File #: ACT 19-173

DATE: September 17, 2019

TO: Council Sustainability Committee

FROM: Director of Public Works

SUBJECT

Draft Electrification Reach Codes for 2019 California Energy Code and California Green Building Standards Code

RECOMMENDATION

That the Committee reviews and comments on this report and recommends to Council adoption of the draft Reach Code.

SUMMARY

This report presents draft ordinances to address the electrification of buildings and vehicles related to new construction. Every three years, the California Building Code undergoes a full update and the 2019 Code will be in effect on January 1, 2020. Local jurisdictions can implement codes that are more stringent than the State Code. These "Reach Codes" can address the electrification of buildings and vehicles at the time of construction of new buildings.

The proposed Reach Codes would modify Part 6 (California Energy Code) and Part 11 (California Green Building Standards Code, aka CALGreen) of the California Building Code (Title 24 of the California Code of Regulations). This report includes an overview of the Statewide cost-effectiveness study, details findings, and provides language recommended for the associated reach codes for the 2019 building cycle. The draft ordinances would require that new buildings be either: constructed as all-electric (with no natural gas plumbing); or constructed as mixed fuel with extra energy efficiency, solar, and battery storage. As discussed in this report, the Committee may recommend that mixed -fuel be removed from the reach code as an option for low-rise residential (single-family and multi-family up to three stories).

ATTACHMENTS

Attachment I	Staff Report
Attachment II	Greenhouse Gas and Energy Savings and Cost-Effectiveness
Attachment III	Reach Code for Part 6 (California Energy Code)
Attachment IV	Reach Code for Part 11 (California Green Building Standards Code)

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BACKGROUND

All-electric buildings are one of the key strategies to decarbonizing the state's building stock. The state's electric system is rapidly becoming cleaner, driven by escalating renewable portfolio standards and cleaner product offerings by the utilities and community choice energy programs including East Bay Community Energy (EBCE).

In addition, advances in electric heat pumps and other electrical equipment are yielding much higher overall efficiencies than their natural gas counterparts. Electric heat pumps, unlike traditional electric resistance heaters, do not generate heat, but concentrate and transfer it for end uses such as space conditioning/heating and water heating. This process uses less primary energy and emits much less carbon, particularly when it is powered by renewable energy. In addition, induction cooktops are gaining popularity and are significantly more efficient than gas stoves. According to EBCE, on a BTU basis, electricity is approximately three times more expensive than natural gas. However, some heat pump equipment is approximately three times more efficient than similar natural gas-powered equipment. The more significant cost savings associated with building electrification come from the avoided infrastructure and plumping needed to serve a building with natural gas.

Reach Code Adoption Process

Every three years, the State of California adopts new building standards that are organized in Title 24 of the California Code of Regulations, referred to as the California Building Standards Code. This regular update is referred to as a "code cycle." The last code cycle was adopted in 2016 and was effective as of January 1, 2017. The next code cycle was adopted in 2019 and will be effective January 1, 2020. Cities and counties can adopt reach codes that require items that are above minimum state code requirements. However, these reach codes must be filed with the State.

In addition, the California Energy Commission (CEC) requires that a cost-effectiveness study be conducted and filed in the case of local amendments to the Energy Code (Title 24, Part 6). It is required that the City demonstrate to the CEC, using a cost-effectiveness study, that the amendments to the code are financially responsible and do not represent an unreasonable burden to the non-residential and residential applicants. A cost-effectiveness study is not required for amendments to the Green Building Code (Title 24, Part 11).

Funded by the California investor-owned utilities, the California Statewide Codes and Standards Program led the development of a cost-effectiveness study[1] for Energy Code reach codes that examined different performance-based approaches for new construction of low-rise residential (single-family and multi-family up to 3 stories) and non-residential building types. A study for high-rise multi-family has yet to be completed. The results of the study are summarized in the Economic Impacts section of this report and in Attachment II.

Sustainability Committee Meetings

On July 16, 2018, the Committee considered a report titled *Building Electrification & Reducing Natural Gas Use*[2]. The Committee recommended supporting and encouraging East Bay Community Energy (EBCE) to address electrification of existing buildings. The Committee also expressed support for phasing out the use of natural gas in new construction and,

[1] https://localenergycodes.com/content/2019-local-energy-ordinances/
[2] Report is available at https://hayward.legistar.com/LegislationDetail.aspx?ID=3551018&GUID=718DCC1C-13F6-41D0-8833-C72B0B86DCE5&Options=&Search=

eventually, no longer permitting new natural gas lines for new construction. The Committee noted that heat pump water heaters in new construction may be a good place to start and that any new regulations should come with sufficient advance notice to developers and builders.

On January 14, 2019, the Committee considered a report titled *Natural Gas Use in New Construction*[3], which described the current regional effort to develop a reach code that would encourage all-electric construction. The Committee supported the idea of a reach code and asked staff to engage with local builders and developers and noted that a reach code would be most effective if all cities in the area would adopt the same requirements.

On May 13, 2019, the Committee considered a report titled *Update on Possible Reach Code for Building and Vehicle Electrification*[4] which included a summary of the cost-effectiveness studies prepared by the California Energy Codes and Standards program. The Committee indicated support for not allowing natural gas in new single-family and low-rise (up to three stories) multi-family homes. For non-residential, the Committee prefers that buildings be all-electric, but mixed fuel buildings should be allowed where flexibility is needed for certain building types. The Committee also supported requiring electric vehicle (EV) charging infrastructure in new construction.

DISCUSSION

For multiple reasons including health, safety, economics and environmental benefits, there is growing interest in all-electric new construction, or "building electrification," which means that the buildings would not have any fossil fuel services. All-electric buildings have electric appliances for space heating, water heating, clothes-drying, and cooking. A major reason to encourage building electrification stems from the fact that East Bay Community Energy is providing carbon-free electricity and eliminating the use of natural gas can greatly reduce greenhouse gas emissions from the building sector.

As noted in previous reports to the Committee, in order to adopt a reach code that will be effective on January 1, 2020, local ordinances must be adopted in September 2019 to allow time for filing with and review by the California Energy Commission and the California Building Standards Commission by the end of 2019. However, in order to allow for stakeholder outreach and accommodate the timelines associated with internal review and approval processes, many cities will not have their reach codes effective January 1, 2020. Many cities expect to have their reach codes in effect by March 2020.

The proposed ordinance is similar to the approach other local governments are considering. It is based on a model ordinance developed through a collaborative effort involving the City staff, California Energy Commission, the State's major utilities, several

[3] Report is available at https://hayward.legistar.com/LegislationDetail.aspx?ID=3834310&GUID=B84DE7FD-6A5A-43D6-A042-26992FFF031C&Options=&Search=
[4] Report is available at https://hayward.legistar.com/LegislationDetail.aspx?ID=3946057&GUID=61EEA528-55E8-4C6D-BAD3-24211EC64ABA&Options=&Search=

community choice aggregators including EBCE and representatives from local governments and energy policy agencies.

The cities of San Mateo, Menlo Park and San Luis Obispo have adopted reach codes that, pending approval by the CEC, will be effective January 1, 2020. The cities of Fremont, San Jose, Oakland, Berkeley, and Albany are developing reach codes that could be adopted by the end of 2019 and would be effective in early 2020. Staff is working with EBCE and the other cities in Alameda County to develop similar codes. Also, keeping Hayward's adoption schedule similar to that of surrounding cities will allow for more consistency between codes, which will help to simplify implementation.

The City of Berkeley, on July 16, 2019, adopted a ban on the installation of natural gas infrastructure in new buildings. The ban, effective January 1, 2020, is not amendment of the Energy Code (Title 24, Part 6), but is incorporated into the city's health and safety code and will be implemented as conditions of approval during the planning approval process. Because some development proposals do not require formal planning approval prior to submittal of a building permit application, the City of Berkeley is also preparing to adopt a reach code, which will apply to projects that do not require a planning permit or a zoning certificate.

Staff has worked closely with EBCE's consultants to interpret the study's results and infer what options may or may not be cost-effective for the building types that are prevalent in Hayward. EBCE has also provided consultant support to assist cities in understanding the cost-effectiveness study results and adopting reach codes. The proposed reach codes meet the requirements of the CEC for cost-effectiveness, and are also a cost-effective approach for constituents, contractors, and developers pursuing new construction with the city limits. In addition, the analysis results show that all-electric buildings are typically less expensive to construct. Costs include incremental capital costs, and, in some cases higher energy costs. In general, the first costs of an all-electric building are lower than a mixed fuel building due to the lack of gas plumbing. More detail about the cost-effectiveness of the proposed reach code is included in the Economic Impact section of this report and in Attachment II.

Recommended reach code requirements for newly constructed buildings are:

Single-family Residential

- An all-electric home must meet the basic requirements of the state's 2019 Code, which includes some solar photovoltaics.
- Mixed-fuel building must either:
    - Meet a minimum EDR[5] margin of 10 (performance approach); or

[5] *Energy Design Rating* – According to the California Energy Commission, the Energy Design Rating (EDR) is a way to express the energy performance of a building using a scoring system where 100 represents the energy performance of a home designed to meet the 2006 Energy Code and 0 represents the energy performance of a home that combines high levels of energy efficiency with renewable generation to "zero out" it's time-dependent value (TDV) of energy.

