**DATE:** June 21, 2022

**TO:** Honorable Mayor and Members of the City Council

**FROM:** XX, Community and Economic Development Director and

XX, Chief Building Official

**SUBJECT:** Reach Codes – Proposed Electrification Reach Codes for 2022 Green Building Standards Code

**RECOMMENDATION**

Staff recommends the City Council consider the options of electrification reach codes as written, to be established on January 1, 2023; to help reduce carbon emissions associated with new construction, reduce costs in new construction, improve indoor air quality and safety of our building stock, support affordable housing, and increase adoption of electric vehicles.

**BACKGROUND**

The interest in building electrification stems from the fact that <Peninsula Clean Energy or Silicon Valley Clean Energy or East Bay Community Energy> is providing virtually 100% carbon-free electricity and eliminating the use of fuel gas, which can greatly reduce greenhouse gas emissions from the building sector. The <City/Town of XX> has demonstrated leadership in sustainability when <proof that this City has demonstrated leadership in sustainability>.

In alignment with the above, staff recommends modifying Part 11 of the California Building Code. This report provides an overview of the Statewide cost-effectiveness study, detailed findings, and provides language recommended for the associated reach code for the 2022 code cycle.

**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. The 2019 Code became effective on January 1, 2020, and the 2022 Code will become effective on January 1, 2023. Cities and counties can adopt reach codes that set conditions above the minimum state code requirements. However, these reach codes must be filed with the California Building Standards Commission.

If local amendments require energy efficiency or conservation measures, such as higher performance envelope or battery storage, the California Energy Commission (CEC) requires that the amendments be supported by a cost-effectiveness study and filed as amendments to the Energy Code (Title 24, Part 6). A cost-effectiveness study and filing with the CEC is not required for amendments that do not require efficiency or conservation, such as only requiring electrification, and the amendments can be made to the Green Building Standards Code (Title 24, Part 11, also known as CALGreen). However, a cost-effectiveness study can demonstrate to the public that amendments to the code are financially responsible and do not represent an unreasonable burden to the residential and nonresidential building owners and occupants.

**Statewide Cost-Effectiveness Study for Energy Code Reach Codes**

Funded by the California investor-owned utilities (IOUs), the California Statewide Codes and Standards Program (Statewide Program) is leading the development of cost-effectiveness studies for Energy Code reach codes that examine different performance-based approaches for new construction of specific building types.

The Statewide Program is analyzing the cost-effectiveness of several new construction building prototypes. A [Single Family and Accessory Dwelling Unit (ADU) cost-effectiveness study](https://localenergycodes.com/download/1364/file_path/fieldList/2022%20PCE_SVCE%20SF%20NewCon%20CE%20Report.pdf) including one-story and two-story single-family homes, and a 650 ft2 ADU, has been published thus far. [A nonresidential cost-effectiveness study](https://localenergycodes.com/download/1266/file_path/fieldList/2022%20Nonres%20New%20Construction%20Cost-eff%20Report.pdf) has been released that analyzes cost-effectiveness of a three-story office building, a one-story retail building, a four-story hotel, and a quick-service restaurant. In early 2023, a multifamily building cost-effectiveness will be released.

The Single-Family and ADU study prototypes are directly applicable to <City/Town Name> development. The City has averaged <number of single-family homes permitted year> new single-family homes constructed each year over the past five years. Additionally, many approved development projects include <type of non-res buildings most commonly permitted>.

The Statewide Program team analyzed the capital and operational costs of mixed-fuel and all-electric new construction over 30 years for residential buildings. Results generally indicate that all-electric new construction is cost-effective in <City/Town Name>’s climate zone using an energy policy metric used by the CEC to develop statewide policy known as Time Dependent Valuation (TDV), which includes societal costs of greenhouse gas emissions. While there is an on-bill cost-effective pathway for all-electric new construction electrification, this package requires the addition of some limited efficiency measures and/or increases in on-site solar photovoltaics (PV) beyond what is already required by the state. Generally, all-electric buildings are less costly upfront to construct, but operational costs increase compared to mixed-fuel buildings, thus additional solar PV and efficiency measures are necessary to be on-bill cost-effective.

