ02	PG&E	170,542	0	35.14	$229,804	$486,704	$398,363	2.1	1.7	$256,900	$168,559
CZ03	PG&E	172,266	0	35.66	$229,804	$535,974	$395,374	2.3	1.7	$306,170	$165,570
CZ04	PG&E	175,940	0	36.32	$229,804	$525,788	$422,579	2.3	1.8	$295,984	$192,775
CZ04-2	CPAU	175,940	0	36.32	$229,804	$416,019	$422,579	1.8	1.8	$186,216	$192,775
CZ05	PG&E	178,728	0	36.91	$229,804	$554,968	$409,086	2.4	1.8	$325,164	$179,283
CZ06	SCE	173,567	0	35.99	$229,804	$290,599	$412,690	1.3	1.8	$60,795	$182,886
CZ06-2	LA	173,567	0	35.99	$229,804	$169,786	$412,690	0.7	1.8	($60,018)	$182,886
CZ07	SDG&E	180,508	0	37.61	$229,804	$425,793	$427,040	1.9	1.9	$195,989	$197,236
CZ08	SCE	175,616	0	36.29	$229,804	$296,318	$434,687	1.3	1.9	$66,514	$204,883
CZ08-2	LA	175,616	0	36.29	$229,804	$170,489	$434,687	0.7	1.9	($59,315)	$204,883
CZ09	SCE	177,966	0	36.74	$229,804	$300,540	$421,195	1.3	1.8	$70,736	$191,391
CZ09-2	LA	177,966	0	36.74	$229,804	$178,852	$421,195	0.8	1.8	($50,952)	$191,391
CZ10	SDG&E	180,248	0	36.91	$229,804	$459,486	$410,537	2.0	1.8	$229,683	$180,733
CZ10-2	SCE	180,248	0	36.91	$229,804	$301,219	$410,537	1.3	1.8	$71,415	$180,733
CZ11	PG&E	171,779	0	34.85	$229,804	$490,245	$417,679	2.1	1.8	$260,442	$187,875
CZ12	PG&E	171,392	0	34.77	$229,804	$497,363	$417,371	2.2	1.8	$267,559	$187,567
CZ12-2	SMUD	171,392	0	34.77	$229,804	$273,783	$417,371	1.2	1.8	$43,979	$187,567
CZ13	PG&E	173,052	0	34.97	$229,804	$488,196	$397,791	2.1	1.7	$258,392	$167,987
CZ14	SDG&E	191,703	0	38.31	$229,804	$420,241	$452,641	1.8	2.0	$190,437	$222,837
CZ14-2	SCE	191,703	0	38.31	$229,804	$294,010	$452,641	1.3	2.0	$64,206	$222,837
CZ15	SCE	182,299	0	36.01	$229,804	$279,036	$416,382	1.2	1.8	$49,232	$186,578
CZ16	PG&E	194,293	0	40.00	$229,804	$535,137	$432,951	2.3	1.9	$305,333	$203,147
CZ16-2	LA	194,293	0	40.00	$229,804	$175,573	$432,951	0.8	1.9	($54,231)	$203,147

Figure 66. Cost Effectiveness for Medium Retail – All-Electric + 3kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 3kW PV											
CZ01	PG&E	-25,214	3893	14.61	($16,318)	$4,288	($5,450)	>1	3.0	$20,606	$10,868
CZ02	PG&E	-17,101	2448	8.40	($20,734)	$859	$5,779	>1	>1	$21,593	$26,513
CZ03	PG&E	-9,851	1868	7.18	($17,381)	$15,418	$8,702	>1	>1	$32,799	$26,083
CZ04	PG&E	-9,353	1706	6.24	($16,166)	$9,110	$10,394	>1	>1	$25,276	$26,560
CZ04-2	CPAU	-9,353	1706	6.24	($16,166)	$24,000	$10,394	>1	>1	$40,166	$26,560
CZ05	PG&E	-9,423	1746	6.42	($18,776)	$14,076	$6,351	>1	>1	$32,852	$25,127
CZ06	SCE	-2,759	1002	4.24	($15,032)	$29,710	$12,592	>1	>1	$44,741	$27,623
CZ06-2	LA	-2,759	1002	4.24	($15,032)	$26,292	$12,592	>1	>1	$41,324	$27,623
CZ07	SDG&E	1,148	522	2.72	($17,032)	$76,810	$12,350	>1	>1	$93,842	$29,382
CZ08	SCE	-979	793	3.64	($20,192)	$28,576	$13,185	>1	>1	$48,768	$33,377
CZ08-2	LA	-979	793	3.64	($20,192)	$24,475	$13,185	>1	>1	$44,667	$33,377
CZ09	SCE	-2,352	970	4.28	($25,383)	$29,776	$13,207	>1	>1	$55,159	$38,590
CZ09-2	LA	-2,352	970	4.28	($25,383)	$25,823	$13,207	>1	>1	$51,207	$38,590
CZ10	SDG&E	-5,388	1262	4.95	($20,541)	$75,458	$11,493	>1	>1	$95,999	$32,034
CZ10-2	SCE	-5,388	1262	4.95	($20,541)	$32,394	$11,493	>1	>1	$52,936	$32,034
CZ11	PG&E	-14,533	2415	8.86	($25,471)	$7,618	$13,295	>1	>1	$33,090	$38,766
CZ12	PG&E	-14,764	2309	8.19	($25,774)	$2,210	$10,152	>1	>1	$27,984	$35,926
CZ12-2	SMUD	-14,764	2309	8.19	($25,774)	$21,215	$10,152	>1	>1	$46,988	$35,926
CZ13	PG&E	-12,069	1983	7.08	($21,428)	$5,647	$8,570	>1	>1	$27,075	$29,998
CZ14	SDG&E	-7,950	1672	6.45	($19,926)	$60,412	$16,679	>1	>1	$80,338	$36,605
CZ14-2	SCE	-7,950	1672	6.45	($19,926)	$28,631	$16,679	>1	>1	$48,557	$36,605
CZ15	SCE	2,534	518	3.10	($22,813)	$27,271	$17,162	>1	>1	$50,084	$39,976
CZ16	PG&E	-36,081	4304	14.26	($19,041)	($30,111)	($41,181)	0.6	0.5	($11,070)	($22,140)
CZ16-2	LA	-36,081	4304	14.26	($19,041)	$45,706	($41,181)	>1	0.5	$64,747	($22,140)

Figure 67. Cost Effectiveness for Medium Retail – All-Electric + 3kW PV + 5 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 3kW PV + 5 kWh Battery											
CZ01	PG&E	-25,214	3893	14.61	($14,692)	$4,288	($5,450)	>1	2.7	$18,980	$9,242
CZ02	PG&E	-17,101	2448	8.40	($14,692)	$859	$5,779	>1	>1	$15,551	$20,472
CZ03	PG&E	-9,851	1868	7.18	($14,692)	$15,418	$8,702	>1	>1	$30,110	$23,394
CZ04	PG&E	-9,353	1706	6.24	($14,692)	$9,110	$10,394	>1	>1	$23,802	$25,086
CZ04-2	CPAU	-9,353	1706	6.24	($14,692)	$24,000	$10,394	>1	>1	$38,693	$25,086
CZ05	PG&E	-9,423	1746	6.42	($14,692)	$14,076	$6,351	>1	>1	$28,768	$21,043
CZ06	SCE	-2,759	1002	4.24	($14,692)	$29,710	$12,592	>1	>1	$44,402	$27,284
CZ06-2	LA	-2,759	1002	4.24	($14,692)	$26,292	$12,592	>1	>1	$40,984	$27,284
CZ07	SDG&E	1,148	522	2.72	($14,692)	$76,810	$12,350	>1	>1	$91,502	$27,042
CZ08	SCE	-979	793	3.64	($14,692)	$28,576	$13,185	>1	>1	$43,268	$27,877
CZ08-2	LA	-979	793	3.64	($14,692)	$24,475	$13,185	>1	>1	$39,167	$27,877
CZ09	SCE	-2,352	970	4.28	($14,692)	$29,776	$13,207	>1	>1	$44,468	$27,899
CZ09-2	LA	-2,352	970	4.28	($14,692)	$25,823	$13,207	>1	>1	$40,516	$27,899
CZ10	SDG&E	-5,388	1262	4.95	($14,692)	$75,458	$11,493	>1	>1	$90,150	$26,185
CZ10-2	SCE	-5,388	1262	4.95	($14,692)	$32,394	$11,493	>1	>1	$47,086	$26,185
CZ11	PG&E	-14,533	2415	8.86	($14,692)	$7,618	$13,295	>1	>1	$22,310	$27,987
CZ12	PG&E	-14,764	2309	8.19	($14,692)	$2,210	$10,152	>1	>1	$16,902	$24,845
CZ12-2	SMUD	-14,764	2309	8.19	($14,692)	$21,215	$10,152	>1	>1	$35,907	$24,845
CZ13	PG&E	-12,069	1983	7.08	($14,692)	$5,647	$8,570	>1	>1	$20,339	$23,262
CZ14	SDG&E	-7,950	1672	6.45	($14,692)	$60,412	$16,679	>1	>1	$75,104	$31,371
CZ14-2	SCE	-7,950	1672	6.45	($14,692)	$28,631	$16,679	>1	>1	$43,323	$31,371
CZ15	SCE	2,534	518	3.10	($14,692)	$27,271	$17,162	>1	>1	$41,963	$31,855
CZ16	PG&E	-36,081	4304	14.26	($14,692)	($30,111)	($41,181)	0.5	0.4	($15,419)	($26,489)
CZ16-2	LA	-36,081	4304	14.26	($14,692)	$45,706	($41,181)	>1	0.4	$60,398	($26,489)