    - Comply with a prescriptive list of requirements including extra energy efficiency measures, a solar photovoltaic system meeting 100% of the building's estimated annual electrical usage, and battery energy storage system.
- Free-standing accessory dwelling units less than 400 square feet are exempt, which means they can include natural gas appliances for water heating, space heating, etc.[6]

Multi-family Residential (up to 3 stories)[7]

- An all-electric building must meet the basic requirements of the state's 2019 Code.
- Mixed-fuel building must either:
    - Meet a minimum EDR margin of 10 (performance approach); or
    - Comply with a prescriptive list of requirements including extra energy efficiency measures, a solar photovoltaic system meeting 100% of the building's estimated annual electrical usage, and battery energy storage system.

Non-residential

- An all-electric building must meet the basic requirements of the state's 2019 Code.
- Mixed-fuel building must:
    - Install solar panels on the entire Solar Zone[8]; and
    - Meet a minimum EDR margin of 10% (or 15% for office and retail); or
    - Comply with a prescriptive list of energy efficiency requirements

For non-residential buildings, staff feels it is important to allow the flexibility that the mixed-fuel option provides. There are certain commercial and industrial building types that would be very challenging or infeasible to build as all-electric. For residential construction (single-family and multi-family up to three stories), the mixed-fuel option may not be necessary. At the direction of the Committee, staff could modify the draft ordinance to simply require all-electric buildings in all new low-rise residential construction. Other cities, including the City of Oakland, may be considering this requirement in their reach code.

The full text of the recommended amendments to the Energy Code (California Building Code, Title 24, Part 6) is included as Attachment III.

Reach Code for Electric Vehicle Charging Infrastructure

Local residents are showing a significant interest in electric vehicles. It is widely known that availability of EV charging infrastructure is a critical component to EV adoption. Meanwhile, 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 and non-residential parking has ample EV charging capability will reduce long-term costs of EV infrastructure installation, while helping to increase EV adoption and decrease transportation-related

[6] A home of this size may not have the space needed for a heat pump water heater and may be connected to the main panel of the primary dwelling, which may have capacity constraints.
[7] The cost-effectiveness study for high-rise residential (four stories and higher) has yet to be completed.
[8] *Solar Zone* – The Energy Code defines the solar zone as an allocated space that is unshaded, unpenetrated, and free of obstructions. It serves as a suitable place that solar panels can be installed at a future date.

greenhouse gas emissions. While California's new minimum requirements are a step forward, it is unlikely that the requirements for multi-family dwellings and non-residential buildings are enough to keep pace with expected EV growth looking towards 2030. The Statewide Program's team reviewed approaches to increase the amount of EV infrastructure in new construction buildings, while keeping construction costs as low as possible.

Unlike amendments to the Energy Code, a cost-effectiveness study is not required for amendments to Title 24, Part 11, or the Green Building Code "CALGreen" which covers items such as electric vehicle (EV) charging infrastructure. However, to evaluate the financial impact on first costs, PCE/SVCE commissioned an analysis of the total cost of implementing various EV infrastructure measures. Staff worked closely with East Bay Community Energy, and the Statewide Program's team to establish new construction EV requirements which are more in-line with local EV adoption trends, while providing flexibility for the builder and keeping construction costs as low as possible.

Electric Vehicle (EV) charging requirements in California can generally be broken into three categories:

- EV Charging Installed: all supply equipment is installed at a parking space, such that an EV can charge without additional equipment. (Staff does not recommend installation of charging equipment. EVs and EV charger technologies are evolving rapidly and unused installations could become outdated quickly.)
- EV Ready: Parking space is provided with all power supply and associated outlet, such that a charging station can be plugged in and a vehicle can charge.
- EV Capable: Conduit is installed to parking space, and building electrical system has ample capacity to serve future load. An electrician would be required to complete the circuit before charging is possible.

EV charging capacity and speed can be summarized as three categories:

- Level 1: Capable of charging at 120V, 20A. This is equivalent to a standard home outlet. (Staff is not recommending requirements for Level 1 chargers as they are not expected to be useful as technology advances. In the near future, EVs are expected to have larger capacity batteries, which will take a very long time to charge using a Level 1 charger.
- Level 2: Capable of charging at 240V, 30-40A. This is the service capacity typically used for larger appliance loads in homes
- Level 3 (DC Fast Charging): Capable of charging at 20-400kW. This is the type of charger used for Tesla Superchargers and DC Fast Chargers at some shopping centers (and there are two at the City Hall parking structure).

The 2019 California Green Building Code Update (Title 24, Part 11) increases requirements for electric vehicle charging infrastructure in new construction; including:

- New one- and two-family dwellings and townhouses with attached private garages: must be Level 2 EV-capable
- Multi-family dwellings: 10% of parking spaces must be Level 2 EV-capable
- Non-residential: 6% of parking spaces must be Level 2 EV-capable

Recommended reach code requirements for EV infrastructure are:

Residential

- Single Family Dwelling: For each dwelling unit, install two dedicated Level 2 EV Ready circuits.
    - Exception: For each dwelling unit with only one parking space, install one Level 2 EV Ready circuit
- Multi-Unit Dwelling, <20 units: Per unit, a single Level 2 EV Ready circuit
    - Exception: Not required for units without parking
- Multi-Unit Dwelling, >20 units: 75% of the units, a single Level 2 EV Ready circuit per unit; 25% of the units, a single Level 2 EV Capable circuit per unit
    - Exception: Not required for units without parking

Non-Residential Office

- 20% of the parking spaces, Level 2 EV Ready circuit
- 30% of the parking spaces EV Capable at the "pinch points" utilizing at least Level 2-sized conduit with panel capacity for 2kW per EV capable parking space. Pinch points are defined as the areas where conduit should be installed at the time of new construction so that future installations do not require walls to be opened or asphalt dug up.

Non-Residential, Non-Office

- 15% of the parking spaces, Level 2 EV Ready circuit
- For parking lots with more than 100 spaces, first hundred spaces must adhere to Level 2 requirements, with option to install a single DC fast charger (Level 3) for each subsequent set of 100 spaces.

The full text of the recommended amendments to CALGreen (California Building Code, Title 24, Part 11) is included as Attachment IV.

ECONOMIC IMPACT

A reach code may only be adopted if it is determined that the proposed requirements are cost-effective. Cost-effectiveness is measured considering lifecycle costs using a 30-year timeframe. Generally, electric appliances are not more expensive compared to those fueled by natural gas. When considering the avoided cost of installing gas infrastructure (piping), in most cases, all-electric construction is cost-effective. The CEC requires that the cost-effectiveness analysis incorporate the time-dependent valuation (TDV) of energy so that the costs for the construction and operation of the building can be accurately calculated[9]. In addition to TDV, the studies also present cost-effectiveness in terms of the on-bill customer lifecycle benefit-to-

[9] As defined in the cost-effectiveness studies, the TDV calculation is "intended to capture the "societal value or cost" of energy use including long-term projected costs such as the cost of providing energy during peak periods of demand and other societal costs such as projected costs for carbon emissions, as well as grid transmission and distribution impacts. This metric values energy use differently depending on the fuel source (gas, electricity, and propane), time of day, and season. Electricity used (or saved) during peak periods has a much higher value than electricity used (or saved) during off-peak periods (Horii et al., 2014). This is the methodology used by the Energy Commission in evaluating cost-effectiveness for efficiency measures in Title 24, Part 6."

cost ratio. The on-bill method shows that a new all-electric single-family home is not cost-effective when meeting the minimum 2019 state code requirements. This is because the study assumed appliances that meet minimum federal efficiency standards. In most cases, more efficient appliances are installed, which would cause the project to be cost-effective.

Two studies were completed; one for single-family and low-rise residential and one for non-residential construction. In general, the studies found that all-electric construction is cost effective for new construction for several building prototypes including: single-family home, low-rise multi-family building, medium office and medium retail. The complete cost effectiveness studies are available on the California Energy Codes and Standards program website[10] and are summarized in Attachment II.

FISCAL IMPACT

The proposed energy performance amendments parallel the structure and terms of the State code and as such any incremental plan check and inspection time should be minimal. The electric readiness provisions will require plan checkers and inspectors to apply additional check lists to mixed-fuel buildings. These items are not expected to require very much additional staff time. Any incremental costs of administering these requirements will be covered through existing permit fees.

East Bay Community Energy (EBCE) is assisting its member jurisdictions with community outreach and development of local ordinances. EBCE will provide a grant of $10,000 to each city that presents and ordinance to its council as compensation for the staff time spent on the effort. Before a reach code is adopted, staff will evaluate the potential impacts that implementation would have on the General Fund.

STRATEGIC INITIATIVES

This agenda item does not directly relate to one of Council's three Strategic Initiatives.

SUSTAINABILITY FEATURES

Meeting the City's long-term GHG reduction goal of 82.5% by 2050 will require that the use of natural gas be significantly curtailed throughout the community. Eliminating the use of natural gas in new construction would be a step toward meeting this goal. Furthermore, a reach code that encourages all-electric construction is consistent with the following General Plan policy:

> Natural Resources Policy 2.6: Greenhouse Gas Reduction in New Development
> The City shall reduce potential greenhouse gas emissions by discouraging new development that is primarily dependent on the private automobile; promoting infill development and/or new development that is compact, mixed use, pedestrian

[10] https://localenergycodes.com/content/2019-local-energy-ordinances/

friendly, and transit oriented; promoting energy-efficient building design and site planning; and improving the regional jobs/housing balance ratio.

ENVIRONMENTAL DETERMINATION

Adoption of the proposed Reach Codes is categorically exempt from the California Environmental Quality Act (CEQA) pursuant to Section 15308 of the CEQA Guidelines, Actions by Regulatory Agencies for the Protection of the Environment.

