



SUSTAINABILITY DIVISION

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CITY COUNCIL STAFF REPORT

Meeting: November 19, 2019

Subject

Study session regarding policy options to reduce the use of natural gas and increase electrification of Cupertino's building stock via local amendments to the 2019 California Energy & Green Building Standards Codes (Reach Codes).

Recommended Action

Provide direction on policy options to reduce the use of natural gas and increase electrification of Cupertino's building stock via local amendments to the 2019 California Energy and Green Building Standards Codes.

Background

In 2015, the City Council adopted the City's [Climate Action Plan \(CAP\)](#)¹ to put Cupertino on the path to achieve a 15% reduction in carbon emissions by the year 2020, 49% reduction by 2035, and 83% by 2050. The first goals of the CAP are to increase energy efficiency in homes and buildings, and to increase the use of carbon-free energy community-wide.

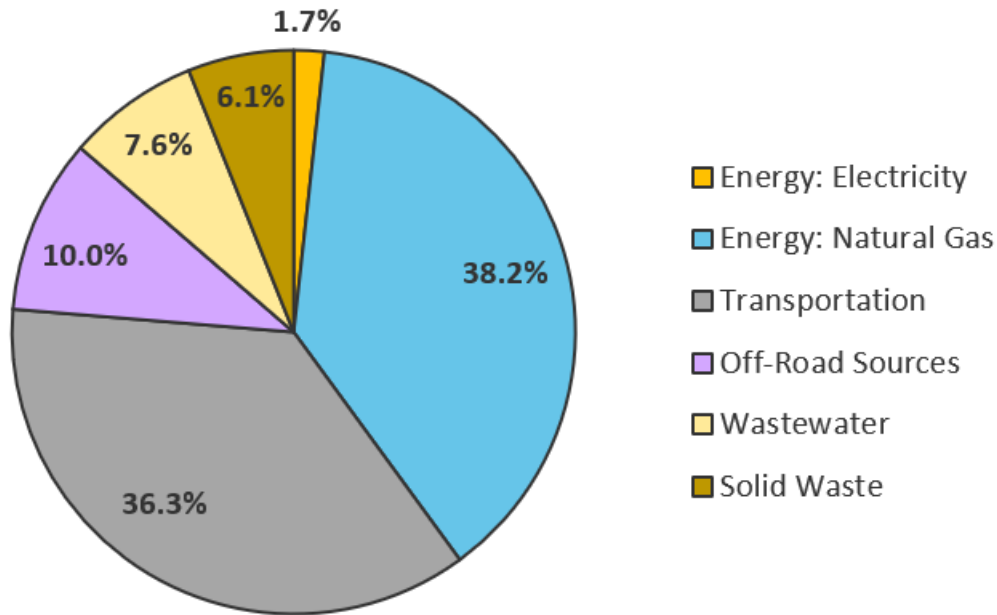
Encouraging or requiring the electrification of buildings in Cupertino is one method to support the goals of the CAP. Cupertino's electricity supply from Silicon Valley Clean Energy ("SVCE") is carbon-free, so buildings that are all-electric or largely electric will similarly be carbon-free. The sustainability impact of addressing fuel choices in new construction is notable, given the fact that any newly installed natural gas service would "lock in" that fuel for 30-50 years in the life of that building, potentially putting the owner at risk of having to retrofit that building in response to future regulations addressing fossil fuel emissions.

To track progress towards the CAP goals, the Sustainability Division completes an inventory of greenhouse gas emissions every 3 years. The 2018 Greenhouse Gas Inventory found that Community-wide natural gas emissions increased 14% from 2010 to 2018 and increased 34% from 2015 to 2018. As shown in Figure 1, natural gas emissions made up 38% of Cupertino's total community-wide emissions in 2018. With natural gas making up

¹ <https://www.cupertino.org/our-city/departments/environment-sustainability/climate-action>

the largest portion of the City's emissions, an all-electric or electric-preferred energy reach code could help reduce this percentage.

Figure 1. Cupertino City-Wide Greenhouse Gas Emissions by Sector, 2018.

