



CITY OF SAN MATEO

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Agenda Report

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TO: Sustainability and Infrastructure Commission

FROM: Kathy Kleinbaum

PREPARED BY: City Manager's Office

MEETING DATE: April 13, 2022

SUBJECT:
Sustainability-Related Amendments to the 2022 Building Code

RECOMMENDATION:

Provide feedback on potential amendments to the 2022 Building Code for new construction and existing buildings related to building electrification and electric vehicle readiness.

BACKGROUND:

Transportation accounts for 50% of greenhouse gas emissions in San Mateo, followed by electricity and natural gas use in buildings that accounts for 34% of emissions. The City's Climate Action Plan identifies encouraging adoption of electric vehicles (EV) and electrification of new and existing buildings as key focus areas to meet greenhouse gas emission reduction goals. Furthermore, the City Council directed staff to establish policies to decarbonize existing buildings and eliminate methane gas use by 2030.

Local governments can adopt amendments to the building code, also known as "reach codes," to require more sustainable development and address emissions from the transportation and building sectors. Reach codes are typically evaluated every three years in line with the State's triennial building code cycle. The last building code was adopted in 2019 and went into effect on January 1, 2020. The 2022 building code will be adopted this fall and be effective January 1, 2023 through December 31, 2025.

This report provides an overview of the importance building electrification and EV infrastructure, summarizes the City's current reach codes, and introduces options for new reach codes addressing building electrification and EV readiness in new construction for the 2022 building code. This report also introduces possible reach codes to address building electrification in existing buildings for the 2022 building code.

BUILDING ELECTRIFICATION AND EV READINESS BACKGROUND

All-electric buildings or building electrification refers to buildings that have no natural gas service. All-electric buildings use electric equipment for space and water heating, clothes drying, cooking, and more. Building electrification has gained traction in recent years because Peninsula Clean Energy (PCE), San Mateo County's electricity provider, supplies very clean electricity to the community. Currently, PCE provides electricity that is 50% renewable and 100% carbon free. PCE is committed to delivering 100% renewable and carbon free electricity by 2025. This ambitious energy portfolio greatly reduces emissions from buildings.

While electricity has become cleaner, natural gas is a fossil fuel producing significant emissions. The primary component of natural gas is methane, which contributes emissions with a very high global warming potential. Leakage from natural gas infrastructure adds to emissions as gas leakage occurs during production, transmission, and even at the building level. There are health and safety concerns associated with the transmission and use of natural gas in homes. Natural gas can

produce hazardous gases within buildings and many cooking stoves are not equipped with proper ventilation.

Bolstering EV charging infrastructure is an important priority in the Climate Action Plan and critical to reducing greenhouse gas emissions in the transportation sector. The State established ambitious goals around electrifying vehicles and by 2035, the sale of all new passenger cars and trucks will be zero-emission. The sale of electric vehicles in San Mateo County has grown rapidly over the past ten years, last year 20% of new vehicle sales were electric. To meet the State's aggressive climate goals, millions of more charging ports will need to be installed throughout the state. The availability of home charging is specifically important because the lack of at-home charging is considered the primary barrier to EV adoption. The California Energy Commission estimates that 70% of people need access to at-home charging to enable an all-electric fleet.

Installing EV infrastructure in new construction is significantly cost saving compared to retrofitting existing buildings. PCE authorized a study to compare new construction and retrofit costs and modeled two different sized multifamily buildings and an office building. In each scenario, retrofitting existing buildings to install EV infrastructure costs three to four times more than the installation of EV infrastructure at the time of new construction. Retrofitting for EV infrastructure can require costly trenching, wiring, and electrical work. Installing EV infrastructure as part of new construction will save the building owner significant costs compared to retrofitting in the future.