PUBLIC CONTACT

East Bay Community Energy is coordinating the preparation of draft reach codes and stakeholder engagement for its member agencies. EBCE has developed a website[11] with information and resources. On April 23 and 24, EBCE held four meetings in Fremont and Berkeley. Each location had one meeting for city staff and one for community members and stakeholders. In total, more than 100 people attended, including city staff from at least seven EBCE jurisdictions. On May 3, 2019, staff met with the Chamber of Commerce's Government Relations Council where staff from EBCE presented an overview of the need for and the benefits of a reach code. Comments received at the April and May meetings were summarized in the report presented to the Committee on May 13, 2019.

Recent Stakeholder Engagement

On August 26, 2019, staff partnered with BayREN to offer a workshop to local pluming contractors to provide code compliance information related to heat pump water heaters. During the meeting staff informed attendees that the City is developing a reach code, which could require heat pump water heaters in new construction.

Staff created a webpage dedicated to the reach code effort. It includes links to previous Committee reports as well as links to external resources.

In September, staff mailed and emailed letters to hundreds of developers and contractors with information about the reach code development, including information about the September 17 Committee meeting.

Finally, an article about the Reach code will be published in Leaflet on September 24, 2019.

NEXT STEPS

Upon a recommendation from the Committee, staff may present the draft reach codes to Council in October or November. Additional steps would be as follows:

Sept. – November	Continue Stakeholder Engagement
October 30	Sustainability Committee Meeting (if needed)

[11] https://ebce.org/reach/

November 19	Council Meeting (Public Hearing and First Reading of Ordinance)
December 3	Council Meeting (Second Reading and Adoption of Ordinance)
January 2020	Submit Reach Code to CEC for Approval

The reach codes would become effective upon approval by the CEC. The CEC currently requires a 60-day public review period. Effective January 1, 2020, the review period will be only 15 days. Staff intends to submit the reach codes in January after the shorter review period is in effect.

Prepared by: Erik Pearson, Environmental Services Manager

Recommended by: Alex Ameri, Director of Public Works

Approved by:

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Kelly McAdoo, City Manager

Greenhouse Gas, Energy and Cost Savings

The California Statewide Codes and Standards Program led the development of a cost-effectiveness study[1] for Energy Code reach codes that examined different performance-based approaches for new construction of low-rise residential (single-family and multi-family up to 3 stories) and non-residential building types. The study finds that all-electric buildings, even those with no other energy performance enhancements, provide significant greenhouse gas (GHG) reductions. The addition of energy efficiency and more solar can drive net energy use to nearly zero from some building types and GHG emissions to less than a third of a mixed-fuel 2019 State code compliant building.

The charts below compare total GHG emissions and net energy consumption (after onsite generation) of various strategies for typical building types.