Figure 68. Cost Effectiveness for Medium Retail – All-Electric + 110kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 110kW PV											
CZ01	PG&E	115,344	3893	41.82	$143,932	$454,277	$296,025	3.2	2.1	$310,345	$152,093
CZ02	PG&E	150,004	2448	40.80	$139,516	$470,236	$371,817	3.4	2.7	$330,720	$232,301
CZ03	PG&E	158,951	1868	39.82	$142,869	$544,095	$370,696	3.8	2.6	$401,226	$227,827
CZ04	PG&E	163,043	1706	39.73	$144,084	$488,619	$388,847	3.4	2.7	$344,534	$244,763
CZ04-2	CPAU	163,043	1706	39.73	$144,084	$432,905	$388,847	3.0	2.7	$288,821	$244,763
CZ05	PG&E	165,711	1746	40.30	$141,473	$565,525	$382,760	4.0	2.7	$424,051	$241,287
CZ06	SCE	167,328	1002	37.24	$145,218	$306,670	$395,066	2.1	2.7	$161,452	$249,848
CZ06-2	LA	167,328	1002	37.24	$145,218	$184,797	$395,066	1.3	2.7	$39,579	$249,848
CZ07	SDG&E	178,042	522	37.07	$143,218	$428,332	$406,032	3.0	2.8	$285,114	$262,814
CZ08	SCE	171,149	793	36.94	$140,058	$301,219	$417,635	2.2	3.0	$161,161	$277,577
CZ08-2	LA	171,149	793	36.94	$140,058	$178,419	$417,635	1.3	3.0	$38,361	$277,577
CZ09	SCE	172,027	970	38.50	$134,867	$307,640	$414,075	2.3	3.1	$172,773	$279,208
CZ09-2	LA	172,027	970	38.50	$134,867	$187,813	$414,075	1.4	3.1	$52,946	$279,208
CZ10	SDG&E	171,107	1262	39.40	$139,708	$463,692	$403,505	3.3	2.9	$323,984	$263,796
CZ10-2	SCE	171,107	1262	39.40	$139,708	$311,464	$403,505	2.2	2.9	$171,755	$263,796
CZ11	PG&E	153,732	2415	41.41	$134,778	$467,356	$394,165	3.5	2.9	$332,578	$259,387
CZ12	PG&E	153,126	2309	40.61	$134,476	$467,106	$389,111	3.5	2.9	$332,630	$254,635
CZ12-2	SMUD	153,126	2309	40.61	$134,476	$283,343	$389,111	2.1	2.9	$148,867	$254,635
CZ13	PG&E	157,332	1983	39.97	$138,822	$477,831	$385,947	3.4	2.8	$339,008	$247,124
CZ14	SDG&E	179,582	1672	42.42	$140,324	$437,575	$452,729	3.1	3.2	$297,251	$312,405
CZ14-2	SCE	179,582	1672	42.42	$140,324	$309,064	$452,729	2.2	3.2	$168,740	$312,405
CZ15	SCE	180,751	518	37.26	$137,436	$294,877	$421,612	2.1	3.1	$157,440	$284,176
CZ16	PG&E	154,248	4304	51.20	$141,209	$473,892	$364,016	3.4	2.6	$332,682	$222,807
CZ16-2	LA	154,248	4304	51.20	$141,209	$211,677	$364,016	1.5	2.6	$70,467	$222,807

Figure 69. Cost Effectiveness for Medium Retail – All-Electric + 110kW PV + 50 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 90kW PV + 50 kWh Battery											
CZ01	PG&E	114,356	3893	43.52	$171,832	$451,043	$310,265	2.6	1.8	$279,211	$138,433
CZ02	PG&E	148,793	2448	42.89	$167,416	$475,081	$394,099	2.8	2.4	$307,664	$226,683
CZ03	PG&E	157,707	1868	42.12	$170,769	$541,418	$394,034	3.2	2.3	$370,649	$223,265
CZ04	PG&E	161,769	1706	41.82	$171,984	$523,603	$422,535	3.0	2.5	$351,618	$250,551
CZ04-2	CPAU	161,769	1706	41.82	$171,984	$430,567	$422,535	2.5	2.5	$258,582	$250,551
CZ05	PG&E	164,408	1746	42.68	$169,373	$561,966	$405,087	3.3	2.4	$392,592	$235,714
CZ06	SCE	166,052	1002	39.48	$173,118	$306,697	$414,756	1.8	2.4	$133,579	$241,638
CZ06-2	LA	166,052	1002	39.48	$173,118	$187,941	$414,756	1.1	2.4	$14,823	$241,638
CZ07	SDG&E	176,705	522	39.47	$171,118	$479,038	$428,490	2.8	2.5	$307,920	$257,372
CZ08	SCE	169,825	793	39.14	$167,958	$312,602	$436,709	1.9	2.6	$144,645	$268,751
CZ08-2	LA	169,825	793	39.14	$167,958	$187,142	$436,709	1.1	2.6	$19,185	$268,751
CZ09	SCE	170,747	970	40.23	$162,767	$318,113	$423,370	2.0	2.6	$155,346	$260,604
CZ09-2	LA	170,747	970	40.23	$162,767	$197,006	$423,370	1.2	2.6	$34,240	$260,604
CZ10	SDG&E	169,935	1262	41.08	$167,608	$503,504	$411,284	3.0	2.5	$335,896	$243,675
CZ10-2	SCE	169,935	1262	41.08	$167,608	$317,927	$411,284	1.9	2.5	$150,319	$243,675
CZ11	PG&E	152,559	2415	42.99	$162,678	$491,775	$420,667	3.0	2.6	$329,096	$257,989
CZ12	PG&E	151,956	2309	42.21	$162,376	$494,703	$417,063	3.0	2.6	$332,327	$254,687
CZ12-2	SMUD	151,956	2309	42.21	$162,376	$288,950	$417,063	1.8	2.6	$126,573	$254,687
CZ13	PG&E	156,271	1983	41.25	$166,722	$485,422	$395,770	2.9	2.4	$318,699	$229,047
CZ14	SDG&E	178,505	1672	43.94	$168,224	$452,456	$457,387	2.7	2.7	$284,232	$289,163
CZ14-2	SCE	178,505	1672	43.94	$168,224	$311,520	$457,387	1.9	2.7	$143,296	$289,163
CZ15	SCE	179,840	518	38.23	$165,336	$296,004	$422,293	1.8	2.6	$130,668	$256,957
CZ16	PG&E	152,965	4304	53.53	$169,109	$483,205	$378,299	2.9	2.2	$314,096	$209,190
CZ16-2	LA	152,965	4304	53.53	$169,109	$215,341	$378,299	1.3	2.2	$46,231	$209,190

6.7.3 Cost Effectiveness Results – Small Hotel

Figure 70 through Figure 77 contain the cost-effectiveness findings for the Small Hotel packages. Notable findings for each package include:

- **Mixed-Fuel + 3 kW PV:** Packages are cost effective and achieve savings for all climate zones for both the On-Bill and TDV approaches.
- **Mixed-Fuel + 3 kW PV + 5 kWh Battery:** The packages are less cost effective as compared to the previous minimal PV only package and not cost effective for LADWP and SMUD service area. The addition of battery reduces the cost effectiveness of packages.
- **Mixed-Fuel + PV only:** Packages are cost effective and achieve savings for the On-Bill approach for all climate zones except for LADWP territory. Packages are cost effective and achieve savings for the TDV approach for all climate zones.
- **Mixed-Fuel + PV + 50 kWh Battery:** Adding battery slightly reduces On-Bill B/C ratios. Packages are not cost effective for LADWP territory, SMUD territory as well as for climate zones 6,8,9 under PG&E service area.
- **All-Electric + 3 kW PV:** All packages are cost effective using the On-Bill approach. All packages are cost effective using the TDV approach but do not achieve positive energy cost savings.
- **All-Electric + 3 kW PV + 5 kWh Battery:** Similar to minimal PV only package, all packages are cost effective using the On-Bill approach. All packages are cost effective using the TDV approach but do not achieve positive energy cost savings.
- **All-Electric + PV only**: All packages are cost effective for both On-Bill and TDV approaches. Packages achieve on-bill savings for all climate zones.
- **All-Electric + PV + 50 kWh Battery:** Adding battery slightly reduces On-Bill B/C ratios but is still cost effective for all climate zones.

Figure 70. Cost Effectiveness for Small Hotel – Mixed Fuel + 3kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle $- TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 3kW PV											
CZ01	PG&E	3,941	0	0.8	$5,566	$12,616	$8,326	2.3	1.5	$7,050	$2,760
CZ02	PG&E	4,785	0	0.9	$5,566	$12,639	$10,332	2.3	1.9	$7,073	$4,766
CZ03	PG&E	4,733	0	0.9	$5,566	$15,146	$9,991	2.7	1.8	$9,580	$4,425
CZ04	PG&E	4,834	0	1.0	$5,566	$13,266	$10,445	2.4	1.9	$7,700	$4,879
CZ04-2	CPAU	4,834	0	1.0	$5,566	$11,507	$10,445	2.1	1.9	$5,941	$4,879
CZ05	PG&E	5,027	0	1.0	$5,566	$16,048	$10,634	2.9	1.9	$10,482	$5,068
CZ06	SCE	4,769	0	0.9	$5,566	$10,276	$10,559	1.8	1.9	$4,710	$4,993
CZ06-2	LA	4,769	0	0.9	$5,566	$6,307	$10,559	1.1	1.9	$741	$4,993
CZ07	SDG&E	4,960	0	1.0	$5,566	$14,576	$10,861	2.6	2.0	$9,010	$5,295
CZ08	SCE	4,824	0	0.9	$5,566	$10,837	$11,202	1.9	2.0	$5,271	$5,636
CZ08-2	LA	4,824	0	0.9	$5,566	$6,505	$11,202	1.2	2.0	$939	$5,636
CZ09	SCE	4,779	0	0.9	$5,566	$10,298	$10,824	1.9	1.9	$4,732	$5,258
CZ09-2	LA	4,779	0	0.9	$5,566	$6,201	$10,824	1.1	1.9	$635	$5,258
CZ10	SDG&E	4,905	0	1.0	$5,566	$16,302	$10,710	2.9	1.9	$10,736	$5,144
CZ10-2	SCE	4,905	0	1.0	$5,566	$9,468	$10,710	1.7	1.9	$3,902	$5,144
CZ11	PG&E	4,701	0	0.9	$5,566	$14,193	$10,483	2.6	1.9	$8,627	$4,917
CZ12	PG&E	4,770	0	0.9	$5,566	$15,262	$10,596	2.7	1.9	$9,696	$5,030
CZ12-2	SMUD	4,770	0	0.9	$5,566	$7,848	$10,596	1.4	1.9	$2,282	$5,030
CZ13	PG&E	4,633	0	0.9	$5,566	$14,674	$10,105	2.6	1.8	$9,108	$4,539
CZ14	SDG&E	5,377	0	1.1	$5,566	$16,615	$12,375	3.0	2.2	$11,049	$6,809
CZ14-2	SCE	5,377	0	1.1	$5,566	$10,021	$12,375	1.8	2.2	$4,455	$6,809
CZ15	SCE	4,997	0	1.0	$5,566	$9,542	$11,164	1.7	2.0	$3,976	$5,598
CZ16	PG&E	5,240	0	1.0	$5,566	$14,961	$10,975	2.7	2.0	$9,395	$5,409
CZ16-2	LA	5,240	0	1.0	$5,566	$5,670	$10,975	1.0	2.0	$104	$5,409

