



STAFF REPORT

Meeting Date: June 14, 2022
Agency: City of Belmont
Staff Contact: Carlos de Melo, Community Development Director, (650) 595-7440, cdemelo@belmont.gov
Agenda Title: Energy Reach/EV Infrastructure Code Amendments
Agenda Action: Ordinance

Recommendation

1. Conduct Public Hearing.
2. Consider and adopt Energy Reach & EV Infrastructure Code Amendments Ordinance (2nd Reading).

Strategic Focus Area

Quality of Life

Background

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 (CBSC). This regular update is referred to as a “code cycle.” The current code cycle was adopted in 2019 and became effective on January 1, 2020. Cities and counties can adopt reach codes that require items that are above the minimum state code requirements. However, these reach codes must be filed with the State.

Belmont briefly reviewed the Energy Reach Code concept in conjunction with the CBSC Adoption process in December 2019, in conjunction with a Climate Action Plan (CAP) update in March 2021, and via updates in October 2021 and February 2022. At the conclusion of City Council review of the matter at their February 8, 2022 meeting, Council provided direction on code language to be incorporated into an Energy Reach & EV Infrastructure Amendments Ordinance. Staff has prepared a subsequent Ordinance (First Reading) for Council consideration as part of tonight’s agenda item.

At the April 26, 2022 City Council meeting, the Council reviewed the Model Energy Reach & EV Infrastructure Code Amendments (1st Reading of Ordinance), and discussed the item. At the conclusion of their discussion, the Council directed staff to set and conduct a future Public Hearing for the 2nd Reading of the Ordinance. No Council modifications were directed for the Draft Ordinance.

Analysis

Building Electrification

In August 2021, the California Energy Commission (CEC) adopted the 2022 Building Energy Efficiency Standards (“2022 Energy Code”). The 2022 Energy Code was also considered by the California Building Standards Commission (CBSC) in December 2021. The proposed 2022 Energy Code, which is slated to go into effect on January 1, 2023, includes a few key changes from the 2019 Energy Code. This includes promoting usage of electric heat pump technology, establishing electric-ready requirements for buildings



when natural gas is installed, updating requirements for solar photovoltaic (PV) system and battery storage standards, and bolstering ventilation standards.

Provisions for multifamily buildings include a compliance pathway for central heat pump water heating and prescriptive heat pump requirements for multifamily HVAC systems in dwelling units. Single-family dwelling requirements include a new prescriptive baseline based on either a space heating heat pump or heat pump water heater. Nonresidential buildings will be required to add efficiency measures if not meeting prescriptive requirements such as heat pump space heating.

Funded by the California investor-owned utilities (IOUs), the California Statewide Codes and Standards Program (Statewide Program) led the development of a cost-effectiveness studies for Energy Code reach codes that examined different performance-based approaches for new construction of specific building types. The Statewide Program's analysis estimated cost-effectiveness of several building prototypes including one-story and two-story single-family homes, a two-story and five-story multifamily building, a three-story office building, a one-story retail building, and a four-story hotel. The single-family homes, multifamily homes, and office building prototypes are directly applicable to current Belmont development. Similar studies examining the cost effectiveness of electrification have been performed by multiple consultants as well as California Energy Commission staff, as referenced later in this report.

The City has seen a dramatic increase in multi-family residential activity within the last two years (over 490 units currently under construction), In addition, over 435 multi-family units (spread over 6 different projects) are currently in the review pipeline. The City also anticipates enhanced commercial development activity in the form of proposed Biotech/Life Sciences office uses in key redevelopment areas of the community - Island Parkway, Shoreway Road, and the Unincorporated Harbor Industrial Area (HIA) - over the next several years.

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

- All-Electric Municipal Code: No gas hookup allowed (via municipal ordinance). This code is the most effective, avoids the triennial building code cycle, and is flexible in that a City may choose to include time-certain or existing building policies.
- All-Electric Building Code Amendment: Appliances must be electric has many of the same benefits as the Municipal Code option, except that it must be re-adopted with every triennial building code cycle.
- All-Electric-Preferred Building Code Amendment: 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. In many ways, the 2022 California Energy Code is already electric-preferred.

Electric Vehicle Charging Infrastructure

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.
- 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 an equivalent to a standard home outlet.
- **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 supermarkets.

The 2022 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, 25% of parking spaces must be low-power Level 2 EV Ready, and 5% must be Level 2 EV Charging Installed.
- Non-residential: 15% of parking spaces must be Level 2 EV-capable, and 5% must be Level 2 EV Charging Installed.

Discussion

Building Appliance Electrification

An all-electric required model Ordinance requires specific end-uses to install electric appliances, with exceptions. For multiple reasons including health, safety, economics, and environmental benefits, there is considerable interest in mandating 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. The interest in building electrification stems from the fact that Peninsula Clean Energy is providing 100% carbon-free electricity and eliminating the use of natural gas can greatly reduce greenhouse gas emissions from the building sector.