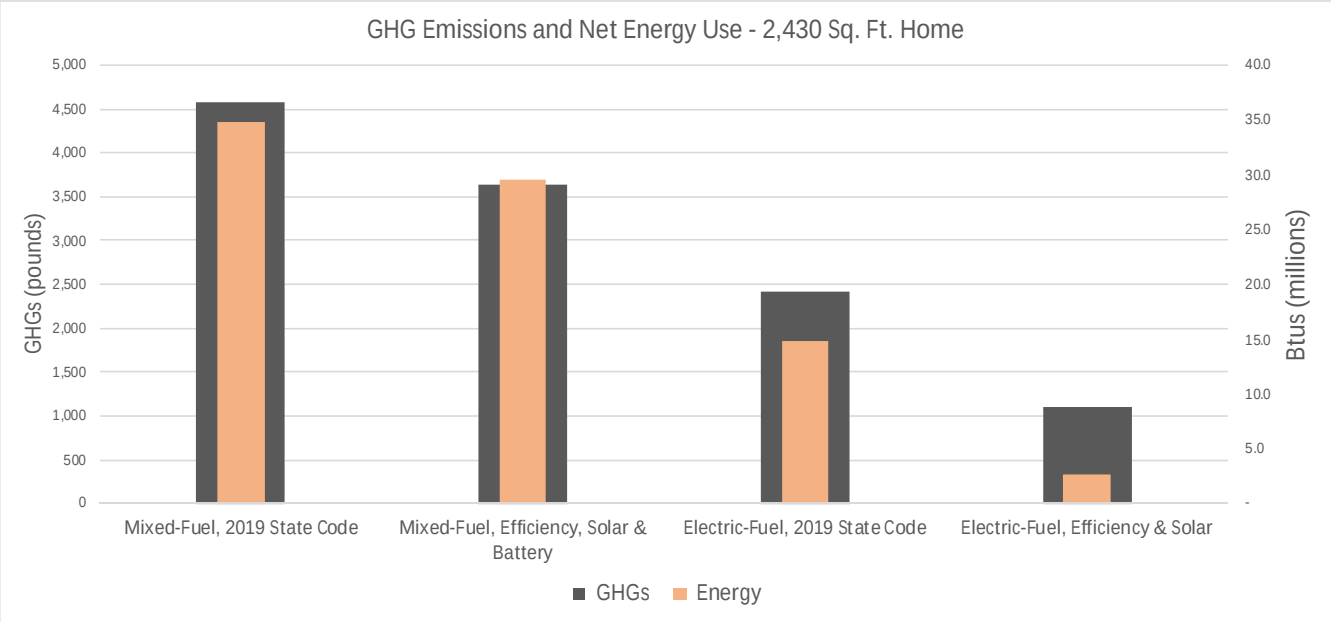


Figure 1: GHG and Energy Impact, Single Family Home

[1] https://localenergycodes.com/content/2019-local-energy-ordinances/

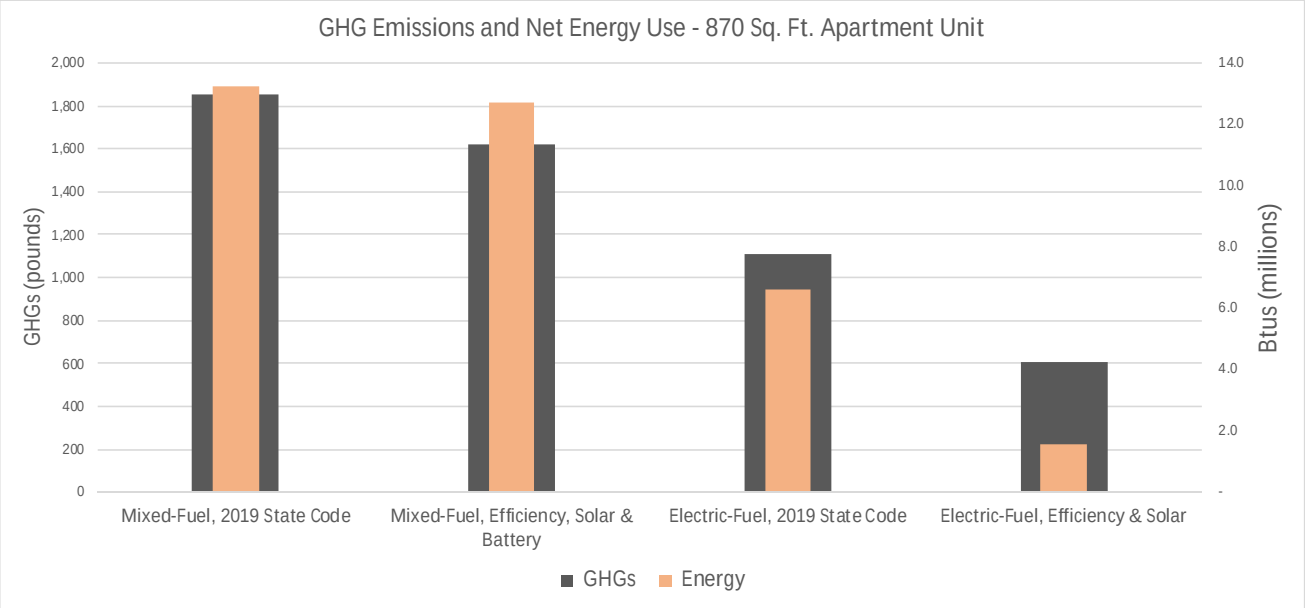


Figure 2: GHG and Energy Impacts, Low-Rise Multifamily Unit

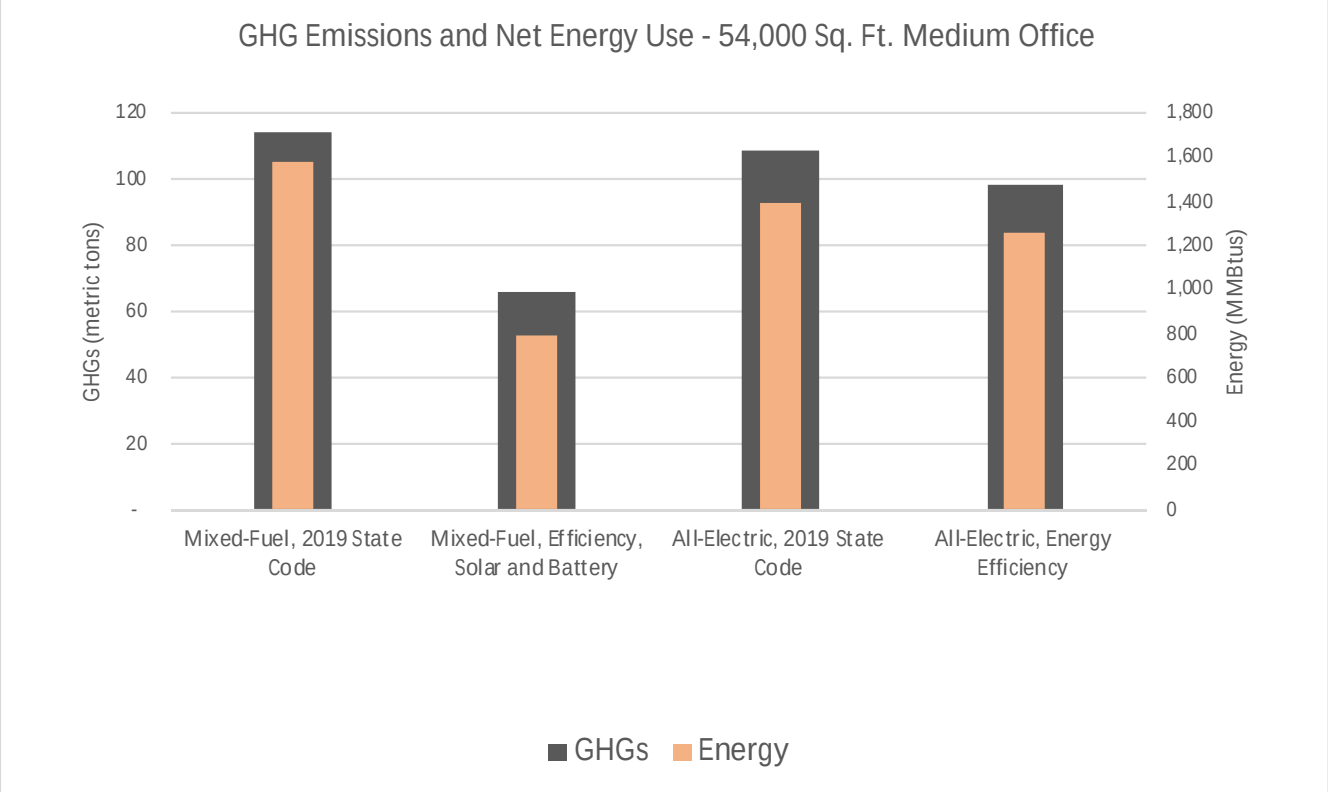


Figure 3: GHG and Energy Impact, Medium Office Building

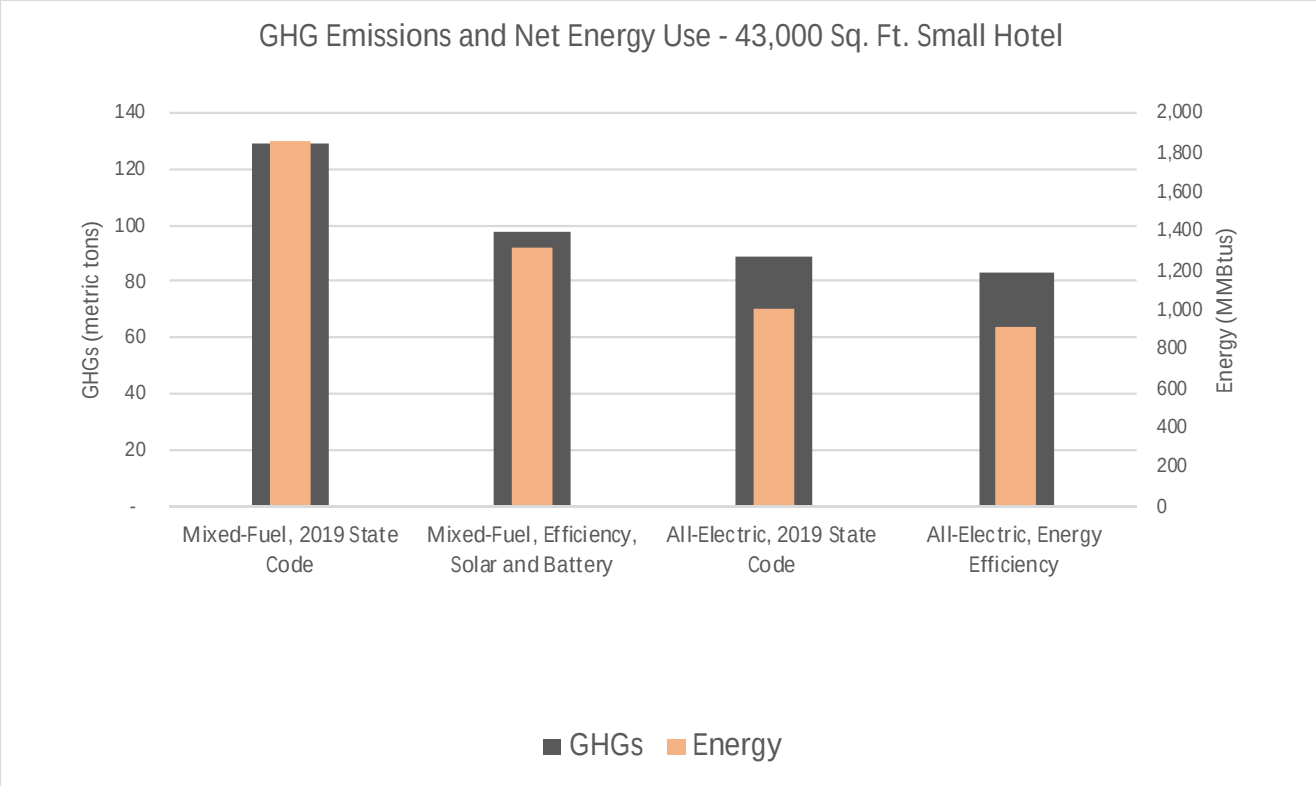


Figure 4: GHG and Energy Impact Small Hotel

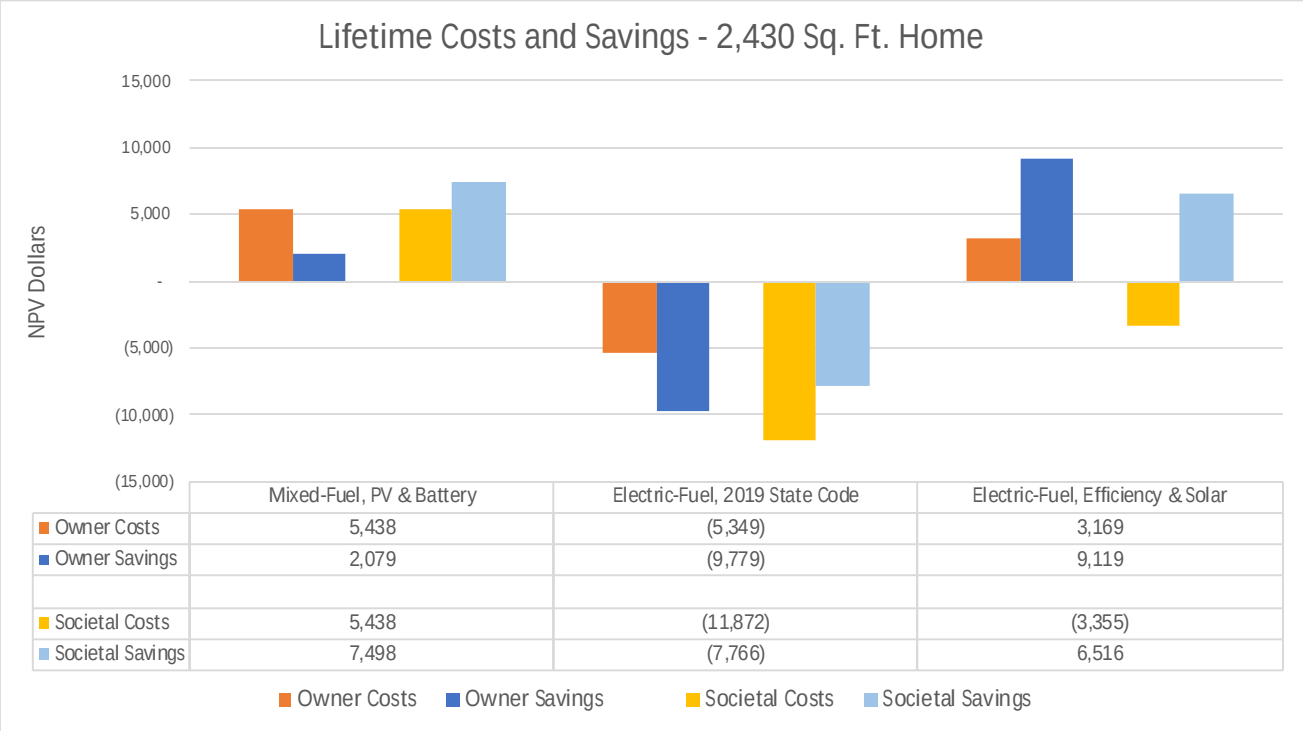
Economic Impacts

All-electric buildings are generally cheaper to build due to the elimination of running gas plumbing to the building. These lower first costs generally make all-electric construction more cost-effective on a life-cycle basis. This is particularly true for low-rise residential buildings, where it is also often increasingly more cost-effective for the owner to exceed the code by improving efficiency and adding solar. In fact, if one invests the savings from the gas infrastructure in additional PV capacity to offset more of the electricity load, in many cases the building is cost-effective for the owner and society from day one, meaning the building is both less expensive to build and cheaper to operate. This is shown as the "Neutral Cost" scenario in row 13 of Figure 6 below.

The charts below depict the incremental net present value costs and savings of various designs relative to a State-code-complaint mixed-fuel design. Note, each building type is examined from two perspectives: one from the owners/operator's point of view; the other from society's point of view[2]. The latter reflects benefits that accrue to other ratepayers and society.

[2] The societal point of view incorporates the time-dependent valuation (TDV) of energy, which is required by the CEC when determining cost-effectiveness.