In the previous code cycle, PCE supported jurisdictions in the adoption of reach codes to advance renewable energy, building electrification and EV readiness. PCE provided cost-effectiveness studies, model code language and technical support to City staff. This year, PCE is leading the newly formed Bay Area Reach Codes group that includes East Bay Clean Energy (EBCE) and Silicon Valley Clean Energy (SVCE) and providing this same type of support to local governments. The Bay Area Reach Codes team is focusing on building electrification and EV readiness in new construction and policy options for encouraging electrification in existing buildings.

CURRENT REACH CODES – NEW CONSTRUCTION

In 2019, the City adopted reach codes addressing solar, building electrification and EV readiness. The City's current reach codes will expire on December 31, 2022 and are summarized below.

Solar – Multifamily and Nonresidential

The 2019 building code requires solar installation on new construction of low-rise residential projects. The City's reach code mandates minimum size solar photovoltaic installations on all other types of new construction.

Building Electrification – Residential Buildings and Buildings with Office Use

The City's reach code requires all residential new construction and all new construction of buildings with office use be all-electric.

Electric Vehicle Readiness – All Building Types

The City's reach code requires a higher number of EV charging infrastructure than what is required by the State for new construction projects. An EV Capable space contains electrical capacity and raceway. An EV Ready space contains electrical capacity, raceway, conduit, and receptacle. Electrical vehicle supply equipment (EVSE) spaces include Level 2 EVSE installed. The City's current reach code for EV readiness varies by building type:

- One- and Two- family dwellings and town houses: One EV Ready space
- Multifamily buildings: 15% EV Capable spaces
- New non-residential buildings: 10% EV Capable spaces, 5% EVSE installed spaces

REACH CODE OPTIONS – NEW CONSTRUCTION

The Bay Area Reach Code team is developing reach code options for building electrification and EV readiness in new construction. It is important to note that reach codes for solar and battery storage are no longer necessary since the 2022 State Energy Code now requires solar and battery storage for all types of new construction. Staff recommends focusing on reach code options recommended by the Bay Area Reach Codes team.

Building Electrification – All Building Types

Currently, the City’s reach code requires specific building types be all-electric, including residential new construction and new buildings with office use. Staff recommends expanding this all-electric requirement to the new construction of all building types. Granting exemptions for gas stoves for commercial kitchens/restaurants, outdoor fire pits, and different types of end-uses was a heavily debated topic during the reach code development process in 2019. The Bay Area Reach Code team recommends jurisdictions do not allow for blanket exemptions but instead establish a process and criteria to grant exceptions. It is important to minimize exceptions for specific equipment given the availability of electric equipment options. Further, the installation of gas infrastructure to service one piece of equipment diminishes the project cost savings of not installing gas infrastructure and creates investment in new gas infrastructure that does not align with the City’s goal to reduce emissions and phase out natural gas in buildings by 2030.

Staff recommends the City adopt a reach code requiring all new construction be all-electric, with a defined process to evaluate and grant exceptions, as proposed by the Bay Area Reach Codes group.

Electric Vehicle Readiness – All Building Types

EV readiness can mean having panel capacity and raceway installed so that a branch circuit and receptacle/equipment can be installed at a later date or can require the installation of electric vehicle supply equipment (EVSE). EV readiness terminology is summarized in Table 1.

Table 1: EV Readiness Definitions

	Definition
Level 1 EV Ready	Includes full 110/120 V 20-amp circuit with a receptacle or outlet
Level 2 EV Capable	Includes panel capacity for 208/240 V 40-amp circuit and conduit or raceways
Level 2 EV Ready (low-power)	Includes full 208/240 V 20-amp circuit with a receptacle or outlet
Level 2 EV Ready	Includes full 208/240 V 40-amp circuit with a receptacle or outlet
Level 2 EV Charging Space (EVCS)	Includes full charging capability with EVSE (Electric Vehicle Supply Equipment) installed

The State has continued to increase EV readiness requirements every three years, for the first time the State will require the installation of EVSE. Table 2 summarizes the 2019 State Code, the City’s current reach code requirements and the 2022 State Code requirements.