Electric Vehicle Charging Infrastructure

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 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 Peninsula Clean Energy team reviewed approaches to increase the amount of EV infrastructure in new construction buildings, while keeping construction costs as low as possible.



Community Engagement

As part of the Council's 10/12/21 update, staff shared the results of a community-wide survey (August through September 2021) regarding perspectives on Reach Code impacts to residents, businesses, and developers. As part of the Council's 2/8/22 update, staff shared Biotech/Life Sciences stakeholders/pending developers feedback. As part of the 4/26/22 Council meeting for the Draft Ordinance, public comments/feedback/support were received.

Common Concerns (Community and Council)

A number of concerns (and requests for additional information) have typically arisen from communities, city councils, and other stakeholders when considering a reach code. Responses to common reach code concerns are listed below:

- Electricity grid costs and reliability: While true that distribution grid upgrades can sometimes be expensive, these costs are offset by savings gained through all-electric construction. Public Safety Power Shut-offs are a concern; however, gas appliances & infrastructure do not promote resilience, as most gas appliances also require electricity to ignite. Furthermore, the gas grid takes longer to reactive than the electric grid when natural disasters such as wildfires or earthquakes do occur.
- Technical challenges with installing central heat pump water heaters: This will be alleviated with more contractor trainings and the CPUC funded BUILD and TECH programs. Belmont can consider exemptions for entitled projects to help address this issue.
- Effectiveness of heat pumps: Heat pumps are over 300% efficient in Belmont's climate, compared to 90% for gas or electric resistance alternatives, and are used effectively even in much colder climates as the [Pacific Northwest](#) and [New England](#) regions. The majority of homes built in the U.S. are [already all-electric](#), with heat pumps representing a significant portion of new installations.
- Whether electricity is clean: PCE base service is 100% carbon neutral today and targets 100% renewable "[round the clock](#)" by 2025.

Previous Council Questions/Requests for Additional Information/Exceptions for Consideration

- Outline the availability of electric equipment: Most technologies for all-electric retrofits are currently available. For example, heat pump water heaters are commonly available at Home Depot, and induction appliances are among the highest rated by [Consumer Reports](#).
- Hire credible consultant to analyze a typical 2,000 sf home and run it through several simulation programs under five different scenarios – outlined below: With some exceptions (noted below), this action has been completed twice as part of the Statewide Utility Codes and Standards program adoptions. The size of home used in these studies is 2,400 ft² :
 - See link to [the first study by Frontier \(https://peninsulareachcodes.org/wp-content/uploads/2019/09/2019-Res-NC-Reach-Codes.pdf\)](https://peninsulareachcodes.org/wp-content/uploads/2019/09/2019-Res-NC-Reach-Codes.pdf) using federal minimum efficiency equipment, and,
 - Link to [the second study by E3 \(https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf\)](https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf), the results of which were used in this [Cost Infographic \(https://peninsulareachcodes.org/wp-content/uploads/2019/10/Electrification-Cost-Story-Infographic_v8.1.pdf\)](https://peninsulareachcodes.org/wp-content/uploads/2019/10/Electrification-Cost-Story-Infographic_v8.1.pdf).



1. All gas - Using real world examples with Belmont temperatures and actual utility prices. Included in both studies noted above.
2. All electric - Except for gas for space or water heating. No gas cooking; no gas clothes dryer. Appliance results are disaggregated in the E3 study noted above.
3. All electric - But, using electric resistance for space heating. Excluded. This analysis may not be necessary as you typically cannot install resistance for space heating in CA unless you are building an extremely efficient envelope.
4. All electric-using heat pumps. Included in both studies.
5. All electric-using solar. Included in the Frontier study.

Provide analysis of all above scenarios in current day-Belmont terms: Analysis performed in Climate Zone 3 using PG&E utility rates. All-electric is cost effective due to the upfront cost savings, and can provide on-bill cost savings if you use these cost savings to install extra solar.

- A proposed Ordinance should also include exceptions. (i.e. pharmaceuticals/medical labs that must use flame; restaurant and hotel banquet kitchens that use certain type of cooking; Commercial buildings where it is infeasible or economically unjustifiable.) *The attached Reach Code Ordinance Amendments allow for these types of exceptions.*
- Council requested feedback to include single family homes (new or substantial remodel) as being subject to Reach Codes. A commonplace definition for a “substantial remodel” trigger centers on replacement of more than 50% of the foundation or the above-sill framing. *Several cities have adopted this approach and staff has included this language as part of the proposed Code Amendments.*
- For the 2022 EV reach codes which will also be included as part of the state code adoption (and implementation on 1/1/23), technical advisory staff is fine tuning the code language and percentages, but they will remain at a 100% access requirement for Multi-Family Residential buildings.
- The Council also indicated seeking some nuanced Reach Code exceptions and used central water heating as an example of a technical challenge. Below are a few design resources indicating why central water heating is a surmountable challenge:
 - [Building Decarbonization Practice Guide](#) – for practitioners and includes central water heating discussion in section 2.6.2
 - [Ecosizer](#) – a design resource for engineers and energy consultants
 - [Building Electrification Technology Roadmap](#) – covers the technical capabilities of a variety of end-uses
- The Council also indicated they would like to see a ‘neutral’ report on electrification. There are several studies developed for the California Energy Commission staff and their consultants on this topic:
 - [Deep Decarbonization in a High Renewables Future](#) – Identifies electrification as
 - [The Challenge of Retail Gas in California’s Low Carbon Future](#)
 - [Building Decarbonization Assessment \(AB3232\)](#)