In the following charts, Cost values less than zero indicate lower capital cost. Savings values less than zero indicate higher energy costs. "Mixed-Fuel, PV & Batter" corresponds with row 5 in the table; "Electric-Fuel, 2019 State Code" corresponds with row 11; and "Electric-Fuel, Efficiency & Solar" corresponds with row 12.

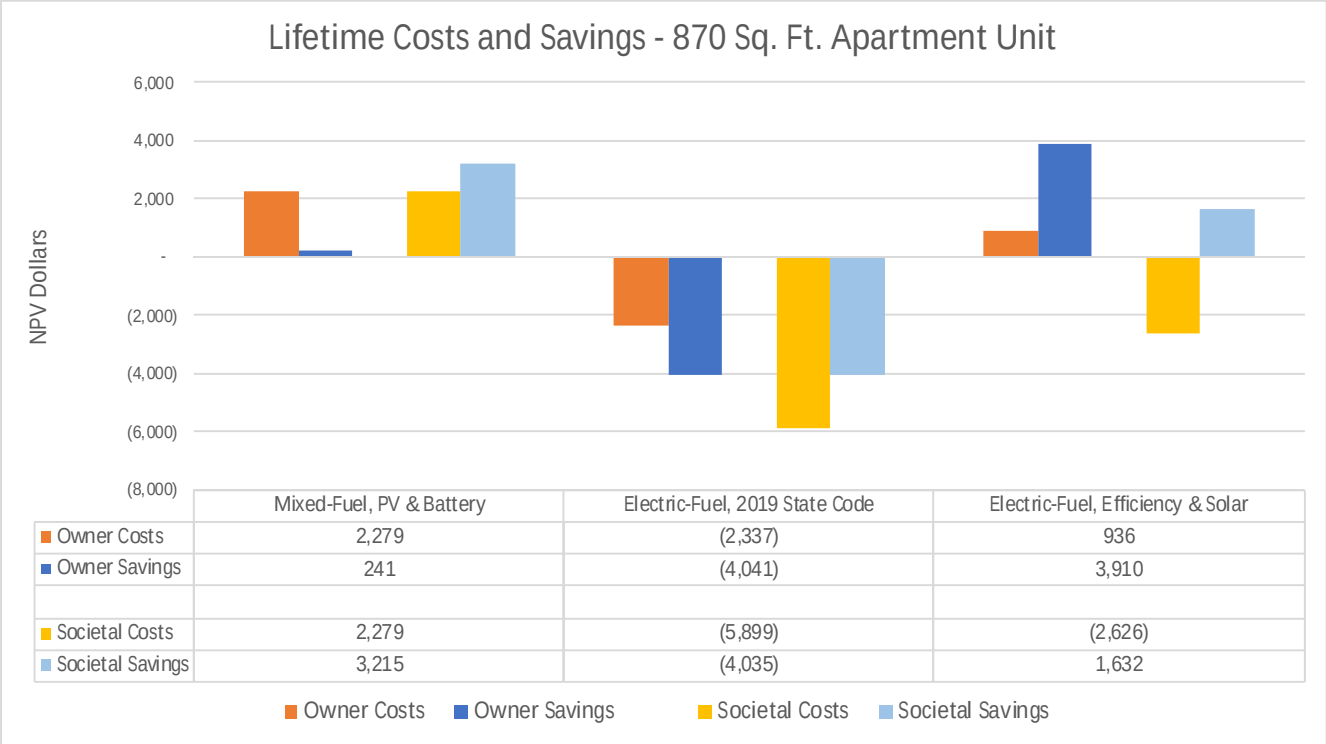


	Mixed-Fuel, PV & Battery	Electric-Fuel, 2019 State Code	Electric-Fuel, Efficiency & Solar
Owner Costs	5,438	(5,349)	3,169
Owner Savings	2,079	(9,779)	9,119
Societal Costs	5,438	(11,872)	(3,355)
Societal Savings	7,498	(7,766)	6,516

Figure 5: Costs and Benefits - Single-Family Home

	Climate Zone 3 PG&E Single Family		Annual Net kWh	Annual therms	EDR Margin[4]	PV Size Change (kW)[5]	CO2-Equivalent Emissions (lbs/sf)		NPV of Lifetime Incremental Cost ($)	Benefit to Cost Ratio (B/C)	
							Total	Reduction		On-Bill	TDV
2	Mixed Fuel[1]	Code Compliant	(0)	348	n/a	n/a	1.88	n/a	n/a	n/a	n/a
3		Efficiency-Non-Preempted	(0)	296	2.5	(0.03)	1.63	0.26	$1,552	1.28	1.31
4		Efficiency-Equipment	(0)	273	4.0	(0.03)	1.52	0.37	$1,448	1.91	1.97
5		Efficiency & PV/Battery	(20)	296	10.0	0.07	1.50	0.38	$5,438	0.38	1.38
6	All-Electric[2]	Code Compliant	4,355	0	n/a	n/a	1.00	n/a	n/a	n/a	n/a
7		Efficiency-Non-Preempted	3,584	0	4.5	0.00	0.85	0.15	$1,519	2.60	2.36
8		Efficiency-Equipment	3,670	0	4.0	0.00	0.86	0.14	$2,108	1.76	1.62
9		Efficiency & PV	790	0	18.0	1.77	0.46	0.54	$8,517	2.22	1.68
10		Efficiency & PV/Battery	(12)	0	29.0	2.37	0.23	0.76	$14,380	1.50	1.58
11	Mixed Fuel to All-Electric[3]	Code Compliant	4,355	0	0.0	0.00	1.00	0.89	($5,349)	0.55	1.53
12		Efficiency & PV	790	0	18.0	1.77	0.46	1.43	$3,169	2.88	>1
13		Neutral Cost	2,217	0	10.5	1.35	0.70	1.18	$0	>1	>1

Figure 6: Benefit to Cost Ratios - Single-Family Home



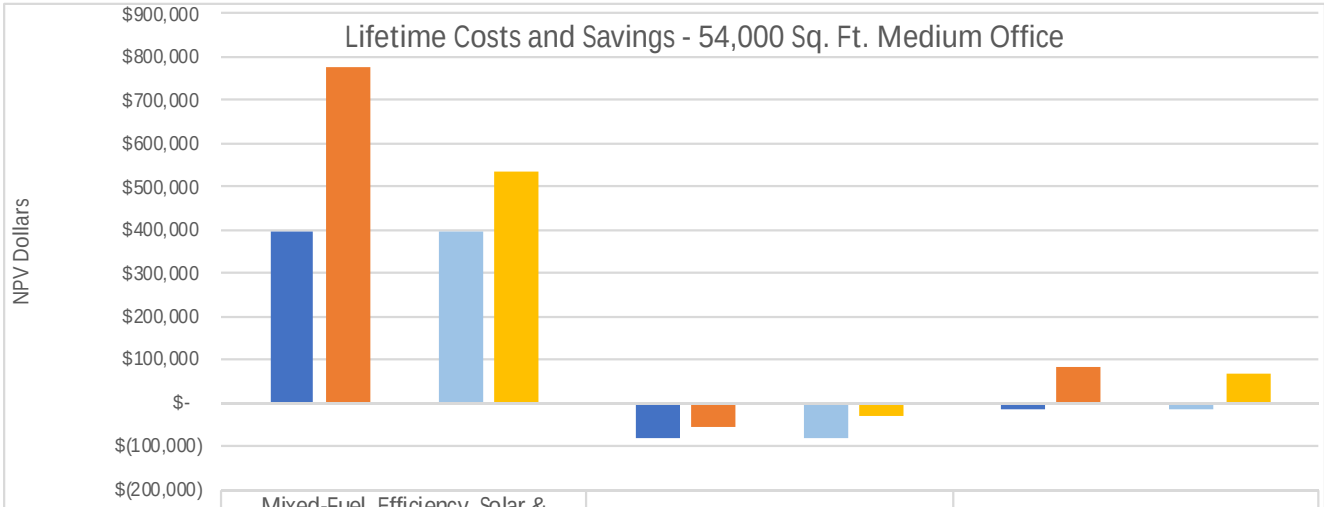
	Mixed-Fuel, PV & Battery	Electric-Fuel, 2019 State Code	Electric-Fuel, Efficiency & Solar
Owner Costs	2,279	(2,337)	936
Owner Savings	241	(4,041)	3,910
Societal Costs	2,279	(5,899)	(2,626)
Societal Savings	3,215	(4,035)	1,632

Figure 7 Costs and Benefits - Low-Rise Multifamily Unit

	Climate Zone 3 PG&E Multifamily		Annual Net kWh	Annual therms	EDR Margin[4]	PV Size Change (kW)[5]	CO2-Equivalent Emissions (lbs/sf)		NPV of Lifetime Incremental Cost ($)	Benefit to Cost Ratio (B/C)	
							Total	Reduction		On-Bill	TDV
2	Mixed Fuel[1]	Code Compliant	(0)	133	n/a	n/a	2.13	n/a	n/a	n/a	n/a
3		Efficiency-Non-Preempted	(0)	127	0.5	(0.00)	2.06	0.07	$175	1.00	1.11
4		Efficiency-Equipment	(0)	119	1.5	(0.00)	1.94	0.19	$403	1.11	1.23
5		Efficiency & PV/Battery	(10)	127	10.0	0.05	1.86	0.27	$2,279	0.11	1.41
6	All-Electric[2]	Code Compliant	1,944	0	n/a	n/a	1.27	n/a	n/a	n/a	n/a
7		Efficiency-Non-Preempted	1,944	0	0.0	0.00	1.27	0.00	$0	-	-
8		Efficiency-Equipment	1,698	0	2.5	0.00	1.13	0.14	$795	1.73	1.58
9		Efficiency & PV	457	0	16.0	0.92	0.69	0.58	$3,272	2.43	1.73
10		Efficiency & PV/Battery	(7)	0	29.5	1.26	0.33	0.94	$6,344	1.32	1.64
11	Mixed Fuel to All-Electric[3]	Code Compliant	1,944	0	0.0	0.00	1.27	0.86	($2,337)	0.58	1.46
12		Efficiency & PV	57	0	16.0	0.92	0.69	1.43	$936	4.18	>1
13		Neutral Cost	845	0	11.5	0.70	0.85	1.28	$0	>1	>1