Table 2: EV Readiness Requirements

	2019 State Code	2019 City Reach Code (currently in effect)	2022 State Code
Single Family and Two-Family Townhomes	One Level 2 EV Capable space per dwelling unit	One Level 2 EV Ready space per dwelling unit	One Level 2 EV Capable space per dwelling unit
Multifamily	10% Level 2 EV Capable	15% Level 2 EV Capable	5% Level 2 EVCS 25% Level 2 EV Ready (low-power) 10% Level 2 EV Capable <i>Total: 40% of spaces</i>
Non Residential	6% Level 2 EV Capable	5% Level 2 EVCS 10% Level 2 EV Capable <i>Total: 15% of spaces</i>	5% Level 2 EVCS 15% Level 2 EV Capable <i>Total: 20% of spaces</i>

The City has the opportunity to reach beyond the 2022 State Code requirements. The State offers reach codes options for jurisdictions to adopt called “CalGreen tiers” and the Bay Area Reach Codes team provided their own recommendation. The different EV Readiness reach code options are summarized in Table 3.

Table 3: EV Readiness Reach Code Options for 2022 Building Code

	CalGreen Tier 1	CalGreen Tier 2	Bay Area Reach Codes Model Code
Single Family and Two-Family Townhomes	None	None	One Level 2 EV Ready per dwelling unit; One Level 1 EV Ready space if second space provided
Multifamily	10% Level 2 EVCS 35% Level 2 EV Ready (low-power) <i>Total: 45% of spaces</i> *also applies to hotel and motel	15% Level 2 EVCS 40% Level 2 EV Ready (low-power) <i>Total: 55% of spaces</i> *also applies to hotel and motel	40% Level 2 EVCS 60% Level 1 EV Ready <i>Total: 100% of dwelling units with spaces</i> <u>Affordable Housing</u> 15% Level 2 EVCS 25% Level 2 Ready (low-power) 60% Level 1 EV Ready <i>Total: 100% of dwelling units with spaces</i>
Non Residential	10% Level 2 EVCS 20% Level 2 EV Capable <i>Total: 30% of spaces</i>	15% Level 2 EVCS 30% Level 2 EV Capable <i>Total: 45% of spaces</i>	<u>Office Use</u> 20% Level 2 EVCS 30% Level 2 EV Capable <i>Total: 50% of spaces</i> <u>All Other Uses</u> 10% Level 2 EVCS 10% Level 2 EV Capable <i>Total: 20% of spaces</i>

For Single Family and Two-Family Townhomes, currently the City's reach code requires one Level 2 EV Ready space per dwelling unit. *Staff recommends adoption of the Bay Area Reach Codes Model Code that requires one Level 2 EV Ready space per dwelling unit; in addition, one Level 1 EV Ready space would be required if the development includes more than one parking space to ensure sufficient charging access.*

For multifamily buildings, the City's current reach code requires 15% Level 2 EV Capable spaces. CalGreen tier reach code options go beyond the state code to require a higher percentage of EV readiness in spaces. CalGreen tiers concentrate the availability of chargers in a limited number of spaces. The Bay Area Reach Codes group focuses on ensuring every residential unit has access to EV charging and relies on Level 1 outlets, these outlets are the typical standard outlet that you see inside your home. According to a California Air Resources Board study, 50% of EV drivers use Level 1 charging. PCE assessed EV charging needs for multifamily properties and found that in residential settings, cars are typically parked for more than twelve hours. Given the average commute for a Bay Area resident is approximately 25 – 35 miles per day, charging needs can often be satisfied with a Level 1 charger, avoiding more expensive electrical capacity upgrades.

EV charging poses some challenges to multifamily property owners as they need to learn to manage EVSE and/or access to outlets. Most Level 2 EVSE include energy monitoring and payment capabilities and this technology is just emerging for Level 1 outlets. Without this technology, electricity is typically billed to one meter and the property owners will need to navigate how to charge tenants for the electricity use related to EV charging.

Staff recommends the Bay Area Reach Codes reach code option for multifamily buildings to ensure charging is accessible to all residential units.

