



STAFF REPORT

AGENDA NO: Study Session

MEETING DATE: November 4, 2019

To: Honorable Mayor and City Council

Date: November 4, 2019

From: Sigalle Michael, Sustainability Coordinator – (650) 558-7261
Kevin Gardiner, Community Development Director – (650) 558-7253

Subject: Discussion of Building Electrification and Electric Vehicle Infrastructure Reach Codes

RECOMMENDATION

Staff requests that the City Council discuss Building Code reach codes that would encourage dual-fuel or all electric construction and electric vehicle (EV) infrastructure in new developments.

BACKGROUND

On November 4, the City Council is scheduled to adopt the triennial update of the California Building Standards Code that will go into effect January 1, 2020. In conjunction with this process, local governments have an option to adopt reach codes as a supplement to the triennial update. Reach codes are local building code amendments that go beyond the State's requirements for energy efficiency and green building standards. Local governments generally adopt reach codes to reduce greenhouse gas (GHG) emissions and meet climate action goals.

Reach codes that encourage new developments to reduce or eliminate natural gas in new construction have gained momentum over the past year. Natural gas usage in buildings is one of the largest sources of GHG emissions for local municipalities, usually second to transportation, and California is taking significant action to eliminate GHG emissions from buildings. In 2018, California adopted SB 100 mandating that all electricity in California be carbon free by 2045; Executive Order B-55-18 established a statewide goal to be carbon neutral by 2045. These ambitious targets ignited efforts on the local level for cleaner electricity and a move away from fossil fuels. Local community choice aggregation programs have accelerated the use of renewable energy and commitments for carbon-free electricity. Peninsula Clean Energy, Burlingame's local electricity provider, is on the path to 100% renewable energy for San Mateo County by 2025 and currently offers 90% carbon-free electricity.

Over 50 cities in California are set to adopt reach codes, and 18 jurisdictions in San Mateo County are currently considering them. The cities of Berkeley, San Jose, Menlo Park, Morgan Hill, Los

Angeles, and the University of California have already adopted ordinances that limit or eliminate the use of natural gas.

DISCUSSION

There are a number of different approaches municipalities can take to adopt reach codes, ranging from “fuel neutral,” which focuses primarily on energy efficiency (with a corresponding reduction in GHG emissions from reduced energy use), to “future-focused all-electric,” which prepares for a future scenario of carbon-free electricity. Table 1 below summarizes three common approaches to reach codes being considered by municipalities in conjunction with the triennial update of the California Building Standards Code:

**TABLE 1
REACH CODE APPROACHES**

	Future Focused All-Electric	Emissions Focused Electric-Preferred	Energy-Focused Fuel Neutral
Summary	No New Natural Gas Hookups	All-electric meets code. Mixed fuel must increase efficiency.	All fuel types increase efficiency
Residential		CALGreen Tier 1 for Mixed-Fuel (28-75% better)	+ Energy Efficiency for all buildings (27-44% better)
High-Rise Residential		CALGreen Tier 1 & 2 5-10% better	4-10% better
Commercial		+ Energy Efficiency for Mixed Fuel (5-15%)	+ Energy Efficiency for all buildings (5-15%)
Average GHG Savings	37%	21%	16%

Source: Building Decarbonization Coalition

Peninsula Clean Energy (PCE) Model Reach Codes

Peninsula Clean Energy (PCE), with the support of the San Mateo County Office of Sustainability, and Silicon Valley Clean Energy, is encouraging local jurisdictions to adopt reach codes in conjunction with the triennial building code update adoption.

PCE developed two proposed reach codes for jurisdictions to consider. One reach code targets building electrification and solar power, and the other looks at EV infrastructure. PCE is also providing technical and funding assistance to jurisdictions. The City of Burlingame, along with other San Mateo County municipalities, received a \$10,000 grant from PCE to assist with the staff work related to consideration of reach codes.

Building Electricity

The proposed PCE building model reach code offers a dual-fuel option for new buildings, in the manner of the “Emissions Focused Electric-Preferred” approach summarized in Table 1. In the PCE model code, new developments may choose to build all-electric; or alternatively, they may use natural gas for heating, cooling, and cooking provided they meet 15% higher efficiency standards and install the wiring and circuits for electric appliances.