Figure 71. Cost Effectiveness for Small Hotel – Mixed Fuel + 3kW PV + 5 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 3kW PV + 5kWh Battery											
CZ01	PG&E	3,941	0	0.8	$9,520	$12,616	$8,326	1.3	0.9	$3,096	($1,194)
CZ02	PG&E	4,785	0	0.9	$9,520	$12,639	$10,332	1.3	1.1	$3,119	$811
CZ03	PG&E	4,733	0	0.9	$9,520	$15,146	$9,991	1.6	1.0	$5,626	$471
CZ04	PG&E	4,834	0	1.0	$9,520	$13,266	$10,445	1.4	1.1	$3,746	$925
CZ04-2	CPAU	4,834	0	1.0	$9,520	$11,507	$10,445	1.2	1.1	$1,987	$925
CZ05	PG&E	5,027	0	1.0	$9,520	$16,048	$10,634	1.7	1.1	$6,528	$1,114
CZ05-2	SCG	5,027	0	1.0	$9,520	$16,048	$10,634	1.7	1.1	$6,528	$1,114
CZ06	SCE	4,769	0	0.9	$9,520	$10,276	$10,559	1.1	1.1	$756	$1,039
CZ06-2	LA	4,769	0	0.9	$9,520	$6,307	$10,559	0.7	1.1	($3,213)	$1,039
CZ07	SDG&E	4,960	0	1.0	$9,520	$14,576	$10,861	1.5	1.1	$5,056	$1,341
CZ08	SCE	4,824	0	0.9	$9,520	$10,837	$11,202	1.1	1.2	$1,317	$1,682
CZ08-2	LA	4,824	0	0.9	$9,520	$6,505	$11,202	0.7	1.2	($3,015)	$1,682
CZ09	SCE	4,779	0	0.9	$9,520	$10,298	$10,824	1.1	1.1	$778	$1,303
CZ09-2	LA	4,779	0	0.9	$9,520	$6,201	$10,824	0.7	1.1	($3,319)	$1,303
CZ10	SDG&E	4,905	0	1.0	$9,520	$16,302	$10,710	1.7	1.1	$6,782	$1,190
CZ10-2	SCE	4,905	0	1.0	$9,520	$9,468	$10,710	0.99	1.1	($52)	$1,190
CZ11	PG&E	4,701	0	0.9	$9,520	$14,193	$10,483	1.5	1.1	$4,673	$963
CZ12	PG&E	4,770	0	0.9	$9,520	$15,262	$10,596	1.6	1.1	$5,742	$1,076
CZ12-2	SMUD	4,770	0	0.9	$9,520	$7,848	$10,596	0.8	1.1	($1,672)	$1,076
CZ13	PG&E	4,633	0	0.9	$9,520	$14,674	$10,105	1.5	1.1	$5,154	$584
CZ14	SDG&E	5,377	0	1.1	$9,520	$16,615	$12,375	1.7	1.3	$7,095	$2,855
CZ14-2	SCE	5,377	0	1.1	$9,520	$10,021	$12,375	1.1	1.3	$501	$2,855
CZ15	SCE	4,997	0	1.0	$9,520	$9,542	$11,164	1.0	1.2	$22	$1,644
CZ16	PG&E	5,240	0	1.0	$9,520	$14,961	$10,975	1.6	1.2	$5,441	$1,455
CZ16-2	LA	5,240	0	1.0	$9,520	$5,670	$10,975	0.6	1.2	($3,851)	$1,455

Figure 72. Cost Effectiveness for Small Hotel - Mixed Fuel +80kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 80kW PV											
CZ01	PG&E	105,090	0	20.6	$179,470	$336,440	$221,883	1.9	1.2	$156,970	$42,413
CZ02	PG&E	127,592	0	25.0	$179,470	$320,009	$275,130	1.8	1.5	$140,539	$95,660
CZ03	PG&E	126,206	0	24.8	$179,470	$403,900	$266,426	2.3	1.5	$224,430	$86,956
CZ04	PG&E	128,894	0	25.4	$179,470	$322,782	$278,536	1.8	1.6	$143,312	$99,066
CZ04-2	CPAU	128,894	0	25.4	$179,470	$306,862	$278,536	1.7	1.6	$127,392	$99,066
CZ05	PG&E	134,041	0	26.5	$179,470	$427,935	$283,834	2.4	1.6	$248,465	$104,364
CZ06	SCE	127,168	0	25.0	$179,470	$200,425	$281,488	1.1	1.6	$20,955	$102,018
CZ06-2	LA	127,168	0	25.0	$179,470	$119,357	$281,488	0.7	1.6	($60,113)	$102,018
CZ07	SDG&E	132,258	0	26.1	$179,470	$247,646	$289,700	1.4	1.6	$68,176	$110,230
CZ08	SCE	128,641	0	25.3	$179,470	$207,993	$298,594	1.2	1.7	$28,523	$119,124
CZ08-2	LA	128,641	0	25.3	$179,470	$122,591	$298,594	0.7	1.7	($56,879)	$119,124
CZ09	SCE	127,447	0	25.3	$179,470	$211,567	$288,830	1.2	1.6	$32,096	$109,360
CZ09-2	LA	127,447	0	25.3	$179,470	$123,486	$288,830	0.7	1.6	($55,984)	$109,360
CZ10	SDG&E	130,792	0	25.8	$179,470	$274,832	$285,386	1.5	1.6	$95,361	$105,916
CZ10-2	SCE	130,792	0	25.8	$179,470	$206,865	$285,386	1.2	1.6	$27,395	$105,916
CZ11	PG&E	125,366	0	24.6	$179,470	$316,781	$279,331	1.8	1.6	$137,311	$99,861
CZ12	PG&E	127,203	0	25.0	$179,470	$406,977	$282,358	2.3	1.6	$227,507	$102,888
CZ12-2	SMUD	127,203	0	25.0	$179,470	$198,254	$282,358	1.1	1.6	$18,784	$102,888
CZ13	PG&E	123,535	0	24.4	$179,470	$317,261	$269,908	1.8	1.5	$137,791	$90,437
CZ14	SDG&E	143,387	0	28.1	$179,470	$309,521	$330,345	1.7	1.8	$130,051	$150,875
CZ14-2	SCE	143,387	0	28.1	$179,470	$225,083	$330,345	1.3	1.8	$45,612	$150,875
CZ15	SCE	133,246	0	25.9	$179,470	$207,277	$297,648	1.2	1.7	$27,807	$118,177
CZ16	PG&E	139,738	0	27.3	$179,470	$341,724	$292,728	1.9	1.6	$162,254	$113,258
CZ16-2	LA	139,738	0	27.3	$179,470	$114,215	$292,728	0.6	1.6	($65,255)	$113,258

Figure 73. Cost Effectiveness for Small Hotel – Mixed Fuel + 80kW PV + 50 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Mixed Fuel + 80kW PV + 50kWh Battery											
CZ01	PG&E	104,026	0	23.2	$207,370	$332,596	$237,740	1.6	1.1	$125,226	$30,370
CZ02	PG&E	126,332	0	28.1	$207,370	$336,179	$296,058	1.6	1.4	$128,809	$88,688
CZ03	PG&E	124,934	0	28.0	$207,370	$399,220	$289,360	1.9	1.4	$191,850	$81,990
CZ04	PG&E	127,602	0	28.5	$207,370	$332,161	$308,887	1.6	1.5	$124,790	$101,517
CZ04-2	CPAU	127,602	0	28.5	$207,370	$303,828	$308,887	1.5	1.5	$96,458	$101,517
CZ05	PG&E	132,725	0	29.8	$207,370	$423,129	$303,627	2.0	1.5	$215,758	$96,257
CZ06	SCE	125,880	0	28.4	$207,370	$193,814	$297,950	0.9	1.4	($13,556)	$90,580
CZ06-2	LA	125,880	0	28.4	$207,370	$123,083	$297,950	0.6	1.4	($84,287)	$90,580
CZ07	SDG&E	130,940	0	29.5	$207,370	$274,313	$309,682	1.3	1.5	$66,943	$102,312
CZ08	SCE	127,332	0	28.5	$207,370	$199,786	$312,899	1.0	1.5	($7,584)	$105,529
CZ08-2	LA	127,332	0	28.5	$207,370	$124,651	$312,899	0.6	1.5	($82,719)	$105,529
CZ09	SCE	126,232	0	28.2	$207,370	$206,706	$292,804	1.0	1.4	($664)	$85,433
CZ09-2	LA	126,232	0	28.2	$207,370	$126,710	$292,804	0.6	1.4	($80,660)	$85,433
CZ10	SDG&E	129,683	0	28.4	$207,370	$292,202	$287,278	1.4	1.4	$84,832	$79,908
CZ10-2	SCE	129,683	0	28.4	$207,370	$206,171	$287,278	1.0	1.4	($1,199)	$79,908
CZ11	PG&E	124,337	0	26.9	$207,370	$315,330	$283,683	1.5	1.4	$107,960	$76,313
CZ12	PG&E	126,013	0	27.8	$207,370	$403,127	$297,118	1.9	1.4	$195,757	$89,748
CZ12-2	SMUD	126,013	0	27.8	$207,370	$198,007	$297,118	1.0	1.4	($9,363)	$89,748
CZ13	PG&E	122,591	0	26.5	$207,370	$315,541	$280,996	1.5	1.4	$108,171	$73,626
CZ14	SDG&E	142,257	0	30.7	$207,370	$317,565	$334,697	1.5	1.6	$110,195	$127,327
CZ14-2	SCE	142,257	0	30.7	$207,370	$224,195	$334,697	1.1	1.6	$16,824	$127,327
CZ15	SCE	132,418	0	27.8	$207,370	$208,044	$299,199	1.0	1.4	$674	$91,829
CZ16	PG&E	138,402	0	30.7	$207,370	$358,582	$315,699	1.7	1.5	$151,212	$108,329
CZ16-2	LA	138,402	0	30.7	$207,370	$118,770	$315,699	0.6	1.5	($88,600)	$108,329