For nonresidential buildings, the City's current reach code requires 5% Level 2 EVCS and 10% Level 2 EV Capable. The CalGreen tier options recommend higher percentage of EV readiness for all uses. The Bay Area Reach Codes option provides a recommendation for office use and a recommendation for all other uses. The option for office use requires a higher percentage of EV readiness than the option for all other uses.

Staff recommends adoption of the Bay Area Reach Codes reach code for nonresidential buildings because the policy focuses on increasing charging in office buildings, where most charging is likely to occur after at-home charging.

REACH CODE OPTIONS – EXISTING BUILDINGS

The City has a strong history of applying reach codes to new construction, but new construction represents a small fraction of the built environment in San Mateo. Decarbonizing existing building stock is key to reach the City's ambitious climate goals but addressing the existing building stock can be challenging. Along with mandates implemented through reach codes, staff will prioritize working with partner agencies to provide outreach and education to the community on the benefits of building electrification, exploring financing options for converting to electric equipment, and supporting workforce training to install electric equipment.

The Bay Area Reach Codes team emphasizes that a jurisdiction must consider equity to ensure that electrification reach codes do not negatively impact underserved communities. A study by the Greenlining Institute outlines the barriers to electrification in Environmental Social Justice (ESJ) communities. Upfront costs to convert to new technology and electric equipment is often the primary barrier. In addition, electricity prices are currently higher than natural gas prices so homes with electric equipment have higher utility bills. ESJ communities often face energy insecurity "the inability to pay for energy bills without making a significant trade-off such as not paying for other basic needs such as food, medical care, transportation or rent." Someone who faces energy insecurity is not able to prioritize electrification. Further, those who are renters lack the choice of choosing to electrify.

While electricity prices are currently higher than natural gas, as more people electrify their homes, those who remain gas customers will be challenged with rising gas prices. A sharp increase in gas bills is expected in the future because utilities are asking for rate increases to fund necessary safety upgrades to the state's aging gas infrastructure. According to the Greenlining Institute, the ESJ communities who face barriers to electrification will need assistance to move to cleaner, electric appliances to help shield them from the rising cost of gas.

Encouraging or requiring electric conversions make the most economic sense when coupled with specific triggers to be more cost effective and less disruptive to the building owner and occupants. The Bay Area Reach Codes group is currently analyzing a number of measures to encourage the installation of electric equipment and electrification readiness in different building types but has not finalized a list of recommended measures. Staff reviewed preliminary analysis with the Bay Area Reach Codes group and identified a list of potential measures for discussion. It is important to note that these are mix and match options and that the City can move forward with whichever combination of policies that are determined to be optimal:

1) *Electric-readiness (panel capacity) at time of electrical panel upgrade – Residential*

This measure requires the reservation of breaker space in the existing or new electric panel to accommodate anticipated future electrification of the buildings' electrical load at the time of electrical panel upgrade or replacement. The measure would require dedicated breaker spaces for future electric appliances, including a heat pump water heater, heat pump space heater, EV charger, and other end-uses. Electrical capacity is key to future electrification of a building's systems. By requiring the reservation of breaker space when a building owner is already making changes their electrical panel, gas equipment can more easily be converted to electric at the end of equipment life.

2) *Electric-readiness (outlets installed) at time kitchen or laundry room renovations – Single Family Residential*

This measure requires the installation of electrical outlets at the time of kitchen or laundry room renovation if a gas appliance is installed. This means at least one outlet capable of serving electric equipment is located within six feet of the kitchen stove during a kitchen renovation and clothes dryer during a laundry room renovation. This simple requirement enables electric equipment to be easily installed at a later date.

3) *Heat pump air conditioning – Residential and Small Commercial*

This measure requires the installation of a heat pump air conditioning unit at the time of installation of a new air conditioning system or replacement of an existing unit. This measure would apply to residential buildings and for commercial buildings with air conditioning units up to 30 tons of air flow.