The City of San Mateo recently adopted PCE’s proposed reach code with slight variations, and many other local jurisdictions are considering it as well. The City of Menlo Park took a different route by requiring all low rise residential (one-three stories) to use electric space and water heating (with some exceptions) and the option of natural gas for cooking. New commercial and high rise multifamily buildings must be all electric (with some exceptions). Menlo Park’s approach simplifies the permit process and will achieve higher GHG emission reductions from buildings than PCE’s dual-fuel option. The exceptions in Menlo Park’s code include:

- Life science buildings may use natural gas for space heating.
- Public agency owned and operated emergency operations centers (such as fire stations and police stations) may use natural gas.
- Nonresidential kitchens (such as for-profit restaurants and cafeterias) may appeal to use natural gas stoves.
- For all exceptions that are granted, natural gas appliance locations must be electrically pre-wired for future electric appliance installation.

The proposed PCE building reach code relies on incentivizing developments to choose all-electric over the dual-fuel option, but stops short of requiring all-electric. Incentivizing developers, contractors, and occupants to choose an electric option over natural gas – which they may be more used to and comfortable with – may take significant outreach and education resources and may not result in the reach code’s intended outcomes. Also, building electrification, specifically for space and water heating, is most cost effective at the design and construction phase of buildings.

Building electrification reach codes make local amendments to the state’s Energy Code, and the California Energy Commission (CEC) requires such reach codes to demonstrate that the amendments are cost effective and do not cause unreasonable burden to builders. The California Statewide Codes and Standards Program (a statewide utility program) has been supporting the reach code effort and prepared cost-effectiveness studies analyzing all-electric and mixed-fuel new construction that jurisdictions can apply in their reach codes. (Cost effectiveness studies are not needed for the EV reach code since that reach code makes a local amendment to the Green Building Standard Code and not the Energy Code.)

City of Burlingame staff has been analyzing the City’s potential adoption of reach codes because such an action will help reduce greenhouse gas emissions (GHG) and implement the City’s recently adopted Climate Action Plan Update (CAP). Burlingame’s CAP presents the City’s strategy to avoid

approximately 50,000 MTCO₂e¹ over the next decade to achieve its goal of reducing GHG emissions by 40% by 2030. Natural gas in buildings represents 23% of Burlingame's GHG emissions. The City's CAP currently estimates reductions from increased green building and efficiencies in natural gas to about 3,300 MTCO₂e by 2030 (CAP Measures 11 and 12). Adopting an all-electric building reach code would contribute an additional 3,000 MTCO₂e reduction by 2030. Reductions from the PCE proposed dual-fuel option reach code would be considerably less and rely on how many projects choose the all-electric option.

Although building electrification reach codes will help transition the building sector to be carbon-free, the change will occur gradually in Burlingame given that it would only apply to new construction (existing buildings would not be required to be modified). On average, the City permits approximately 14 new single family homes per year, one new major multi-family project per year, and one or fewer new commercial buildings per year. PCE anticipates a modest impact from reach codes on their electricity load. PCE will be modeling the outcomes of the countywide reach code efforts and has high confidence that they will be able to meet the growth in demand.

Solar Energy

The new 2019 Building Code requires all new single family homes to install solar power. The PCE proposed reach code extends the requirement to include a minimum amount of on-site solar to commercial and large multi-family developments. More specifically, the proposed reach code requires a 3kW solar photovoltaic system on new non-residential buildings less than 10,000 sq. ft., and a 5kW solar photovoltaic system for commercial and multi-family buildings greater than 10,000 sq. ft.

EV Infrastructure

The EV charging infrastructure reach code is intended to support the state's goal of five million zero emission vehicles on the road by 2030 and 250,000 EV charging stations by 2025. PCE's proposed reach code expands on the limited EV infrastructure requirements in the new 2019 Building Code. Installing EV infrastructure equipment during construction costs two to five times less than when installing it in an existing building. Table 2 below lists the proposed reach code EV infrastructure requirements in comparison to the 2019 Building Code.