Figure 74. Cost Effectiveness for Small Hotel – All-Electric + 3kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost*	Lifecycle Energy Cost Savings	Lifecycle TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 3kW PV											
CZ01	PG&E	-155,861	16917	54.7	($1,265,139)	($568,892)	($106,835)	2.2	11.8	$696,246	$1,158,304
CZ02	PG&E	-113,954	12677	40.9	($1,266,111)	($229,433)	($41,288)	5.5	30.7	$1,036,679	$1,224,823
CZ03	PG&E	-105,862	12322	41.4	($1,268,383)	($309,874)	($41,175)	4.1	30.8	$958,510	$1,227,208
CZ04	PG&E	-108,570	11927	37.5	($1,268,218)	($208,239)	($42,689)	6.1	29.7	$1,059,980	$1,225,530
CZ04-2	CPAU	-108,570	11927	37.5	($1,268,218)	($6,261)	($42,689)	202.6	29.7	$1,261,958	$1,225,530
CZ05	PG&E	-103,579	11960	39.3	($1,268,272)	($332,879)	($44,051)	3.8	28.8	$935,393	$1,224,221
CZ06	SCE	-73,524	8912	30.3	($1,268,413)	$48,898	($17,484)	>1	72.5	$1,317,311	$1,250,929
CZ06-2	LA	-64,859	8188	29.0	($1,266,760)	($120,842)	($12,337)	10.5	102.7	$1,145,918	$1,254,423
CZ07	SDG&E	-67,090	8353	29.2	($1,264,731)	($43,964)	($11,618)	28.8	108.9	$1,220,767	$1,253,113
CZ08	SCE	-67,090	8353	29.2	($1,264,731)	$48,736	($11,618)	>1	108.9	$1,313,467	$1,253,113
CZ08-2	LA	-67,483	8402	29.3	($1,266,529)	($35,547)	($11,126)	35.6	113.8	$1,230,982	$1,255,403
CZ09	SCE	-67,483	8402	29.3	($1,266,529)	$52,410	($11,126)	>1	113.8	$1,318,939	$1,255,403
CZ09-2	LA	-75,157	8418	27.2	($1,263,531)	($156,973)	($25,469)	8.0	49.6	$1,106,558	$1,238,061
CZ10	SDG&E	-75,157	8418	27.2	($1,263,531)	($54,711)	($25,469)	23.1	49.6	$1,208,820	$1,238,061
CZ10-2	SCE	-94,783	10252	31.9	($1,264,340)	($169,847)	($38,904)	7.4	32.5	$1,094,493	$1,225,436
CZ11	PG&E	-94,702	10403	33.0	($1,265,779)	($324,908)	($34,968)	3.9	36.2	$940,872	$1,230,811
CZ12	PG&E	-94,297	10403	33.1	($1,265,779)	$13,603	($33,757)	>1	37.5	$1,279,382	$1,232,022
CZ12-2	SMUD	-92,196	10029	31.5	($1,264,152)	($168,358)	($40,229)	7.5	31.4	$1,095,794	$1,223,923
CZ13	PG&E	-96,021	10056	30.7	($1,264,510)	($308,542)	($44,202)	4.1	28.6	$955,969	$1,220,308
CZ14	SDG&E	-96,021	10056	30.7	($1,264,510)	($110,730)	($44,202)	11.4	28.6	$1,153,780	$1,220,308
CZ14-2	SCE	-44,856	5579	19.0	($1,262,631)	$8,996	($10,256)	>1	123.1	$1,271,627	$1,252,375
CZ15	SCE	-211,468	17599	42.9	($1,268,907)	($625,671)	($228,203)	2.0	5.6	$643,236	$1,040,704
CZ16	PG&E	-211,468	17599	42.9	($1,268,907)	$37,142	($228,203)	>1	5.6	$1,306,049	$1,040,704
CZ16-2	LA	-155,861	16917	54.7	($1,265,139)	($568,892)	($106,835)	2.2	11.8	$696,246	$1,158,304

Figure 75. Cost Effectiveness for Small Hotel – All-Electric + 3kW PV + 5 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 3kW PV + 5kWh Battery											
CZ01	PG&E	-155,861	16917	54.7	($1,288,428)	($568,892)	($106,835)	2.3	12.1	$719,536	$1,181,593
CZ02	PG&E	-113,954	12677	40.9	($1,288,428)	($229,433)	($41,288)	5.6	31.2	$1,058,996	$1,247,140
CZ03	PG&E	-105,862	12322	41.4	($1,288,428)	($309,874)	($41,175)	4.2	31.3	$978,554	$1,247,253
CZ04	PG&E	-108,570	11927	37.5	($1,288,428)	($208,239)	($42,689)	6.2	30.2	$1,080,190	$1,245,740
CZ04-2	CPAU	-108,570	11927	37.5	($1,288,428)	($6,261)	($42,689)	205.8	30.2	$1,282,167	$1,245,740
CZ05	PG&E	-103,579	11960	39.3	($1,288,428)	($332,879)	($44,051)	3.9	29.2	$955,549	$1,244,377
CZ06	SCE	-73,524	8912	30.3	($1,288,428)	($52,341)	($17,484)	24.6	73.7	$1,236,087	$1,270,944
CZ06-2	LA	-73,524	8912	30.3	($1,288,428)	$48,898	($17,484)	>1	73.7	$1,337,326	$1,270,944
CZ07	SDG&E	-64,859	8188	29.0	($1,288,428)	($120,842)	($12,337)	10.7	104.4	$1,167,586	$1,276,091
CZ08	SCE	-67,090	8353	29.2	($1,288,428)	($43,964)	($11,618)	29.3	110.9	$1,244,464	$1,276,810
CZ08-2	LA	-67,090	8353	29.2	($1,288,428)	$48,736	($11,618)	>1	110.9	$1,337,164	$1,276,810
CZ09	SCE	-67,483	8402	29.3	($1,288,428)	($35,547)	($11,126)	36.2	115.8	$1,252,881	$1,277,302
CZ09-2	LA	-67,483	8402	29.3	($1,288,428)	$52,410	($11,126)	>1	115.8	$1,340,838	$1,277,302
CZ10	SDG&E	-75,157	8418	27.2	($1,288,428)	($156,973)	($25,469)	8.2	50.6	$1,131,455	$1,262,959
CZ10-2	SCE	-75,157	8418	27.2	($1,288,428)	($54,711)	($25,469)	23.5	50.6	$1,233,718	$1,262,959
CZ11	PG&E	-94,783	10252	31.9	($1,288,428)	($169,847)	($38,904)	7.6	33.1	$1,118,582	$1,249,524
CZ12	PG&E	-94,702	10403	33.0	($1,288,428)	($324,908)	($34,968)	4.0	36.8	$963,520	$1,253,460
CZ12-2	SMUD	-94,297	10403	33.1	($1,288,428)	$13,603	($33,757)	>1	38.2	$1,302,031	$1,254,671
CZ13	PG&E	-92,196	10029	31.5	($1,288,428)	($168,358)	($40,229)	7.7	32.0	$1,120,071	$1,248,199
CZ14	SDG&E	-96,021	10056	30.7	($1,288,428)	($308,542)	($44,202)	4.2	29.1	$979,887	$1,244,226
CZ14-2	SCE	-96,021	10056	30.7	($1,288,428)	($110,730)	($44,202)	11.6	29.1	$1,177,698	$1,244,226
CZ15	SCE	-44,856	5579	19.0	($1,288,428)	$8,996	($10,256)	>1	125.6	$1,297,425	$1,278,172
CZ16	PG&E	-211,468	17599	42.9	($1,288,428)	($625,671)	($228,203)	2.1	5.6	$662,757	$1,060,225
CZ16-2	LA	-211,468	17599	42.9	($1,288,428)	$37,142	($228,203)	>1	5.6	$1,325,570	$1,060,225

Figure 76. Cost Effectiveness for Small Hotel – All-Electric + 80kW PV

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 80kW PV											
CZ01	PG&E	-54,712	16917	74.6	($1,123,442)	($240,170)	$106,722	4.7	>1	$883,272	$1,230,164
CZ02	PG&E	8,853	12677	65.0	($1,124,415)	$128,649	$223,510	>1	>1	$1,253,063	$1,347,925
CZ03	PG&E	15,612	12322	65.3	($1,126,687)	$44,532	$215,260	>1	>1	$1,171,219	$1,341,947
CZ04	PG&E	15,490	11927	62.0	($1,126,522)	$145,778	$225,402	>1	>1	$1,272,300	$1,351,924
CZ04-2	CPAU	15,490	11927	62.0	($1,126,522)	$289,094	$225,402	>1	>1	$1,415,616	$1,351,924
CZ05	PG&E	25,436	11960	64.8	($1,126,575)	$56,019	$229,149	>1	>1	$1,182,594	$1,355,724
CZ06	SCE	48,875	8912	54.4	($1,126,716)	$163,343	$253,445	>1	>1	$1,290,060	$1,380,161
CZ06-2	LA	62,439	8188	54.1	($1,125,064)	$115,822	$266,502	>1	>1	$1,240,886	$1,391,565
CZ07	SDG&E	56,727	8353	53.5	($1,123,034)	$147,987	$275,773	>1	>1	$1,271,022	$1,398,808
CZ08	SCE	56,727	8353	53.5	($1,123,034)	$163,971	$275,773	>1	>1	$1,287,005	$1,398,808
CZ08-2	LA	55,185	8402	53.7	($1,124,832)	$155,101	$266,880	>1	>1	$1,279,933	$1,391,712
CZ09	SCE	55,185	8402	53.7	($1,124,832)	$169,010	$266,880	>1	>1	$1,293,843	$1,391,712
CZ09-2	LA	50,731	8418	52.0	($1,121,834)	$113,936	$249,207	>1	>1	$1,235,770	$1,371,041
CZ10	SDG&E	50,731	8418	52.0	($1,121,834)	$138,265	$249,207	>1	>1	$1,260,099	$1,371,041
CZ10-2	SCE	25,882	10252	55.6	($1,122,643)	$162,626	$229,944	>1	>1	$1,285,269	$1,352,587
CZ11	PG&E	27,731	10403	57.1	($1,124,083)	$12,954	$236,794	>1	>1	$1,137,037	$1,360,876
CZ12	PG&E	28,136	10403	57.2	($1,124,083)	$206,756	$238,005	>1	>1	$1,330,839	$1,362,087
CZ12-2	SMUD	26,706	10029	55.0	($1,122,455)	$165,991	$219,574	>1	>1	$1,288,446	$1,342,030
CZ13	PG&E	41,989	10056	57.8	($1,122,814)	$22,333	$273,768	>1	>1	$1,145,147	$1,396,582
CZ14	SDG&E	41,989	10056	57.8	($1,122,814)	$120,943	$273,768	>1	>1	$1,243,757	$1,396,582
CZ14-2	SCE	83,393	5579	44.0	($1,120,934)	$210,511	$276,228	>1	>1	$1,331,445	$1,397,162
CZ15	SCE	-76,971	17599	69.2	($1,127,210)	($199,308)	$53,550	5.7	>1	$927,902	$1,180,760
CZ16	PG&E	-76,971	17599	69.2	($1,127,210)	$172,787	$53,550	>1	>1	$1,299,997	$1,180,760
CZ16-2	LA	-54,712	16917	74.6	($1,123,442)	($240,170)	$106,722	4.7	>1	$883,272	$1,230,164