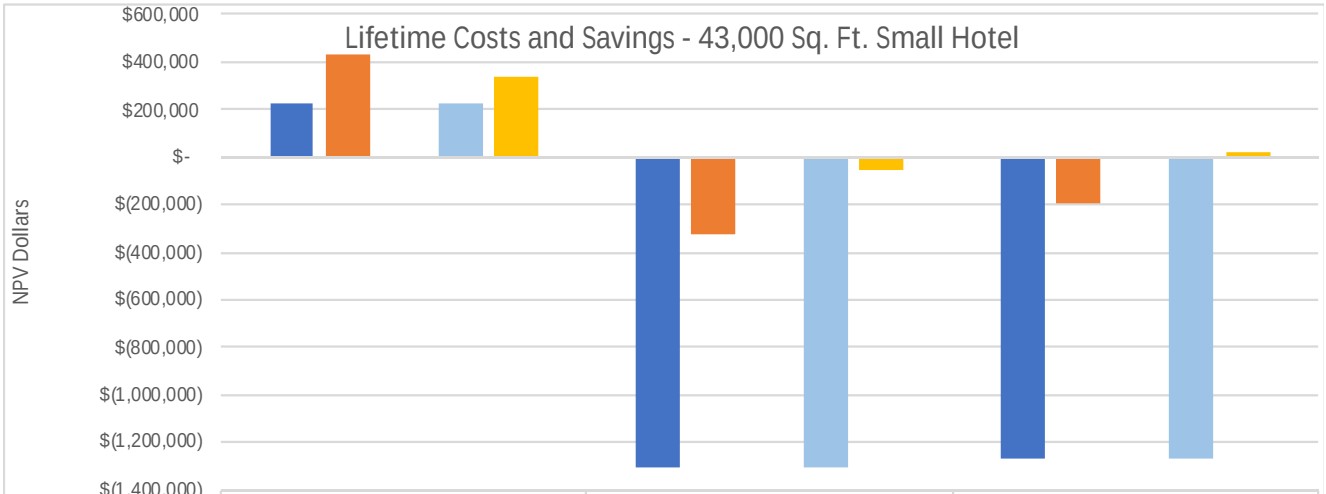
[1]All reductions and incremental costs relative to the **mixed fuel** code compliant home.
[2]All reductions and incremental costs relative to the **all-electric** code compliant home.
[3]All reductions and incremental costs relative to the **mixed fuel** code compliant home except the EDR Margins are relative to the Standard Design for each case which is the **all-electric** code compliant home. Incremental costs for these packages reflect the cots used in the On-Bill cost effectiveness methodology. Costs differ for the TDV methodology due to differences in the site gas infrastructure costs (see Section 2.6).
[4]This represents the Efficiency EDR Margin for the Efficiency-Non-Preempted and Efficiency-Equipment packages and Total EDR Margin for the Efficiency & PV, Efficiency & PV/Battery, and Neutral Cost packages.
[5]Positive values indicate an increase in PV capacity relative to the Standard Design.

Figure 8 Benefit to Cost Ratios - Low-Rise Multifamily Unit



	Mixed-Fuel, Efficiency, Solar & Battery	All-Electric, 2019 State Code	All-Electric, Energy Efficiency
Owner Costs	$397,405	$(82,330)	$(15,681)
Owner Savings	$777,156	$(57,345)	$85,241
Societal Costs	$397,405	$(82,330)	$(15,681)
Sociatel Savings	$536,330	$(29,592)	$68,682

Figure 9: Costs and Benefits - Medium Office



	Mixed-Fuel, Efficiency, Solar & Battery	All-Electric, 2019 State Code	All-Electric, Energy Efficiency
Owner Costs	$228,341	$(1,300,029)	$(1,267,509)
Owner Savings	$430,737	$(326,633)	$(198,234)
Societal Costs	$228,341	$(1,300,029)	$(1,267,509)
Sociatel Savings	$335,758	$(51,166)	$20,729

Figure 10: Costs and Benefits - Small Hotel

SECTION 1. Recitals. The City Council finds and determines the preceding recitals to be true and correct and an integral part of the Council's decision, and hereby adopts and incorporates them into this Ordinance.

SECTION 2. California Environmental Quality Act. This ordinance is exempt from the California Environmental Quality Act (CEQA) pursuant to Section 15308 of the CEQA Guidelines, Actions by Regulatory Agencies for the Protection of the Environment.

SECTION 3: Purpose and Intent. It is the purpose and intent of this Ordinance to expressly enact local amendments to Sections 100.0, 100.1, 140.0, 140.1 and 150.1 of the 2019 California Building Code applicable to new construction to provide standards for new buildings to improve community health and safety while reducing greenhouse gas emissions.

SECTION 4. Enactment of Local Amendments to The California Building Code, Title 24, Part 6 (Amendments to Chapter ____ of the _____ Municipal Code). The local amendments to Sections 100.0, 100.1, 140.0, 140.1 and 150.1 of the 2019 California Building Code, Title 24, Part 6, are hereby enacted. The local amendments being enacted amend _____ Municipal Code Chapter _____ to add Sections _____ through _____ as follows (additions are shown in double underline and deletions are shown as ~~strikethrough~~):

Section 100.0 is modified to add a new section (i) as follows:

(i) Energy Reach Code - Purpose and Intent.

In addition to all requirements of the California Energy Code applicable to new construction, the following shall apply:

1. New low-rise residential buildings, other than accessory dwelling units that are no greater than 400 square feet, which are designed to utilize mixed-fuel (natural gas or propane in addition to electricity) shall be required to either comply with the prescriptive requirements of Section 150.1(c), as amended herein, or meet a Total Energy Design Rating (EDR) margin, as defined by the California Energy Code, of 10. The performance requirements may be reduced, but not below the requirements for the Standard Design Building, if sufficient solar access is not available.
2. New nonresidential buildings that are designed to utilize mixed-fuel (natural gas or propane in addition to electricity) shall be required to install solar panels on the entire Solar Zone, as defined in Section 110.10, and comply with either the prescriptive requirements of Section 140.2, as amended herein, or have compliance margins, as defined in Section 140.1, that meet or exceed the Standard Design Building by the amounts below:

A. Office and retail occupancies: 15%

B. Hotel/Motel and High-Rise Residential occupancies: 10%

C. All other occupancies in buildings with both indoor lighting and mechanical systems: 10%

D. All other occupancies in buildings with indoor lighting or mechanical systems but not both: 10%

3. If a Certified Energy Analyst prepares the Certificate of Compliance, the design shall be credited with one (1) EDR point or one (1) percent of compliance margin, to the extent that the resultant energy budget is no greater than the energy budget for the Standard Building Design.

Section 100.1(b) is modified by adding the following definitions:

ALL-ELECTRIC BUILDING is a building that has no natural gas or propane plumbing installed within the building, and that uses electricity as the source of energy for its space heating, water heating, cooking, and clothes drying appliances. An All-Electric Building may include solar thermal collectors.

CERTIFIED ENERGY ANALYST is a person registered as a Certified Energy Analyst with the California Association of Building Energy Consultants as of the date of submission of a Certificate of Compliance as required under Section 10-103.

FREE STANDING ACCSESSORY DWELLING UNIT is a detached building that is not intended for sale separate from the primary residence, on a lot that is zoned for single family or multifamily use, located on the same lot as an existing dwelling, and does not exceed 1,200 square feet of total floor area.

MIXED-FUEL BUILDING is a building that is plumbed for the use of natural gas or propane as fuel for space heating, water heating, cooking, and/or clothes drying appliances.

Section 150.1(b) is modified as follows:

(b) Performance Standards. A building complies with the performance standards if the energy consumption for the Proposed Design Building is no greater than the energy budget calculated for the Standard Design Building using Commission-certified compliance software as specified by the Alternative Calculation Methods Approval Manual. Mixed-Fuel Buildings must additionally reach an Energy Design Rating margin above the Standard Design in order to comply with performance standards.

Sections 150.1(b)1 and 2 are modified as follows:

1. Newly Constructed Buildings. The Energy Budget for newly constructed buildings is expressed in terms of the Energy Design Rating, which is based on TDV energy. The Energy Design Rating (EDR) has two components, the

Energy Efficiency Design Rating, and the Solar Electric Generation and Demand Flexibility Design Rating. The Solar Electric Generation and Demand Flexibility Design Rating shall be subtracted from the Energy Efficiency Design Rating to determine the Total Energy Design Rating. The Proposed Building shall separately comply with the Energy Efficiency Design Rating and the Total Energy Design Rating.

A. An All-Electric Building or a Free Standing Accessory Dwelling Unit no greater than 400 square feet complies with the performance standards if both the Total Energy Design Rating and the Energy Efficiency Design Rating for the Proposed Building are no greater than the corresponding Energy Design Ratings for the Standard Design Building.