Lastly, the nonresidential cost-effectiveness study highlights some exceptions that would be prudent to include in the code to reflect significant hurdles in cost-effectiveness or code compliance, namely commercial kitchen appliances, and building systems that do not have a prescriptive pathway in the Energy Code.

**Electrification Policy Types**

Building appliance electrification options in California can generally be broken into three categories:

* All-Electric Municipal Ordinance: No gas hookup allowed (via municipal ordinance), with limited exceptions. Is not tied to the building code and can be adopted indefinitely
* All-Electric Required: Appliances must be electric (via CALGreen, Title 24 Part 11), with some exceptions. Must be re-adopted with every code cycle.
* All-Electric Required plus Efficiency and/or Solar PV: Appliances must be electric and include a package of efficiency and solar PV measures (via Energy Code, Title 24 Part 6), with some exceptions. Must be approved by the CEC and re-adopted with every code cycle.
* All-Electric Preferred: Allows mixed-fuel buildings with high energy performance, requiring additional energy efficiency measures, battery storage, and/or pre-wiring for buildings to be electric-ready (via Energy Code, Title 24 Part 6). Must be submitted to the CEC and re-adopted with every code cycle. The state’s 2022 Energy Code already represents an All-Electric Preferred model in a number of ways, such as improved TDV performance, pre-wiring for gas appliances, and higher ventilation rates for gas stoves. This local amendment would tip the scales even more toward all-electric new construction.

**Electric Vehicle Charging Infrastructure**

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

* EV Charging Station: All supply equipment is installed at a parking space, such that an EV can charge without additional equipment.
* EV Ready: Parking space is provided with all power supply and associated outlet, such that a driver-provided supply equipment can be plugged in and a vehicle can charge.
* EV Capable: Conduit is installed to the parking space, and building electrical panel and transformers have reserved capacity to serve future load. An electrician would be required to complete the circuit and/or increase the gauge of upstream wiring before charging is possible.

EV charging capacity can be summarized as three categories:

* Level 1: Capable of charging at 110/120V,16A. This is equivalent to a standard home outlet.
* Level 2: Installation of a 208/240V, 40A circuit or 208/240V, 20A circuit for low-power. 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 supermarkets.

The 2022 California Green Building Code update (Title 24, Part 11) increased requirements for electric vehicle charging infrastructure in new construction compared to 2019; including:

* New one- and two-family dwellings and townhouses with attached private garages: must be Level 2 EV-capable
* Multi-family dwellings:
  + 5% must be Level 2 EV Charging Stations
  + 25% must be Low Power Level 2 EV Ready, and
  + 10% of parking spaces must be Level 2 EV Capable.
* Non-residential:
  + 5% must have Level 2 EV Charging Stations, and
  + 15% of parking spaces must be Level 2 EV Capable.

**DISCUSSION**

**Building Appliance Electrification**

Each option for building electrification has unique benefits and demerits.

All-Electric Municipal Ordinance

Several cities, including the cities of Berkeley, Morgan Hill, San Francisco, and San Jose, have adopted all-electric municipal ordinances (also referred to as gas prohibitions), that are more aggressive than the all-electric and electric-preferred model reach codes. These ordinances eliminate the installation of gas infrastructure at the property with limited exceptions, and thus guarantee significant decreases in greenhouse gas emissions.

All-Electric Required Building Code Amendment

The all-electric required model requires specific end-uses to install electric appliances, including space heating, water heating, clothes-drying, and cooking, with limited exceptions. Efficiency or solar PV measures may be added to improve on-bill savings.

All-Electric Preferred Building Code Amendment

The all-electric preferred approach encourages electrification by giving builders two options:

1. Achieving a higher energy efficiency level than the Energy Code using mixed fuels (fuel gas and electricity); or
2. Building an all-electric building at the minimum efficiency as required in the Energy Code.