Figure 77. Cost Effectiveness for Small Hotel – All-Electric + 80kW PV + 50 kWh Battery

CZ	IOU territory	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
All-Electric + 80kW PV + 50kWh Battery											
CZ01	PG&E	-55,323	16917	75.7	($1,095,542)	($238,351)	$118,605	4.6	>1	$857,191	$1,214,147
CZ02	PG&E	7,849	12677	67.4	($1,096,515)	$129,794	$239,632	>1	>1	$1,226,309	$1,336,146
CZ03	PG&E	14,594	12322	67.7	($1,098,787)	$43,166	$235,280	>1	>1	$1,141,953	$1,334,067
CZ04	PG&E	14,459	11927	64.4	($1,098,622)	$148,698	$249,244	>1	>1	$1,247,320	$1,347,866
CZ04-2	CPAU	14,459	11927	64.4	($1,098,622)	$286,573	$249,244	>1	>1	$1,385,195	$1,347,866
CZ05	PG&E	24,292	11960	67.6	($1,098,675)	$53,719	$244,514	>1	>1	$1,152,394	$1,343,189
CZ06	SCE	47,762	8912	57.2	($1,098,816)	$165,763	$267,221	>1	>1	$1,264,579	$1,366,037
CZ06-2	LA	61,252	8188	57.1	($1,097,164)	$138,060	$283,797	>1	>1	$1,235,223	$1,380,960
CZ07	SDG&E	55,588	8353	56.2	($1,095,134)	$138,718	$286,483	>1	>1	$1,233,852	$1,381,618
CZ08	SCE	55,588	8353	56.2	($1,095,134)	$165,932	$286,483	>1	>1	$1,261,066	$1,381,618
CZ08-2	LA	54,162	8402	56.1	($1,096,932)	$149,615	$269,453	>1	>1	$1,246,548	$1,366,386
CZ09	SCE	54,162	8402	56.1	($1,096,932)	$171,168	$269,453	>1	>1	$1,268,101	$1,366,386
CZ09-2	LA	49,832	8418	54.1	($1,093,934)	$120,627	$250,720	>1	>1	$1,214,561	$1,344,654
CZ10	SDG&E	49,832	8418	54.1	($1,093,934)	$136,144	$250,720	>1	>1	$1,230,078	$1,344,654
CZ10-2	SCE	25,148	10252	57.3	($1,094,743)	$160,744	$233,842	>1	>1	$1,255,487	$1,328,585
CZ11	PG&E	26,813	10403	59.2	($1,096,183)	$10,314	$247,504	>1	>1	$1,106,497	$1,343,686
CZ12	PG&E	27,217	10403	59.3	($1,096,183)	$206,749	$248,790	>1	>1	$1,302,931	$1,344,973
CZ12-2	SMUD	26,027	10029	56.5	($1,094,555)	$164,506	$229,300	>1	>1	$1,259,061	$1,323,856
CZ13	PG&E	41,123	10056	59.7	($1,094,914)	$25,707	$276,947	>1	>1	$1,120,621	$1,371,860
CZ14	SDG&E	41,123	10056	59.7	($1,094,914)	$119,382	$276,947	>1	>1	$1,214,296	$1,371,860
CZ14-2	SCE	82,697	5579	45.5	($1,093,034)	$209,837	$277,287	>1	>1	$1,302,871	$1,370,321
CZ15	SCE	-77,815	17599	71.1	($1,099,310)	($193,758)	$65,850	5.7	>1	$905,552	$1,165,160
CZ16	PG&E	-77,815	17599	71.1	($1,099,310)	$175,872	$65,850	>1	>1	$1,275,182	$1,165,160
CZ16-2	LA	-55,323	16917	75.7	($1,095,542)	($238,351)	$118,605	4.6	>1	$857,191	$1,214,147

6.8 List of Relevant Efficiency Measures Explored

The Reach Code Team started with a potential list of energy efficiency measures proposed for 2022 Title 24 codes and standards enhancement measures, as well as measures from the 2018 International Green Construction Code, which is based on ASHRAE Standard 189.1-2017. The team also developed new measures based on their experience. This original list was over 100 measures long. The measures were filtered based on applicability to the prototypes in this study, ability to model in simulation software, previously demonstrated energy savings potential, and market readiness. The list of 28 measures below represent the list of efficiency measures that meet these criteria and were investigated to some degree. The column to the far right indicates whether the measure was ultimately included in analysis or not.

Figure 78. List of Relevant Efficiency Measures Explored

Building Component	Measure Name	Measure Description	Notes	Include?
Water Heating	Drain water Heat Recovery	Add drain water heat recovery in hotel prototype	Requires calculations outside of modeling software.	Y
Envelope	High performance fenestration	Improved fenestration SHGC (reduce to 0.22).		Y
Envelope	High SHGC for cold climates	Raise prescriptive fenestration SHGC (to 0.45) in cold climates where additional heat is beneficial.		Y
Envelope	Allowable fenestration by orientation	Limit amount of fenestration as a function of orientation		Y
Envelope	High Thermal Mass Buildings	Increase building thermal mass. Thermal mass slows the change in internal temperature of buildings with respect to the outdoor temperature, allowing the peak cooling load during summer to be pushed to the evening, resulting in lower overall cooling loads.	Initial energy modeling results showed marginal cooling savings, negative heating savings.	N
Envelope	Opaque Insulation	Increases the insulation requirement for opaque envelopes (i.e., roof and above-grade wall).	Initial energy modeling results showed marginal energy savings at significant costs which would not meet c/e criteria.	N
Envelope	Triple pane windows	U-factor of 0.20 for all windows	Initial energy modeling results showed only marginal energy savings and, in some cases, increased energy use.	N



Building Component	Measure Name	Measure Description	Notes	Include?
Envelope	Duct Leakage Testing	Expand duct leakage testing requirements based on ASHRAE Standard 215-2018: Method of Test to Determine Leakage of Operating HVAC Air Distribution Systems (ANSI Approved).	More research needs to be done on current duct leakage and how it can be addressed.	N
Envelope	Fenestration area	Reduce maximum allowable fenestration area to 30%.	Instead of this measure, analyzed measure which looked at limiting fenestration based on wall orientation.	N
Envelope	Skinny triple pane windows	U-factor of 0.20 for all windows, with no changes to existing framing or building structure.	Market not ready. No commercially-available products for commercial buildings.	N
Envelope	Permanent projections	Detailed prescriptive requirements for shading based on ASHRAE 189. PF >0.50 for first story and >0.25 for other floors. Many exceptions. Corresponding SHGC multipliers to be used.	Title 24 already allows owner to trade off SHGC with permanent projections. Also, adding requirements for permanent projections would raise concerns.	N
Envelope	Reduced infiltration	Reduce infiltration rates by improving building sealing.	Infiltration rates are a fixed ACM input and cannot be changed. A workaround attempt would not be precise, and the practicality of implementation by developers is low given the modeling capabilities and the fact that in-field verification is challenging. Benefits would predominantly be for air quality rather than energy.	N

Building Component	Measure Name	Measure Description	Notes	Include?
HVAC	Heat recovery ventilation	For the hotel, recover and transfer heat from exhausted air to ventilation air.	For small hotels, the ventilation requirement could be met by various approaches, and the most common ones are: a. Exhaust only system, and ventilation is met by infiltration or window operation. b. Through a Z-duct that connects the zone AC unit's intake to an outside air intake louver. c. Centralized ventilation system (DOAS) The prototype developed for the small hotel is using Type 2 above. The major consideration is that currently, HRV + PTACs cannot be modeled at each guest room, only at the rooftop system. Option 1 would require the same type of HRV implementation as Option 2. Option 3 may be pursuable, but would require a significant redesign of the system, with questionable impacts. Previous studies have found heat recovery as cost effective in California only in buildings with high loads or high air exchange rates, given the relatively mild climate.	N
HVAC	Require Economizers in Smaller Capacity Systems	Lower the capacity trigger for air economizers. Previous studies have shown cost effectiveness for systems as low as 3 tons.		Y
HVAC	Reduce VAV minimum flow limit	Current T24 and 90.1 requirements limit VAV minimum flow rates to no more than 20% of maximum flow. Proposal based on ASHRAE Guideline 36 which includes sequences that remove technical barriers that previously existed. Also, most new DDC controllers are now capable of lower limits. The new limit may be as low as the required ventilation rate. A non-energy benefit of this measure is a reduction in over-cooling, thus improving comfort.		Y