Building Appliance Electrification Reach Codes

Staff worked with PCE/SVCE's consultants to interpret the previous study results and infer what options may or may not be cost-effective for the building types that are prevalent in Belmont but were not analyzed by the team. Peninsula Clean Energy and Silicon Valley Clean Energy have also provided consultant support to assist cities in understanding the cost-effectiveness study results and adopting reach codes. Current reach codes (under consideration) meet the requirements of the CEC for cost-effectiveness and are also a cost-effective approach for constituents, contractors, and developers pursuing new construction within city limits. In addition, the results of the analysis show that all-electric buildings are typically less expensive to construct.

As such, the staff-recommended reach code requirements for newly constructed buildings are:

- Require new multifamily and commercial buildings to be all-electric with limited exceptions.
- Require all exempted appliances have electrical pre-wiring to accommodate a future electric appliance.
- Require all new Single Family Dwellings (SFD) to be all-electric. This requirement extends to substantial SFD remodels (i.e. when replacement of more than 50% of the foundation or the above-sill framing occurs).

Exceptions include:

- Nonresidential buildings containing kitchens located in a place of public accommodation, may apply for a modification to install *commercial food heat-processing equipment* served by *fuel gas*. The City may grant the modification if they find: 1) A business-related need to cook with combustion *equipment*; 2) The need cannot be achieved equivalently with an *electric heating appliance*; and 3) The applicant has employed reasonable methods to mitigate the greenhouse gas emissions of the *combustion equipment*.
- Laboratory areas within Non-Residential Buildings may contain non-electric Space Conditioning Systems. To implement this exception, an applicant shall provide third party verification that the All-Electric space heating requirement is not cost effective and feasible.
- Hotels and motels with eighty or more guestrooms may utilize *fuel gas* in on-site commercial clothes drying equipment.
- If the applicant establishes that there is not an all-electric prescriptive compliance pathway for the building under the California Building Energy Efficiency Standards, and that the building is not able to achieve the performance compliance standard applicable to the building under the Energy Efficiency Standards using commercially available technology and an approved calculation method, then the City may grant a modification. The City may approve alternative materials, design and methods of construction or equipment per California Building Code Section 104.

Electric Vehicle Charging Infrastructure Reach Codes

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 has consulted with Peninsula Clean Energy, Silicon Valley Clean Energy, and the Statewide Program's team



to understand and potentially 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. EV infrastructure requirements included in the proposed Code Amendments are:

Residential

- Single Family:
 - 1 Level 2 EV Ready
 - 1 Level 1 EV Ready

- Multi-Unit Dwelling:
 - 40% of the units, 1 Level 2 EV Ready
 - 60% of the units, 1 Level 1 EV Ready

Exceptions include:

- Accessory Dwelling Unit (ADU's) & Junior Accessory Dwelling Unit (JADU's) without additional parking facilities & without electrical panel upgrade or new panel installation.
- Buildings with entitlement permits.
- Documented high costs for providing utility service, and lower levels of charging infrastructure for 100% affordable housing projects.

Non-Residential Office

- 20% of the parking spaces, Level 2 EV Ready
- 30% of the parking spaces Level 2 EV Capable

Non-Residential, Non-Office

- 10% of the parking spaces, Level 2 EV Ready
- 10% of the parking spaces, Level 2 EV Capable

The use of Automated Load Management Systems (ALMS) is encouraged. ALMS curtail charging speeds during rare instances of building-wide simultaneous EV charging demand, mitigating electrical infrastructure costs such as utility service connections and transformer sizing.

Environmental Assessment

In accordance with California Environmental Quality Act (CEQA) Guidelines, Section 15308, adoption of the proposed Ordinance Amendments is categorically exempt from CEQA, because it imposes stricter energy efficiency requirements and is a regulatory action authorized by state law and intended to protect the environment.

Alternatives

1. Direct staff to revise or remove specific local amendments germane to the Reach Code & EV Infrastructure Ordinance.
2. Request staff to bring back additional information for further consideration.
3. Take no action.



Attachments

- A. Ordinance – 2nd Reading
- B. Resolution with Climatic Findings

Fiscal Impact

- No Fiscal Impact
- Funding Source Confirmed:

Source:

Staff

Purpose:

Discretionary Action

Public Outreach:

Posting of Agenda

- 1) Community survey conducted in August & September 2021 to solicit public feedback regarding Energy Reach Code topics;
- 2) Consideration of Biotech/Life Sciences stakeholder position memos (January/February 2022).
- 3) Publishing of Newspaper Notification twice as required for adoption of an Ordinance by reference.