B. A Mixed-Fuel Building complies with the performance standards if:

   i. The Energy Efficiency Design Rating of the Proposed Building is no greater than the Energy Efficiency Design Rating for the Standard Design Building; and

   ii. The Total Energy Design Rating for the Proposed Building is at least 10 points less than the Total Energy Design Rating for the Standard Design Building.

   EXCEPTION 1 to Section 150.1(b)1.B.ii. If the Certificate of Compliance is prepared and signed by a Certified Energy Analyst and the Total Energy Design Rating of the Proposed Design is no greater than the Standard Design Building, the Total Energy Rating of the Proposed Building complies with this section if it is at least nine (9) points less than the Total Energy Design Rating for the Standard Design Building.

EXCEPTION to Section 150.1(b)1. A community shared solar electric generation system, or other renewable electric generation system, and/or community shared battery storage system, which provides dedicated power, utility energy reduction credits, or payments for energy bill reductions, to the permitted building and is approved by the Energy Commission as specified in Title 24, Part 1, Section 10-115, may offset part or all of the solar electric generation system Energy Design Rating required to comply with the Standards, as calculated according to methods established by the Commission in the Residential ACM Reference Manual.

The first paragraph of Section 150.1(c) is modified as follows:

Prescriptive Standards/Component Package. Buildings that comply with the prescriptive standards shall be designed, constructed, and equipped to meet all of the requirements for the appropriate Climate Zone shown in TABLE 150.1-A or B as well as all of the requirements of Sections 150.1(c)15 and 16, whichever are more stringent. In TABLE 150.1-A and TABLE 150.1-B, a NA (not allowed) means that feature is not permitted in a particular Climate

Zone and a NR (no requirement) means that there is no prescriptive requirement for that feature in a particular Climate Zone. Installed components shall meet the following requirements:

New Sections 150.1(c)15 and 16 are added as follows:

15. Additional Prescriptive Requirements for Single Family Mixed-Fuel Buildings.

A. Duct System Sealing and Leakage Testing. The total duct system leakage shall not exceed 2 percent of the nominal system air handler air flow.

G. Slab insulation. Slab floor perimeter insulation shall be installed with an R-value equal to or greater than R10. The minimum depth of concrete-slab floor perimeter insulation shall be 16 inches or the depth of the footing of the building, whichever is less.

H. Compact Hot Water. The hot water distribution system shall be designed and installed to meet minimum requirements for the basic compact hot water distribution credit according to the procedures outlined in the 2019 Reference Appendices RA4.4.6.

I. Ducted Central Forced Air Heating Systems. Central Fan Integrated Ventilation Systems. The duct distribution system shall be designed to reduce external static pressure to meet a maximum fan efficacy equal to:

Gas Furnaces: 0.35 Watts per cfm

Heat Pumps: 0.45 Watts per cfm,

according to the procedures outlined in the 2019 Reference Appendices RA3.3.

J. Solar photovoltaic. A PV system meeting the minimum qualification requirements as specified in Joint Appendix JA11, with annual electrical output, as determined by Equation 150.1-C in Section 150.1(c)14, of no less than 100% of the dwelling's estimated annual electrical usage. The plans shall include calculations for the estimated electricity load and PV production.

K. Energy Storage. A battery energy storage system with a minimum capacity equal to 5 kWh shall be installed. The system shall have automatic controls programmed to have the ability to charge anytime PV generation is greater than the building load and discharge to the electric grid, during the highest priced time of use hours of the day.

16. Additional Prescriptive Requirements for Multifamily Mixed-Fuel Buildings.

A. Slab insulation. Slab floor perimeter insulation shall be installed with an R-value of equal to or greater than R10. The minimum depth of concrete-slab floor perimeter insulation shall be 16 inches or the depth of the footing of the building, whichever is less.

B. Compact Hot Water. The hot water distribution system shall be designed and installed to meet minimum requirements for the basic compact hot water distribution credit according to the procedures outlined in the 2019 Reference Appendices RA4.4.6.

F. Central Fan Integrated Ventilation Systems. Central forced air system fans used to provide outside air, shall have an air-handling unit fan efficacy less than or equal to 0.35 W/CFM. The airflow rate and fan efficacy requirements in this section shall be confirmed through field verification and diagnostic testing in accordance with all applicable procedures specified in Reference Residential Appendix RA3.3. Central Fan Integrated Ventilation Systems shall be certified to the Energy Commission as Intermittent Ventilation Systems as specified in Reference Residential Appendix RA3.7.4.2.

G. Solar photovoltaic. A PV system meeting the minimum qualification requirements as specified in Joint Appendix JA11 sized to offset 100% of the estimated site electricity load shall be installed. The plans shall include calculations for the electricity load and PV production.

H. Energy Storage. A battery energy storage system with a capacity equivalent to the PV system shall be installed. The system shall have automatic controls programmed to have the ability to charge anytime PV generation is greater than the building load and discharge to the electric grid, during the highest priced time of use hours of the day.

Nonresidential and High-Rise Residential Buildings

Mandatory Measures

SECTION 140.0(b) is modified as follows:

(b) The requirements of Sections 120.0 through 130.5 (mandatory measures for nonresidential, high-rise residential and hotel/motel buildings). and for all newly constructed buildings and additions, including new equipment installed to serve additions:

1. The entire solar zone, as specified in Section 110.10, shall have a solar PV system installed that meets the minimum qualification requirements as specified in Joint Appendix JA11, subject to the exceptions in Section 110.10.

EXCEPTION to 140.0(b)1. Additions.

SECTION 140.1 is modified as follows:

SECTION 140.1 – PERFORMANCE APPROACH: ENERGY BUDGETS
A newly constructed All-Electric Building complies with the performance approach if the energy budget calculated for the Proposed Design Building under Subsection (b) is no greater than the energy budget calculated for the Standard Design Building under Subsection (a).

A newly constructed Mixed-Fuel Building complies with the performance approach if the energy budget calculated for the Proposed Design Building under Subsection (b) has a compliance margin, relative to the energy budget calculated for the Standard Design Building under Subsection (a), of at least the value specified for the corresponding occupancy type in Table 140.1-A below.

Table 140.1-A MIXED-FUEL BUILDING COMPLIANCE MARGINS

Occupancy Type	Compliance Margins
Office/Retail	15%
Hotel/Motel and High-Rise Residential	10%
All other occupancies in buildings with both indoor lighting and mechanical systems	10%
All other occupancies in buildings with indoor lighting or mechanical systems but not both	10%

(a) Energy Budget for the Standard Design Building. The energy budget for the Standard Design Building is determined by applying the mandatory and prescriptive requirements to the Proposed Design Building. The energy budget is the sum of the TDV energy for space-conditioning, indoor lighting, mechanical ventilation, service water heating, and covered process loads.

(b) Energy Budget for the Proposed Design Building. The energy budget for a Proposed Design Building is determined by calculating the TDV energy for the Proposed Design Building. The energy budget is the sum of the TDV energy for space-conditioning, indoor lighting, mechanical ventilation and service water heating and covered process loads.

(c) Calculation of Energy Budget. The TDV energy for both the Standard Design Building and the Proposed Design Building shall be computed by Compliance Software certified for this use by the Commission. The processes for Compliance Software approval by the Commission are documented in the ACM Approval Manual.

EXCEPTION to Section 140.1. For newly constructed buildings, if the Certificate of Compliance is prepared and signed by a Certified Energy Analyst and the energy budget for the Proposed Design is no greater than the Standard Design Building, the required compliance margin is reduced by 1%.

NOTE: Authority: Sections 25213, 25218, 25218.5, 25402 and 25402.1, Public Resources Code. Reference: Sections 25007, 25008, 25218.5, 25310, 25402, 25402.1, 25402.4, 25402.5, 25402.8, and 25943, Public Resources Code.

SECTION 140.2 is modified as follows:

To comply using the prescriptive approach, a building shall be designed with and shall have constructed and installed systems and components meeting the applicable requirements of Sections 140.3 through 140.9 and additionally the

following measures as applicable intended to exceed the remaining prescriptive requirements:

(a) Mixed-Fuel Buildings of Hotel, Motels or High-Rise Multifamily Occupancies

1. Install fenestration with a solar heat gain coefficient no less than 0.45 in both common spaces and guest rooms.
2. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.
3. Include economizers and staged fan control in air handlers with a mechanical cooling capacity ≥ 33,000 Btu/h.
4. Reduce the lighting power density (Watts/ft2) by ten percent (10%) from that required from Table 140.6-C.
5. In common areas, improve lighting without claiming any Power Adjustment Factor credits:
   A. Control to daylight dimming plus off per Section 140.6(a)2.H; and
   B. Perform Institutional Tuning per Section 140.6(a)2.J
6. Install one drain water heat recovery device per every three guest rooms that is field verified as specified in the Reference Appendix RA3.6.9.

(b) All Other Nonresidential Mixed-Fuel Buildings

1. Install fenestration with a solar heat gain coefficient no greater than 0.22.
2. Limit the fenestration area on east-facing and west-facing walls to one-half of the average amount of north-facing and south-facing fenestration.
3. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums where VAV systems are installed.
4. Include economizers and staged fan control in air handlers with a mechanical cooling capacity ≥ 33,000 Btu/h.
5. Reduce the lighting power density (Watts/ft^2) by ten percent (10%) from that required from Table 140.6-C.
6. Improve lighting without claiming any Power Adjustment Factor credits:
   A. Perform Institutional Tuning per Section 140.6(a)2.J, and
   B. In office spaces, control to daylight dimming plus off per Section 140.6(a)2.H, and
   C. Install Occupant Sensing Controls in Large Open Plan Offices per Section 140.6(a)2.I.