Building Component	Measure Name	Measure Description	Notes	Include?
HVAC	Building Automation System (BAS) improvements	With adoption of ASHRAE Guideline 36 (GDL-36), there is now a national consensus standard for the description of high-performance sequences of operation. This measure will update BAS control requirements to improve usability and enforcement and to increase energy efficiency. BAS control requirement language will be improved either by adoption of similar language to GDL-36, or reference to GDL-36. Specific T24 BAS control topics that will be addressed include at a minimum: DCV, demand-based reset of SAT, demand-based reset of SP, dual-maximum zone sequences, and zone groups for scheduling.	In order to realize any savings in the difference, we would need a very detailed energy model with space-by-space load/occupant diversity, etc. We would also need more modeling capability than is currently available in CBECC-Com.	N
HVAC	Fault Detection Devices (FDD)	Expand FDD requirements to a wider range of AHU faults beyond the economizer. Fault requirements will be based on NIST field research, which has consequently been integrated into ASHRAE Guideline 36 Best in Class Sequences of Operations. Costs are solely to develop the sequences, which is likely minimal, and much of the hardware required for economizer FDD is also used to detect other faults.	Market not ready.	N
HVAC	Small circulator pumps ECM, trim to flow rate	Circulator pumps for industry and commercial.	Hot water pump energy use is small already (<1% building electricity usage) so not much savings potential. More savings for CHW pumps. Modeling limitations as well.	N
HVAC	High Performance Ducts to Reduce Static Pressure	Revise requirements for duct sizing to reduce static pressure.	Preliminary energy modeling results showed only marginal energy savings compared to measure cost.	N
HVAC	Parallel fan-powered boxes	Use of parallel fan-powered boxes	Unable to model PFPB with variable speed fans in modeling software.	N
Lighting	Daylight Dimming Plus OFF	Automatic daylight dimming controls requirements include the OFF step.		Y
Lighting	Occupant Sensing in Open Plan Offices	Take the PAF without allowing for increased design wattage		Y
Lighting	Institutional tuning	Take the PAF without allowing for increased design wattage		Y

Building Component	Measure Name	Measure Description	Notes	Include?
Lighting	Reduced Interior Lighting Power Density	Reduced interior LPD values.		Y
Lighting	Shift from general to task illumination	Low levels of general illumination with task and accent lighting added to locations where higher light levels are required. The shift from general to task illumination measure is based on the assumption that proper lighting of a desk surface with high efficacy lighting can allow for the significant reduction of ambient general lighting.	This is a tough measure to require as the LPDs decrease.	N
Lighting	Future-proof lighting controls	Fill any holes in the current code that could lead to the situations where TLEDS or LED fixtures that are not dimmable or upgradable in the future, or any other issues with code that make it hard to transition to ALCS/IoT lighting in the future	Major lighting controls already covered in other measures being considered	N
Lighting	Integrated control of lighting and HVAC systems	Formalize the definition of "lighting and HVAC control integration" by defining the level of data sharing required between systems and the mechanism needed to share such data. The highest savings potential would likely be generated from VAV HVAC systems by closing the damper in unoccupied zones based on the occupancy sensor information from the lighting systems.	Not market ready enough.	N
Other	NR Plug Load Controls	Energy savings opportunities for plug loads, which may include: energy efficient equipment, equipment power management, occupancy sensor control, and occupant awareness programs. The proposal could be extending controlled receptacles requirements in Section 130.5(d) to more occupancy types. It would also consider circuit-level controls.	Office equipment now all have their own standby power modes that use very little power, making plug load controls very difficult to be cost-effective.	N

6.9 Additional Rates Analysis - Healdsburg

After the final version of the report was released, the Reach Code Team provided additional cost effectiveness analysis in Climate Zone 2 using City of Healdsburg electric utility rates and PG&E gas rates. All aspects of the methodology remain the same, and the results for each package and prototype are aggregated below in Figure 79 through Figure 81. Results generally indicate:

- Mixed fuel prototypes achieve positive compliance margins for EE packages and are cost effective.
- All-electric prototypes achieve slightly lower compliance margins than mixed fuel for EE packages and are cost effective.
- All PV and PV+Battery packages are cost effective both using an on-bill and TDV approach.

Figure 79. Healdsburg Utility Rates Analysis – Medium Office, All Packages Cost Effectiveness Summary

Prototype	Package	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Comp-liance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Medium Office	Mixed Fuel + EE	40,985	-505	8.1	17%	$66,649	$89,645	$99,181	1.3	1.5	$22,996	$32,532
	Mixed Fuel + EE + PVB	255,787	-505	50.6	17%	$359,648	$510,922	$573,033	1.4	1.6	$151,274	$213,385
	Mixed Fuel + HE	3,795	550	4.3	4%	$68,937	$24,204	$24,676	0.4	0.4	-$44,733	-$44,261
	All-Electric	-49,684	3,868	5.0	-7%	-$73,695	-$7,042	-$41,429	10.5	1.8	$66,653	$32,266
	All-Electric + EE	-11,811	3,868	15.2	10%	-$7,046	$83,285	$58,563	>1	>1	$90,331	$65,609
	All-Electric + EE + PVB	203,026	3,868	57.8	10%	$285,953	$511,954	$532,273	1.8	1.9	$226,001	$246,320
	All-Electric + HE	-45,916	3,868	6.1	-5%	-$22,722	$6,983	-$26,394	>1	0.9	$29,705	-$3,672
	Mixed Fuel + 3kW	4,785	0	0.9	n/a	$5,566	$10,430	$10,500	1.9	1.9	$4,864	$4,934
	Mixed Fuel + 3kW + 5kWh	4,785	0	0.9	n/a	$8,356	$10,430	$10,500	1.2	1.3	$2,074	$2,144
	Mixed Fuel + 135kW	215,311	0	41.5	n/a	$250,470	$424,452	$471,705	1.7	1.9	$173,982	$221,235
	Mixed Fuel + 135kW + 50kWh	214,861	0	42.6	n/a	$278,370	$423,721	$472,898	1.5	1.7	$145,351	$194,528
	All-Electric + 3kW	-44,899	3,868	6.0	n/a	-$68,129	$3,299	-$30,928	>1	2.2	$71,429	$37,201
	All-Electric + 3kW + 5kWh	-44,899	3,868	6.0	n/a	-$65,339	$3,299	-$30,928	>1	2.1	$68,639	$34,411
	All-Electric + 135kW	165,627	3,868	46.6	n/a	$176,775	$424,146	$430,276	2.4	2.4	$247,371	$253,501
	All-Electric + 135kW + 50kWh	165,200	3,868	47.7	n/a	$204,675	$423,466	$431,469	2.1	2.1	$218,792	$226,795
	All-Electric + 80kW + 50kWh	40,985	-505	8.1	17%	$66,649	$89,645	$99,181	1.3	1.5	$22,996	$32,532

Figure 80. Healdsburg Utility Rates Analysis – Medium Retail, All Packages Cost Effectiveness Summary

Prototype	Package	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Comp-liance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Medium Retail	Mixed Fuel + EE	18,885	613	8.7	13%	$5,569	$49,546	$59,135	8.9	10.6	$43,977	$53,566
	Mixed Fuel + EE + PVB	189,400	613	43.8	13%	$249,475	$376,219	$465,474	1.5	1.9	$126,744	$215,999
	Mixed Fuel + HE	2,288	229	2.0	3%	$9,726	$13,143	$13,998	1.4	1.4	$3,417	$4,273
	All-Electric	-21,786	2,448	7.5	-1%	-$27,464	$9,228	-$4,483	>1	6.1	$36,692	$22,981
	All-Electric + EE	2,843	2,448	14.6	13%	-$21,895	$61,918	$56,893	>1	>1	$83,813	$78,788
	All-Electric + EE + PVB	173,387	2,448	49.9	13%	$222,012	$391,257	$463,431	1.8	2.1	$169,245	$241,419
	All-Electric + HE	-16,989	2,448	8.9	3%	-$4,211	$23,567	$11,251	>1	>1	$27,779	$15,463
	Mixed Fuel + 3kW	4,685	0	0.9	n/a	$5,566	$10,256	$10,262	1.8	1.8	$4,690	$4,696
	Mixed Fuel + 3kW + 5kWh	4,685	0	0.9	n/a	$8,356	$10,256	$10,262	1.2	1.2	$1,900	$1,906
	Mixed Fuel + 110kW	171,790	0	33.3	n/a	$204,087	$316,293	$376,300	1.5	1.8	$112,206	$172,213
	Mixed Fuel + 110kW + 50kWh	170,542	0	35.1	n/a	$231,987	$320,349	$398,363	1.4	1.7	$88,363	$166,376
	All-Electric + 3kW	-17,101	2,448	8.4	n/a	-$21,898	$19,523	$5,779	>1	>1	$41,421	$27,677
	All-Electric + 3kW + 5kWh	-17,101	2,448	8.4	n/a	-$19,108	$19,523	$5,779	>1	>1	$38,631	$24,887
	All-Electric + 110kW	150,004	2,448	40.8	n/a	$176,623	$332,213	$371,817	1.9	2.1	$155,591	$195,194
	All-Electric + 110kW + 50kWh	148,793	2,448	42.9	n/a	$204,523	$335,043	$394,099	1.6	1.9	$130,520	$189,577

Figure 81. Healdsburg Utility Rates Analysis – Small Hotel, All Packages Cost Effectiveness Summary

Prototype	Package	Elec Savings (kWh)	Gas Savings (therms)	GHG savings (tons)	Comp-liance Margin (%)	Incremental Package Cost	Lifecycle Energy Cost Savings	$-TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
Small Hotel	Mixed Fuel + EE	3,802	976	3.9	7%	$20,971	$22,829	$29,353	1.1	1.4	$1,857	$8,381
	Mixed Fuel + EE + PVB	130,144	976	31.1	7%	$205,967	$254,577	$336,575	1.2	1.6	$48,610	$130,608
	Mixed Fuel + HE	981	402	2.7	3%	$23,092	$12,291	$11,808	0.5	0.5	-$10,801	-$11,284
	All-Electric	-118,739	12,677	40.0	-12%	-$1,297,757	-$24,318	-$51,620	53.4	25.1	$1,273,439	$1,246,137
	All-Electric + EE	-88,410	12,677	45.9	5%	-$1,265,064	$45,918	$20,860	>1	>1	$1,310,982	$1,285,924
	All-Electric + EE + PVB	38,115	12,677	73.5	5%	-$1,080,068	$296,233	$317,296	>1	>1	$1,376,301	$1,397,365
	All-Electric + HE	-118,284	12,677	41.2	-11%	-$1,283,243	-$83,994	-$44,505	15.3	28.8	$1,199,249	$1,238,738
	Mixed Fuel + 3kW	4,785	0	0.9	n/a	$5,566	$8,927	$10,332	1.6	1.9	$3,361	$4,766
	Mixed Fuel + 3kW + 5kWh	4,785	0	0.9	n/a	$8,356	$8,927	$10,332	1.1	1.2	$571	$1,976
	Mixed Fuel + 80kW	127,592	0	25.0	n/a	$148,427	$229,794	$275,130	1.5	1.9	$81,367	$126,703
	Mixed Fuel + 80kW + 50kWh	126,332	0	28.1	n/a	$176,327	$236,570	$296,058	1.3	1.7	$60,243	$119,731
	All-Electric + 3kW	-113,954	12,677	40.9	n/a	-$1,292,191	-$14,447	-$41,288	89.4	31.3	$1,277,744	$1,250,902
	All-Electric + 3kW + 5kWh	-113,954	12,677	40.9	n/a	-$1,289,401	-$14,447	-$41,288	89.3	31.2	$1,274,954	$1,248,112
	All-Electric + 80kW	8,853	12,677	65.0	n/a	-$1,149,330	$222,070	$223,510	>1	>1	$1,371,400	$1,372,840
	All-Electric + 80kW + 50kWh	7,849	12,677	67.4	n/a	-$1,121,430	$223,812	$239,632	>1	>1	$1,345,241	$1,361,062

BUSINESS OF THE COUNCIL OF THE CITY OF HALF MOON BAY

AGENDA REPORT

For meeting of: **December 7th, 2021**

TO: Honorable Mayor and City Council

VIA: Bob Nisbet, City Manager

FROM: Lisa Lopez Rossi, Administrative Services Director
Catherine C. Engberg, City Attorney

TITLE: **VACCINATIONS**

RECOMMENDATION:
Receive an informational report on the status of vaccinations and provide further direction regarding mandating vaccinations for City employees and contractors.