Instead of a traditional air conditioning condensing unit, a building owner would need to install a heat pump unit, also known as a reverse cycle air conditioning condensing unit. For residential installations, TECH Clean California incentives make the heat pump option less expensive than the installation of an air conditioner plus new furnace. Heat pump air conditioning units enable electrification of the space heating system. If sized appropriately, the building owner will no longer require a gas space heating system after the heat pump installation.

4) *Heat pump pool heating – Residential*

This measure would require the installation of heat pump pool water heating equipment when a new pool is installed at an existing residential building. If a pool is installed as part of the construction of a new residential building, the pool is already required to use electric heating equipment according to the City's current building electrification reach code.

Compared to a traditional gas pool heater, the electric option can cost \$800 - \$1,300 more. Installation of a heat pump pool heater might trigger an electrical panel upgrade depending on the size of the pool, which could increase project costs. The City of Santa Monica's cost effectiveness study found it is cost effective to require this measure in Climate Zone 6, and a study including San Mateo's climate zone is currently underway.

5) *Heat pump water heating – Single Family Residential*

This measure would require the installation of a heat pump water heater (HPHW) at the time of replacement. With available incentives, the installation of a heat pump water heater instead of gas equipment would cost \$2,500 more or higher.

There are several challenges associated with the conversion of an existing gas fired water heater to a heat pump system. Typically, when gas water heaters fail, contractors are able to replace the equipment with a gas water heater within 24 hours. In order to convert to a heat pump water heater, property owners would need to hire an electrician to install the required wiring and potential electrical panel upgrades before installation of the heat pump equipment. This process can

take several days or even weeks depending on the contractor and equipment availability. Building occupants would have to live without hot water during the conversion and installation process. StopWaste in Alameda County is currently piloting an equipment loan program that provides short term loans of gas water heaters until the heat pump water heater is installed. This type of program could help make the conversion to heat pump water heaters at time of failure more comfortable for building occupants but is currently not available in San Mateo County.

Another challenge with heat pump water heaters is the typical size of the system. Because the HPWH is somewhat slower than a gas fired water heater, manufacturers may recommend replacing a 40-gallon gas fired water heater with a 60- to 80-gallon HPWH. The increase in physical size might make it more complex to site the new HPWH. Water heaters are often located in the garage, but a homeowner might not have sufficient space to replace the system in the garage without encroaching on the parking clearance.

Staff does not currently have a recommendation on electrification reach codes for existing buildings for adoption. Staff is awaiting additional cost-effectiveness analysis and draft code language to better understand the impact and implementation process for enforcing these measures.

Next Steps

Reach codes can be adopted at any time, however, it is optimal to adopt a reach code at the beginning of a code cycle to maximize the time the policy is in effect. Staff recommends that new construction reach codes be adopted by the end of the year so that the current new construction reach codes for building electrification and EV readiness do not lapse. Since there are currently no reach codes pertaining to existing buildings, there is no concern about a potential lapse and therefore the timeline can be more flexible if additional time is needed to develop the optimal policy option. Because this is the first time the City will consider reach codes that impact existing buildings, there might be a need for additional analysis and discussion. If needed, staff recommends separating new construction and existing building reach code efforts to ensure new construction reach codes are prioritized for adoption by the end of the year.

Staff seek Sustainability and Infrastructure Commission feedback on the reach code options for new construction and existing buildings. Based on Commission feedback, staff can return to the Commission for additional discussion if needed. Staff aim to present the Commission's recommended reach codes for consideration at a City Council Study Session in July and an ordinance for adoption by the end of the year.

BUDGET IMPACT:

There is no budget impact.

ENVIRONMENTAL DETERMINATION:

This informational report is not a project subject to CEQA, because it can be seen with certainty that it will not cause a physical change in the environment. (Public Resources Code Section 21065.)

NOTICE PROVIDED

All meeting noticing requirements were met.

ATTACHMENTS

Att 1 – Post Packet Public Comment

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