SECTION 5: Violations. Violation of the requirements of this Chapter shall be considered an infraction of the _____ Municipal Code, punishable by all the sanctions prescribed in [*cite local reference to infractions*].

SECTION 5. Severability. The provisions of this Ordinance are severable, and if any clause, sentence, paragraph, provision, or part of this Ordinance, or the application of this Ordinance to any person, is held to be invalid or preempted by state or federal law, such holding shall not impair or invalidate the remainder of this Ordinance. If any provision of this Ordinance is held to be inapplicable, the provisions of this Ordinance shall nonetheless continue to apply with respect to all other covered development projects and applicants. It is hereby declared to be the legislative intent of the City Council that this Ordinance would have been adopted had such provisions not been included or such persons or circumstances been expressly excluded from its coverage.

SECTION 6. Effective and Operative Dates. This Ordinance shall become effective on and after its adoption by sufficient affirmative votes of the Council of the City of _____, as provided in the Charter of the City of _____, Section _____. This Ordinance shall take effect and be in full force on and after _____, 2020. The Ordinance shall not apply to building/construction related permits already issued and not yet expired.

SECTION 7. Directions to the Building Official. Upon final passage of this Ordinance, the Building Official is hereby directed to transmit this Ordinance, along with the companion Resolution, to the State Building Standards Commission pursuant to the applicable provisions of State law.

Electric Vehicle Infrastructure 2019 Reach Code Language
CALGreen Format

Definitions:

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.

Level 1 EV Ready Circuit: 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 Circuit: 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.

Electric Vehicle Charging Station (EVCS): A parking space that includes installation of electric vehicle supply equipment (EVSE) with a minimum output of 30 amperes connected to a Level 2 EV Ready Circuit. EVCS installation may be used to satisfy a Level 2 EV Ready Circuit requirement.

SECTION 4
RESIDENTIAL MANDATORY MEASURES

4.106.4 Electric vehicle (EV) charging for new construction. New construction shall comply with Sections 4.106.4.1 and 4.106.4.2 to facilitate future installation and use of EV chargers.

Electric Vehicle Infrastructure 2019 Reach Code Language
CALGreen Format

Exceptions:

1. Where there is no commercial power supply.
2. Accessory Dwelling Units (ADU) and Junior Accessory Dwelling Units (JADU) without additional parking facilities, unless the electrical panel is upgraded, or a new panel is installed in which case only the electrical capacity requirements apply.

4.106.4.1 New one- and two-family dwellings and town- houses with attached private garages.
For each dwelling unit, install two Level 2 EV Ready Circuits.

Exception: For each dwelling unit with only one parking space, install a Level 2 EV Ready Circuit.

4.106.4.2 New multifamily dwellings. 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 Circuit.
2. When more than 20 multifamily dwelling units are constructed on a building site:
    a. 75% of the dwelling units with parking space(s) shall be provided with at least one Level 2 EV Ready Circuit. Calculations for the required minimum number of Level 2 EV Ready spaces shall be rounded up to the nearest whole number.
    b. In addition, each remaining dwelling unit with parking space(s) shall be provided with at least a Level 2 EV Capable Circuit.

Notes:

1. Load balancing systems may be installed to increase the number of EV chargers or the amperage or voltage beyond the minimum required. Load balancing does not allow installing less electrical panel capacity than would be required without load balancing.
2. Installation of Level 2 EV Ready Circuits above the minimum number required level may offset the minimum number Level 1 EV Ready Circuits required on a 1:1 basis.

Electric Vehicle Infrastructure 2019 Reach Code Language
CALGreen Format

3. The requirements apply to multifamily buildings with parking spaces including: a) assigned or leased to individual dwelling units, and b) unassigned residential parking.

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: The Division of the State Architect provides guidance on exemptions from Chapter 11B EV infrastructure accessibility requirements, such as buildings that are not subject to Chapter 11B and assigned parking spaces at buildings that are subject to Chapter 11B.

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). Surface slope for this EV space and the aisle shall not exceed 1 unit vertical in 48 units

4.106.4.2.3 Good Design Practices. For all projects subject to California Code of Regulations Title 24, Part 2, Chapter 11B, construction documents shall indicate how many accessible EVCS would be required as per Title 24, Chapter 11B to convert all Level 2 EV Ready Circuits required under section 4.106.4 to EVCS. Construction documents shall also demonstrate that the facility is

designed such that compliance with accessibility standards, including Chapter 11B accessible routes, will be feasible for the required accessible EVCS at the time of EVCS installation. Surface slope for any area designated for accessible EVCS shall meet slope requirements in Chapter 11B and vertical clearance requirements in Chapter 11B at the time of original building construction.[1]

Note: Section11B-812 of the 2016 California Building Code requires that a facility providing EVCS for public and common use also provides one or more accessible EVCS as specified in Table 11B-228.3.2.1. Chapter 11B applies to certain facilities including, but not limited to, public accommodations and publicly funded housing (see Section 1.9 of Part 2 of the California Building Code). Section 11B-812 requires that "Parking spaces, access aisles and vehicular routes serving them shall provide a vertical clearance of 98 inches (2489 mm) minimum." It also requires that parking spaces and access aisles meet maximum slope requirements of 1 unit vertical in 48 units horizontal (2.083 percent slope) in any direction at the time of new building construction or renovation. Section 11B-812.5 contains accessible route requirements. In addition, Title 24 Part 11 Section 4.106.4.2 requires that developers meet certain aspects of accessibility requirements at the time of new construction for a limited number of parking spaces.

SECTION 5
NONRESIDENTIAL MANDATORY MEASURES

5.106.5.3 Electric vehicle (EV) charging. New construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation and use of EV chargers.

Exception: Where there is no commercial power supply.

Notes:

1. Load balancing systems may be installed to increase the number of EV chargers or the amperage or voltage beyond the minimum requirements in this code. The option does not allow for installing less electrical panel capacity than would be required without load balancing.

Electric Vehicle Infrastructure 2019 Reach Code Language
CALGreen Format

5.106.5.3.1 Office buildings: In nonresidential new construction buildings designated primarily for office use:

1. When 10 or more parking spaces are constructed, 20% of the available parking spaces on site shall be equipped with Level 2 EVCS;

2. An additional 30% shall be at least Level 2 EV Capable.

Calculations for the required minimum number of spaces equipped with Level 2 EVCS, Level 1 EV Ready spaces and EV Capable spaces shall all be rounded up to the nearest whole number

Construction plans and specifications shall demonstrate that all raceways shall be a minimum of 1" and sufficient for installation of EVCS at all required Level 1 EV Ready and EV Capable spaces; Electrical calculations shall substantiate the design of the electrical system to include the rating of equipment and any on-site distribution transformers, and have sufficient capacity to simultaneously charge EVs at all required EV spaces including Level 1 V Ready and EV Capable spaces; and service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

5.106.5.3.2 Other nonresidential buildings: In nonresidential new construction buildings that are not designated primarily for office use, such as retail or institutional uses:

1. When 10 or more parking spaces are constructed, 15% of the available parking spaces on site shall be equipped with Level 2 EV Ready;

   Calculations for the required minimum number of spaces equipped with Level 2 EV Ready spaces shall be rounded up to the nearest whole number

   Exception: Installation of each Direct Current Fast Charger with the capacity to provide at least 80 kW output may substitute for 15 EV Ready spaces after a minimum of 15 Level 2 EV Ready spaces are installed.

5.106.5.3.3 Good Design Practices. For all projects subject to Title 24, Part 2, Chapter 11B, construction documents shall indicate how many accessible EVCS would be required under the California Code of Regulations Title 24, Chapter 11B, if applicable, in order to convert Level 1 EV Ready infrastructure to EVCS. Construction documents shall also demonstrate that the facility is designed such that compliance with accessibility standards, including Chapter 11B accessible routes, will be feasible for the required accessible EVCS at the time of EVCS installation. Surface slope for any area designated for accessible EVCS shall meet

slope requirements in Chapter 11B and vertical clearance requirements in Chapter 11B at the time of original building construction.

5.106.5.3.5 Clean Air Vehicle Parking Designation. EVCS qualify as designated parking as described in Section 5.106.5.2 Designated parking for clean air vehicles.

Notes:

1. The California Department of Transportation adopts and publishes the California Manual on Uniform Traffic Control Devices (California MUTCD) to provide uniform standards and specifications for all official traffic control devices in California. Zero Emission Vehicle Signs and Pavement Markings can be found in the New Policies & Directives number 13-01. www.dot.ca.gov/hq/traffops/policy/13-01.pdf.

2. See Vehicle Code Section 22511 for EV charging spaces signage in off-street parking facilities and for use of EV charging spaces.

3. The Governor's Office of Planning and Research published a Zero-Emission Vehicle Community Readiness Guidebook which provides helpful information for local governments, residents and businesses. www.opr.ca.gov/ docs/ZEV_Guidebook.pdf.

4. Section 11B-812 of the 2016 California Building Code requires that a facility providing EVCS for public and common use also provide one or more accessible EVCS as specified in Table 11B-228.3.2.1. Chapter 11B applies to certain facilities including, but not limited to, public accommodations and publicly funded housing (see section 1.9 of Part 2 of the California Building Code). Section 11B-812 requires that "Parking spaces, access aisles and vehicular routes serving them shall provide a vertical clearance of 98 inches (2489 mm) minimum." It also requires that parking spaces and access aisles meet maximum slope requirements of 1 unit vertical in 48 units horizontal (2.083 percent slope) in any direction at the time of new building construction or renovation. Section 11B-812.5 contains accessible route requirements.