FISCAL IMPACT:
There is no significant fiscal impact to the City.

STRATEGIC ELEMENT:
This action supports the Healthy Communities and Public Safety elements of the Strategic Plan.

BACKGROUND/DISCUSSION:
The COVID-19 pandemic is a public health emergency. The overwhelming consensus of public health authorities, including the State Public Health Officer and the County Health Officer, is that vaccination against COVID-19 is the most effective means of preventing infection with the COVID-19 virus, and subsequent transmission and outbreaks. Within the City, staff were strongly encouraged to receive their vaccination and city administration allowed departments heads to work with staff to allow them to schedule appointments during work hours.

In September, the California Occupational Safety and Health Standards Board issued additional Cal/OSHA COVID-19 Prevention emergency temporary standards mandating that all businesses track employee's vaccination records while stopping short of mandating vaccines for all employees. Human Resources followed the new mandate and assumed the collection and management without any issue for the City.

On October 8, 2021, San Francisco Mayor London Breed issued a Mayoral Order mandating vaccination for all City contractors who work alongside City employees on a regular basis at a facility owned, leased, or controlled by the City. This mandate will also apply to all City Commissioners. All contractors will be required to be fully vaccinated by December 31st.

On October 15, 2021, the County of San Mateo announced a similar mandate for all County employees, which is included as Attachment 1. All county employees must be vaccinated or subject to weekly testing.

At the November 2, 2021, City Council meeting, Councilmember Rarback requested a future agenda item to consider a vaccination mandate for all contractors doing business with the City.

The status of federal vaccination mandates are currently in flux. On November 4, 2021, the Occupational Safety and Health Administration (Fed/OSHA) issued an emergency temporary standard (ETS) requiring all private employers with 100 or more workers to ensure all employees are either fully vaccinated for COVID-19 or provide a weekly negative test and wear a face covering while working. On November 6, 2021, the 5th U.S. Circuit Court of Appeals in New Orleans issued a stay temporarily blocking the policy after a range of lawsuits were filed in states across the country. Fed/OSHA subsequently suspended implementation and enforcement of the ETS pending future developments in the litigation. Likewise, it appears that Cal/OSHA has also paused any rulemaking activities related to the vaccine mandate until litigation regarding the vaccine mandate and testing requirements for employers with 100 or more employees is resolved. In addition, on November 30, 2021, a federal district court in Kentucky issued a preliminary injunction halting the implementation of the Executive Order 14042, federal contractor vaccine mandate (EO 14042).

ATTACHMENT:
San Mateo County Vaccine Policy

COVID-19 Vaccine Status Verification

and Testing Policy

I. PURPOSE

This policy is enacted in order to set forth the County of San Mateo's policy regarding COVID-19 vaccine status verification, vaccine requirements and testing requirements as directed by the County Manager and/or mandated by the July 26th, August 5th, and August 19th Orders of the State Public Health Officer of the State of California.

II. EFFECTIVE DATE

This policy is effective as of October 15, 2021.

III. SCOPE OF POLICY

This policy applies to all County staff.

IV. POLICY

A. Emergency Health and Safety Measure.

The COVID-19 pandemic is a public health emergency. The overwhelming consensus of public health authorities, including the State Public Health Officer and the County Health Officer, is that vaccination against COVID-19 is the most effective means of preventing infection with the COVID-19 virus, and subsequent transmission and outbreaks. COVID-19 vaccine status verification and vaccine or testing requirements are critical and necessary steps to ensuring the health and safety within County facilities and preventing the spread of COVID-19, especially in light of the highly transmissible variants.

State Public Health Officer Orders establish vaccine mandates for workers in specified health care facilities and other high-risk settings where there is frequent exposure to staff and highly vulnerable patients. The County is expanding these requirements and requiring all County employees not already covered by one of the State Public Health Officer Orders, to either submit proof of vaccination or to be tested for COVID-19 at least once a week.

The below COVID-19 vaccine status verification, vaccine requirements, and testing are reasonable and essential health and safety measures that are job related and consistent with business necessity because individuals with COVID-19 pose a direct threat to others in any indoor facilities during the COVID-19 pandemic. By complying with these requirements, staff diminish the risk of transmitting COVID-19 and can more safely perform their duties working among colleagues and with members of the public. COVID-19 vaccine status verification and testing pursuant to the conditions described below are mandatory and a condition of employment for County employees.

B. Vaccine Status Verification.

All County departments must verify the vaccine status of all employees. All County facilities identified in the July 26th, August 5th, and August 19th State Public Health Orders (including health care, long-term

care, and correctional facilities) must verify the vaccine status of all workers, including employees, contractors, and volunteers.

1. Pursuant to the CDPH Guidance for Vaccine Records Guidelines & Standards, the County will accept the a photo or a scanned copy of any of the following records as proof of vaccination:

a. COVID-19 Vaccination Record Card (issued by the Department of Health and Human Services Centers for Disease Control & Prevention or WHO Yellow Card) which includes name of person vaccinated, type of vaccine provided and date last dose administered); OR

b. Documentation of COVID-19 vaccination from a health care provider; OR

c. Digital record that includes a QR code confirming the vaccine record as an official record of the state of California.

Please note: The proof of vaccination staff provide may be used by the County of San Mateo (1) Occupational Health Coordinator, (2) Risk Manager, (3) Community Contact Tracers, (4) County Contact Tracers, and (5) County Safety Officers to prevent, manage, and respond to COVID-19 transmission and exposure risk.

2. Employees are to upload their proof of vaccination to Workday so the County can verify their vaccination status.

a. Employees who are required to comply with the July 26, 2021 State Health Orders must have uploaded their proof of vaccination by August 23, 2021 (or as soon thereafter as the employee is fully vaccinated), as specified in that Order.

b. Employees who are not subject to that State Health Order must upload this proof of vaccination by November 15, 2021.

3. Workers who are not fully vaccinated, or for whom vaccine status is unknown or documentation is not provided, must be considered unvaccinated.

C. Health care setting vaccine requirements:

1. All workers who provide services or work in health care settings identified by CDPH in the August 5, 2021 State Health Order must comply with that Order and thus must have their first dose of a one-dose COVID vaccine regimen or their second dose of a two-dose COVID vaccine regimen by September 30, 2021. Prior to this date, unvaccinated or incompletely vaccinated workers in such facilities must comply with the respirator and testing requirements discussed below. This requirement applies to the following settings:

a. Acute Health Care and Long-Term Care Settings:
   1. General Acute Care Hospitals
   2. Skilled Nursing facilities (including Subacute Facilities)
   3. Intermediate Care Facilities

b. Other Health Care Settings:

1. Acute Psychiatric Hospitals
2. Adult Day Health Care Centers
3. Program of All-Inclusive Care for the Elderly (PACE) and PACE Centers
4. Ambulatory Surgery Centers
5. Chemical Dependency Recovery Hospitals
6. Clinics & Doctor Offices (including behavioral health, surgical)
7. Congregate Living Health Facilities
8. Dialysis Centers
9. Hospice Facilities
10. Pediatric Day Health and Respite Care Facilities
11. Residential Substance Use Treatment and Mental Health Treatment Facilities.

2. All workers who are regularly assigned to 1) provide health care or health care services to inmates, prisoners, or detainees or 2) work within hospitals, skilled nursing facilities, intermediate care facilities, or the equivalent that are integrated into the correctional facility or detention center in areas where health care is provided must comply with the August 19, 2021 State Health Order and thus must have their first dose of a one-dose COVID vaccine regimen or their second dose of a two-dose COVID vaccine regimen by October 14, 2021. Prior to this date, unvaccinated or incompletely vaccinated workers in such facilities must comply with the respirator and testing requirements discussed below.

3. Workers may be exempt from these vaccination requirements only upon providing Human Resources a declination form, signed by the individual stating either of the following: (1) the worker is declining vaccination based on Religious Beliefs, or (2) the worker is excused from receiving any COVID-19 vaccine due to Qualifying Medical Reasons.

a. To be eligible for a Qualified Medical Reasons exemption, the worker must also provide to the County's ADA Manager, Alicia Kellie, a written statement signed by a physician, nurse practitioner, or other licensed medical professional practicing under the license of a physician stating that the individual qualifies for the exemption (but the statement should not describe the underlying medical condition or disability) and indicating the probable duration of the worker's inability to receive the vaccine (or if the duration is unknown or permanent, so indicate).

4. If the County deems a worker subject to a State Health Officer Order vaccine requirement to have met the requirements of an exemption pursuant to section IV.C.3, the unvaccinated exempt worker must continue to comply with the 1) respirator or mask requirements and 2) testing requirements, as described below in Sections IV.D-E.

D. Respirator or mask requirements:

A. All County facilities must strictly adhere to current CDPH Masking Guidance. To the extent they are already applicable, facilities must also continue to adhere to Cal/OSHA's standards for Aerosol Transmissible Diseases (ATD), which requires respirator use in areas where suspected

and confirmed COVID-19 cases may be present, and the Emergency Temporary Standards (ETS) that requires all unvaccinated workers be provided a respirator upon request.