TABLE 2
EV INFRASTRUCTURE REQUIREMENTS
2019 BUILDING CODE COMPARED TO PCE REACH CODE

Development	2019 Building Code	PCE Reach Code
1-2 unit single family	(1) Level 2 capable	(1) Level 2 outlet and (1) Level 1 outlet
Multifamily, <20 units	10% of spaces Level 2 capable	(1) Level 2 outlet/dwelling

¹ Metric tons of carbon dioxide equivalent

Multifamily, >20 units	10% of spaces Level 2 capable	25% Level 2 outlet/dwelling 75% Level 1 outlet/dwelling
Office Building	6% Level 2 capable	10% Level 2 stations 10% Level 1 outlet 30% Level 2 outlets or capable
Commercial Buildings	6% Level 2 capable	6% Level 2 stations 5% Level 1 outlet (1) fast charger per 100 spaces

- Level 2 outlet is a dryer outlet that an EV can plug into (also known as EV Ready and Plug & Play).
- Level 1 outlet is a standard outlet that an EV can plug into. Charging occurs at a slower rate than level 2 outlets.
- Level 2 station means an EV charging station is installed.
- Level 2 capable means the conduit and electricity is installed, but equipment is still needed for charging.

The EV infrastructure reach code would directly implement the climate action strategy (Measure 6) in Burlingame's CAP that requires new residential developments to include level 2 charging.

All-Electric Construction

As described above, the City of Menlo Park adopted a reach code that prioritizes all-electric construction to a greater degree than the PCE model reach code, and the interest in all-electric codes appears to be growing. For example, jurisdictions such as Morgan Hill, Berkeley, Mountain View, San Jose, and the County of San Mateo have been opting to adopt ordinances that prohibit use of natural gas for space and water heating.

All-electric construction is not a new concept, however. One out of four homes are all-electric across the United States, and all-electric homes are common in Europe and Asia. The theory is that all-electric construction reduces the carbon footprint of a building when electricity is sourced from 100% renewable and carbon-free sources. Research has shown that transitioning to efficient electric appliances could be the most effective way to reduce GHG emissions in homes and buildings.²

All-electric construction is associated with other benefits as well, including:

- **Public health:** All-electric buildings improve indoor air quality by eliminating the burning of natural gas inside homes. Studies have found that emissions from gas cooking can far surpass outdoor pollution levels and impact respiratory diseases. All-electric buildings also eliminate risks of carbon monoxide poisoning.
- **Cost savings:** For new construction, all-electric buildings avoid the infrastructure costs of natural gas, making them generally cheaper to construct. Electric appliances are generally competitive with natural gas appliances in efficiency and costs.

² Building Decarbonization Coalition, <http://www.buildingdecarb.org/resources/a-roadmap-to-decarbonize-californias-buildings>

- Public safety: All-electric buildings avoid the dangers of natural gas accidents caused by earthquakes, gas leaks, and poorly maintained gas lines.³ However, it is important to understand that electrical building systems and distribution systems can also present safety dangers such as electrical fires, and indeed electrical failures or malfunctions were the second leading cause of U.S. home fires in 2012-2016 (behind fires caused by unattended equipment).⁴

The rationale for requiring all-electric construction is that building more new developments that use natural gas means those are additional buildings that would need to be converted in the future as California and cities transition to carbon-free buildings. That said, PCE has recommended the dual-fuel approach because it believes such an approach can be adopted smoothly and has a solid legal basis.

Incentive Approaches

Given that all-electric building is already feasible (but not required), another option would be to offer incentives that could encourage, but not require, new developments to be designed for all-electric construction.

For example, the interim zoning created for Burlingame's North Rollins Road and North Burlingame Mixed Use Districts includes an option for increased floor area and building height for "Net Zero Energy" projects that receive 100 percent of total energy from renewable sources. One option would be to offer a similar incentive approach elsewhere in the City.

Another option would be to encourage passive solar design in new development. This would allow energy savings through solar water heating and/or windows, walls, and floors that collect, store, reflect, and distribute solar energy in the form of heat in the winter and reject solar heat in the summer.

An incentive approach could be paired with the PCE dual-fuel code to further encourage (but not require) all-electric construction, or alternatively could be paired with a less-involved "Energy-Focused Fuel Neutral" approach as summarized in Table 1.

Next Steps

Staff is seeking direction from the City Council on the best reach code route for Burlingame with consideration to the proposed PCE reach codes.

Staff then will propose a reach code ordinance for City Council consideration. Should a reach code ultimately be approved, staff will file the reach code with the California Energy Commission and await a 60-day comment period. Once approved by the CEC, the reach code would go into effect at the end of the CEC comment period, or later depending on the City's timeline.

³ A Zero Emission All-Electric Multifamily Construction Guide, Redwood Energy, <https://fossilfreebuildings.org/ElectricMFGuide.pdf>

⁴ National Fire Protection Association (NFPA), <https://www.nfpa.org/News-and-Research/Data-research-and-tools/Electrical/Electrical>

FISCAL IMPACT

None.