The all-electric preferred model is NOT recommended by <Peninsula Clean Energy or Silicon Valley Clean Energy or East Bay Community Energy> because the California Energy Code is already an electric-preferred model. There are limited incremental greenhouse gas emissions reduction that can be attained by pursuing this model, compared to the All-Electric Required Municipal Ordinance or All-Electric Required Building Code Amendment.

Below is a table of ordinances that have been adopted in San Mateo County, Santa Clara County, and Alameda County jurisdictions under the 2022 code cycle:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **City** | | **2022 Status** | **Reach Code Type** | | |
| **All-Electric** | **Municipal Code** | **EV Infrastructure** |
| San Mateo County | Atherton | Adopted | X |  | X |
| Belmont | Adopted | X |  | X |
| Brisbane | Adopted | X |  | X |
| Burlingame | Adopted | X |  | X |
| Colma | *In-Progress* | X |  | X |
| Daly City | Adopted | X |  | X |
| East Palo Alto | *In-Progress* | X |  |  |
| Half Moon Bay | Adopted |  | X |  |
| Hillsborough | Enforced | X |  |  |
| Menlo Park | Adopted | X |  | X |
| Millbrae | Adopted | X |  | X |
| Pacifica | Adopted | X |  | X |
| Portola Valley | Adopted | X |  |  |
| Redwood City | Adopted | X |  | X |
| San Bruno | Adopted | X |  | X |
| San Carlos | Adopted | X |  | X |
| San Mateo | Adopted | X |  | X |
| San Mateo County | Adopted | X |  | X |
| South San Francisco | *In-Progress* | X |  |  |
| Santa Clara County | Campbell | Adopted | X |  | X |
| Cupertino | Adopted | X |  |  |
| Gilroy | Adopted |  |  | X |
| Los Altos | Adopted | X |  | X |
| Los Altos Hills | Adopted | X |  |  |
| Los Gatos | Adopted | X |  | X |
| Milpitas | Adopted | X |  | X |
| Monte Sereno | Adopted | X |  | X |
| Morgan Hill | Adopted |  | X | X |
| Mountain View | Adopted | X |  | X |
| Palo Alto | Adopted | X |  | X |
| Santa Clara County | Adopted | X |  | X |
| Saratoga | Adopted | X |  | X |
| Sunnyvale | Adopted | X |  | X |
| Alameda County | Alameda | Adopted | X |  |  |
| Albany | Adopted | X |  | X |
| Berkeley | Adopted |  | X |  |
| Dublin | Adopted | X |  | X |
| Emeryville | Adopted | X |  |  |
| Hayward | Adopted | X |  |  |
| Livermore | Adopted | X |  | X |
| Oakland | Adopted |  | X |  |
| Piedmont | Adopted | X |  |  |
| Pleasanton | Adopted | X |  | X |
| San Leandro | Adopted | X |  | X |

**Electric Vehicle Charging Infrastructure**

Local residents are showing a significant interest in electric vehicles. The number of registered plug-in vehicles in San Mateo, Santa Clara, and Alameda counties increased 30% from 2019 to 2021. In that same time frame, the total number of registered gas combustion vehicles in these counties *shrank* by 4%.[[1]](#footnote-1) In San Mateo County, 1 in 4 personal new vehicles purchases was an EV in 2021.

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 retrofit costs of EV infrastructure installation, while helping to increase EV adoption and decrease transportation-related 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.

**FINDINGS**

**Building Appliance Electrification Reach Codes:**

Staff have worked closely with Peninsula Clean Energy/SVCE/EBCE’s consultants to interpret the Statewide Program study’s results, and to infer what options may or may not be cost-effective for the building types that are prevalent in <City/Town Name> but were not analyzed by the team. <Peninsula Clean Energy / Silicon Valley Clean Energy / East Bay Community Energy> have 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 if needed, and are cost-effective over the lifetime of the building systems for new construction buildings within city limits. Notably, the results of the analysis show that all-electric buildings are typically less expensive to construct.