B. Acute Health Care and Long-Term Care Settings: In addition to respirators required under Title 8 of the California Code of Regulations, facilities must provide respirators to all unvaccinated or incompletely vaccinated workers who work in indoor work settings where (1) care is provided to patients or residents, or (2) to which patients or residents have access for any purpose. Workers are strongly encouraged to wear respirators in all such settings. The facility must provide the respirators at no cost, and workers must be instructed how to properly wear the respirator and how to perform a seal check according to the manufacturer's instructions.

C. In other County facilities, where Title 8 of the California Code of Regulations does not require the use of respirators, facilities shall provide all unvaccinated or incompletely vaccinated workers with FDA-cleared surgical masks. Workers are required to wear FDA-cleared surgical masks in indoor settings anywhere they are working with another person.

E. Testing requirements:

1. Acute Health Care and Long-Term Care Settings:

   a. This testing requirement applies to workers in facilities enumerated in Section IV.C.1.a.

   b. Prior to September 30, 2021, all asymptomatic unvaccinated or incompletely vaccinated workers are required to undergo diagnostic screening testing at least twice weekly with either PCR testing or antigen testing.

   c. On and after September 30, 2021, the required twice-weekly testing continues only for those unvaccinated workers who the County has deemed to have met the requirements of an exemption to the health care worker vaccination requirement, as discussed in Section IV.C.3.

2. Correctional Facility Health Care Settings:

   a. This testing requirement applies to workers in facilities enumerated in Section IV.C.2.

   b. Prior to October 14, 2021, all asymptomatic unvaccinated or incompletely vaccinated workers are required to undergo diagnostic screening testing at once weekly with either PCR testing or antigen testing. More frequent testing improves outbreak prevention and control and is encouraged, especially with antigen testing.

   c. On and after October 14, 2021, the required weekly testing continues only for those unvaccinated workers who the County has deemed to have met the requirements of an exemption to the correctional facility health care vaccination requirement, as discussed in Section IV.C.3.

3. High-Risk Congregate Settings (excluding correctional facility health care settings):

a. This testing requirement applies to workers in High-Risk Congregate Settings-- Adult and Senior Care Facilities, Homeless Shelters, and State and Local Correctional Facilities and Detention Centers outside of correctional facility health care settings.

b. Asymptomatic unvaccinated or incompletely vaccinated workers are required to undergo diagnostic screening testing at least once weekly with either PCR testing or antigen testing. More frequent testing improves outbreak prevention and control and is encouraged, especially with antigen testing.

4. Other Health Care Settings:

a. This testing requirement applies to workers in facilities enumerated in Section IV.C.1.b, as well as Adult Day Programs Licensed by the California Department of Social Services and Dental Offices.

b. Prior to September 30, 2021, all asymptomatic unvaccinated or incompletely vaccinated workers are required to undergo diagnostic screening testing at least once weekly with either PCR testing or antigen testing. More frequent testing improves outbreak prevention and control and is encouraged, especially with antigen testing.

c. On and after September 30, 2021, the required weekly testing continues only for those unvaccinated or incompletely vaccinated workers 1) who provide services or work at Adult Day Programs Licensed by the California Department of Social Services or at Dental Office facilities, or 2) whom the County has deemed to have met the requirements of an exemption to the health care worker vaccination requirement, as discussed in Section IV.C.3.

5. All Other County Employees:

a. For County employees who are not already covered by Sections IV.E.1-4, beginning November 16, 2021, all unvaccinated or incompletely vaccinated employees are required to undergo diagnostic screening testing at least once weekly with either PCR testing or antigen testing. More frequent testing improves outbreak prevention and control and is encouraged, especially with antigen testing.

6. Availability of Testing:

a. The County will provide tests to satisfy the testing requirements for unvaccinated or incompletely vaccinated individuals required to be tested pursuant this policy during regular work shifts. Alternatively, as explained in more detail below, individuals may choose to get tested on their own time by a health care provider or testing facility of their choice and submit the date-stamped and identifiable results to the County. The test used must be either a PCR or antigen test administered under the guidance of a health care professional; self-administered home tests are not sufficient. Any PCR (molecular) or antigen test used must either have Emergency Use Authorization by the U.S. Food and Drug Administration or be operating per the Laboratory Developed Test requirements by the U.S. Centers for Medicare and Medicaid Services.

b. Unvaccinated or incompletely vaccinated individuals subject to this policy must also observe all other infection control requirements, including masking, and are not exempted from the testing requirement even if they have a medical contraindication to vaccination, since they are still potentially able to spread the illness. Previous history of COVID-19 or a previous positive antibody test for COVID-19 do not waive this requirement for testing.

c. Diagnostic screening testing of asymptomatic fully vaccinated individuals subject to this policy is not currently required by this policy. However, departments may have their own specific testing policy in place that may apply to County employees, regardless of vaccination status.

d. Facilities and departments should have a plan in place for tracking test results, conducting workplace contact tracing, and must report results to local public health departments.

F. Periodic Testing by Vendor.

The COVID-19 testing of all staff covered by this policy will be conducted by a vendor selected by the County and will be done at no cost to staff. Alternatively, staff may choose to get tested on their own time by a health care provider or testing facility of their choice and will be required to submit documentation of the date of their test and that they received a negative result. Staff who choose to get tested on their own time will still be required to be tested (or provide date-stamped test results) on a regular and periodic basis as outlined in this policy.

G. Missed Tests.

If a staff member misses the on-site COVID-19 testing provided by the County because they were not working on the date of the County testing, the County will determine if the staff member can continue to work while still complying with the above policy requirements until such time as the next on-site COVID-19 testing occurs, depending on the circumstances of each case. Alternatively, a staff member may obtain testing through a health care provider or testing facility of their choice. Staff who choose this option must provide documentation from their health care provider indicating the individual was tested for COVID-19, the date of the test and the results. The County will determine if the staff member can continue to work until such time as they are able to provide the required documentation, depending on the circumstances of each case. Staff may be required to show documentation that they have taken the test through an outside provider and are awaiting results.

If a staff member misses a required test and is unable to continue working until they comply with the testing requirement, they will be considered non-compliant with this policy, as discussed below in Section VI.

H. Test Results and Confidentiality.

The results from COVID-19 testing will be reported by the vendor to the County's Occupational Health Coordinator, Risk Manager, Community Contact Tracers, County Contact Tracers, and for

any purpose that the County reasonably deems necessary in order to take actions consistent with guidance from the CDC, CDPH and other public health or occupational safety authorities.

The County will take reasonable measures to maintain the confidentiality of information regarding the COVID-19 vaccination or testing status of staff. Any information that the County stores regarding the COVID-19 status of an employee will be separately maintained from the employee's personnel file, thus limiting access to this confidential information. The results from COVID-19 testing will only be used for purposes related to preserving the health and safety of employees, patients, clients, inmates, and the community, and will not be used for any other purpose.

An employee who tests negative for COVID-19 may continue working. An employee who has tested positive for COVID-19 and who believes they were exposed to COVID-19 while working on-site or in the field for the County (1) must contact the County's Workers Compensation Department to make a claim, and (2) should contact the County Occupational Health Coordinator to obtain guidance on health and wellness.

V. DISCLOSURE OF RESULTS AND RECEIPT OF INFORMATION

Staff are required to authorize the testing vendor to disclose test results to the County in accordance with this policy and may be required to acknowledge receipt of testing disclosures from the County or the County's testing vendor.

VI. NON-COMPLIANCE WITH POLICY

If an individual is unable to comply with the vaccination or testing requirements based on a qualifying disability or medical restrictions, they may request an ADA accommodation by contacting the County's ADA Manager. Staff who are unable to comply with the vaccination or testing requirement for any other reason, including but not limited to a religious exemption, should contact their manager or the Human Resources Department.

Volunteers who refuse to comply with vaccination or testing requirements will no longer be permitted to volunteer at County facilities that require vaccination or testing.

County employees who do not comply with this policy cannot enter any County facility. Employees who work in the field or telework may be required to report to a County facility at any time and therefore must also comply with this policy. If an employee does not comply with this policy, the employee will be placed on leave. The employee may initially use paid time off balances, except sick pay, for all missed work time until such time that they comply with the policy or the policy is revoked by the County. If you disagree with this decision you may contact Employee & Labor Relations Manager Michelle Kuka at mkuka@smcgov.org to provide information in support of your position.

Employees who continue to not comply with this policy may be subject to disciplinary action up to and including termination.

VII. DEFINITIONS:

For purposes of this Policy, the following definitions apply:

1. "Fully Vaccinated" means individuals who are considered fully vaccinated for COVID-19: two weeks or more after they have received the second dose in a 2-dose series (Pfizer-BioNTech or Moderna or vaccine authorized by the World Health Organization), or two weeks or more after they have received a single-dose vaccine (Johnson and Johnson [J&J]/Janssen). COVID-19 vaccines that are currently authorized for emergency use or that are fully approved:

   a. By the US Food and Drug Administration, are listed at https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines

   b. By the World Health Organization, are listed at https://extranet.who.int/pqweb/vaccines/covid-19-vaccines

2. "Incompletely vaccinated" means persons who have received at least one dose of COVID-19 vaccine but do not meet the definition of fully vaccinated.

3. "Respirator" means a respiratory protection device approved by the National Institute for Occupational Safety and Health (NIOSH) to protect the wearer from particulate matter, such as an N95 filtering facepiece respirator.

4. "Unvaccinated" means persons who have not received any doses of COVID-19 vaccine or whose status is unknown.

5. "WHO Yellow Card" refers to the original World Health Organization International Certificate of Vaccination or Prophylaxis issued to the individual following administration of the COVID-19 vaccine in a foreign country.

6. "Worker" refers to all paid and unpaid persons serving in health care, other health care or congregate settings who have the potential for direct or indirect exposure to patients/clients/residents or SARS-CoV-2 airborne aerosols. Workers include, but are not limited to, nurses, nursing assistants, physicians, technicians, therapists, phlebotomists, pharmacists, students and trainees, and persons not directly involved in patient care, but who could be exposed to infectious agents that can be transmitted in the health care setting (e.g., clerical, dietary, environmental services, laundry, security, engineering and facilities management, administrative, billing, and volunteer personnel).