The recommended reach code for newly constructed buildings is the All-Electric Required Building Code Amendment, which requires all newly constructed residential and non-residential buildings to be built all-electric. Buildings will have no fuel gas infrastructure installed, and electricity will be the sole source of energy for all space heating, water heating, cooking, and clothes drying appliances. Some limited exceptions may include:

* *<Only for cities that have not previously adopted a reach code:* Multifamily residential building projects that have been granted entitlements within a year of the ordinance adoption.>
* Commercial cooking equipment
* Industrial processes
* If there is not an all-electric prescriptive pathway for a building under the state Energy Code, and the building is unable to achieve the Energy Code’s performance compliance pathway using commercially available technology and an approved calculation method, then the building official may grant a modification.

Buildings that invoke these exceptions would be required to prepare the location of fuel gas appliances for future electrification, in order to reduce future retrofit costs.

**Electric Vehicle Charging Infrastructure Reach Codes**

To evaluate the financial impact on first costs, <Peninsula Clean Energy/SVCE/EBCE> commissioned an analysis of the total cost of implementing various EV infrastructure measures. Staff have worked closely with <Peninsula Clean Energy, Silicon Valley Clean Energy, East Bay Community Energy> 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.

Staff incorporated some existing building requirements that are triggered when new parking facilities are added or existing parking facilities alterations involve electrical or lighting work. These requirements include that 10% of these new or altered parking facilities be EVCS, and that any existing EV Capable spaces on-site to be converted to EV Ready spaces.

Recommended requirements for EV infrastructure are:

Residential

* Single Family Dwelling:
  + One dedicated EV ready Level 2 circuit, and
  + One dedicated EV ready Level 1 circuit if there is a second parking space.
* [OPTION A - HIGH POWER ] Multi-Unit Dwelling:
  + 15% of units with parking spaces, Level 2 EV Charging Stations;
  + 85% of units with parking spaces, Low Power Level 2 EV Ready;
* [OPTION B - LOW POWER ] Multi-Unit Dwelling:
  + 40% of units with parking spaces, Level 2 EV Charging Stations;
  + 60% of units with parking spaces, Level 1 EV Ready.

Non-Residential Office

* 20% of the parking spaces, Level 2 EV Charging Stations installed
* 30% of the parking spaces, Level 2 EV Capable

Non-Residential, Non-Office

* 10% of the parking spaces, Level 2 EV Charging Stations installed
* 10% of the parking spaces, Level 2 EV Capable

**Ordinance Language**

Full text of recommended ordinances is available in corresponding document titled <ordinance document title>

**STAFF CONTACT** <staff contact name>

<contact email address>; <contact phone number>

**FISCAL IMPACT**:

No significant fiscal impact.

# ENVIRONMENTAL CLEARANCE:

In accordance with CEQA Guidelines section 15378(b)(5), action on this item is not a project subject to CEQA because policy direction is an administrative action that will not result in a physical change to the environment.

**ALTERNATIVES:**

1. Adopt only the state codes without adopting any local amendments at this time.
2. Direct staff to revise or remove specific local amendments.
3. Request staff to bring back additional information for further consideration.

**RECOMMENDATION:**

Waive First Reading, and to Introduce the Reach Code Ordinance to be Adopted by Reference, to Schedule Public Hearing to Waive the Second Reading for Adoption and Adopt Resolution Approving Findings of Necessity and Need for Amendments, Deletions and Additions to the City/Town Name Municipal Codes.

**DISTRIBUTION:**

California Building Standards Commission

**ATTACHMENTS:**

1. Proposed All-Electric Ordinance
2. Proposed Electric Vehicle Charging Ordinance
3. Cost Effectiveness Studies by the Statewide Programs team

**DATE PREPARED:**

March 23, 2022

1. https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle [↑](#footnote-ref-1)