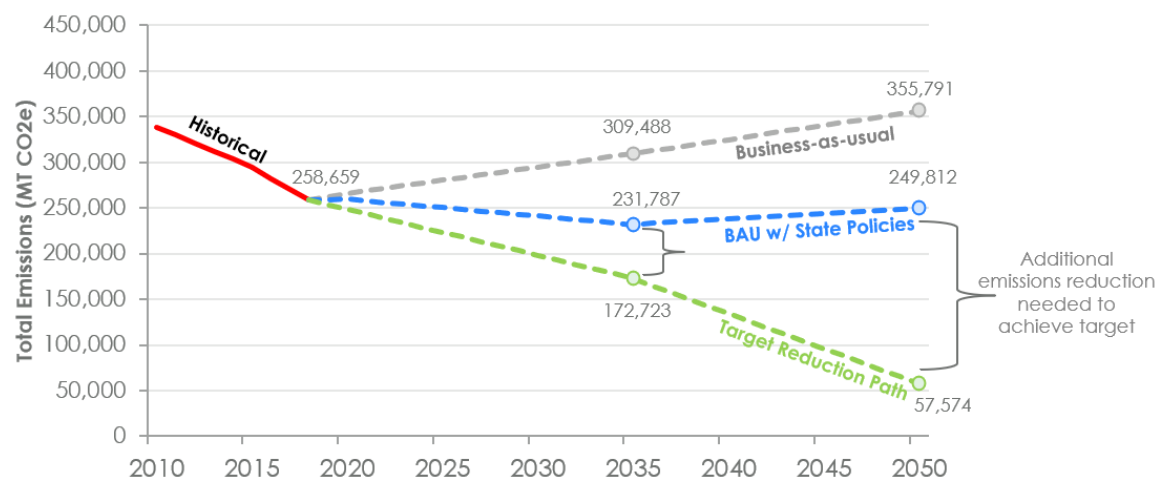


Furthermore, the City studied the greenhouse gas emissions forecast for the years 2010-2050. It was found that local emissions reduction policies are needed (beyond the adopted State policies such as existing clean energy mandates and building codes) between now and 2035 in order to achieve the targets set in Cupertino's CAP. For example, one State policy is to adopt zero-net energy building codes for new non-residential buildings by 2030. Given the cleaner electricity mix available locally, adopting a local electrification ordinance earlier has the potential to avoid a cumulative 59,000 tonnes CO₂e this decade in Cupertino, bringing the City closer to its target emissions path. The target emissions path is shown in figure 2, below. This finding supports the proposed reach code addressing fossil fuels used in buildings and transportation.

Table 1. Summary of Key 2010-2018 Community-Wide Emissions Trends

Emissions Sector	Summary of 2010-2018 Trends
Energy	Energy emissions decreased 40% from 2010 to 2018. This trend in the energy sector is largely driven by a 95% decrease in total electricity emissions. The launch of Silicon Valley Clean Energy (SVCE) is largely responsible for this decrease in electricity emissions. In the period from 2010-2018, natural gas consumption in buildings and associated emissions rose 14% overall in Cupertino.
Transportation	Transportation emissions decreased 10% from 2010 to 2018. An 8% increase in total vehicle miles travelled (VMT) was offset by a 17% improvement in on-road vehicle fuel efficiency.

Figure 2. Cupertino community-wide emissions forecast summary, 2010-2050



In addition, the Cupertino City Council adopted a [climate emergency declaration](#)² on September 18, 2018, calling for an emergency mobilization effort to end citywide greenhouse gas emissions as quickly as possible. The proposed “all-electric” reach code would support this urgent need to reduce citywide greenhouse gas emissions.

Local Government Reach Codes

Local governments may address the emissions associated with their building stock by adopting local amendments to the California Building Standards Code that exceed or differ from the State’s standards. Any local changes to the state Building Standards Code must be justified on the basis of a local climatic, geologic, or topographic condition. Such changes must be filed with the California Building Standards Commission (“CBSC”). Cupertino recently adopted its local amendments to the state codes, and plans to file its ordinance with the CBSC this month. Ordinance No. 19-2189 was enacted by the City Council at the November 5, 2019 regular council meeting.

² <https://cupertino.legistar.com/LegislationDetail.aspx?ID=3656567&GUID=873BFD9A-F7D3-4E4E-BD18-3684722A25E2&Options=ID|Text|Attachments|&Search=%22Climate+emergency%22>

However, in addition to these general changes to the state Building Standards Commission, local governments may also adopt “reach codes,” which are local amendments that exceed the State’s standards for energy efficiency and other green building characteristics. In addition to being filed with the CBSCB, energy reach codes must be approved by the California Energy Commission (“CEC”) before they can be enforced by a local government. To obtain CEC approval, a local government must find that the energy reach code is cost-effective, and the CEC must find that the reach code will result in buildings that use no more energy than permitted by the state code. Other types of reach codes, including local changes to the California Green Building Standards Code (“CALGreen”), need only be filed with the CBSC.

The Cupertino City Council took a leadership position on the adoption of reach codes as a measure to reduce emissions from its building stock when it included a study of reach codes in its FY 2019-20 adopted City Work Program. Specifically, the Sustainability Commission and Sustainability Division were tasked to study model reach codes addressing building electrification and green building measures. Staff in the Sustainability and Building divisions have been leading the reach code process.

Cupertino’s Reach Code Development Process

The Sustainability Commission’s FY 2019-20 Work Program includes reviewing green reach codes and making a recommendation to Council. This Staff Report reflects the recommendations of the Sustainability Commission’s sub-committee on reach codes.

In April 2019, staff participated in Silicon Valley Clean Energy’s (SVCE) model reach code development process along with other member agencies in the SVCE service territory, including Sunnyvale and Mountain View. The intent of this process was to have each participating agency consider the model reach code and make any modifications necessary based on local needs and objectives, as well as to generate regional consistency in public outreach and model code development.

Further elaboration on Cupertino’s reach code development process, including stakeholder outreach and feedback, is provided below.

Discussion

As a result of its participation in the SVCE model reach code development process, staff is exploring two potential energy reach code options:

1. An “all-electric” reach code, which would require all new construction to be built all-electric, meaning that electricity is the sole source of energy for space- and water-heating, cooking, clothes-drying, and other uses. This reach code option would include exceptions for certain classes of buildings, including factories, laboratories, hospitals, and “essential facilities.”

2. An “electric-preferred” reach code, which would encourage electrification in new construction:

a. In non-residential buildings and high-rise residential buildings, this option would require mixed fuel buildings to exceed the state’s energy budget, whereas all-electric buildings would only have to meet the level provided in the state code. Any gas appliances installed in this category of buildings would be required to be accompanied by electrical upgrades that would enable future electrification (“electric-ready”).

b. In low-rise residential buildings, this option would require that electricity be the sole source of energy for all uses other than cooking, for which natural gas would be an option.

These two energy reach code options are discussed in more detail below, with more information regarding their cost-effectiveness and implementation.

In addition to these two energy reach code options, staff is also proposing that the City adopt local amendments to CALGreen. These include an Electric Vehicle (“EV”) reach code, which would require more EV charging infrastructure in newly constructed buildings than is required in the state code, as described in greater detail below. Additionally, Staff recommends adopting the City’s previously-adopted local amendments to CALGreen to maintain consistency with previous City amendments.

Recommended Approach: All-Electric Reach Code

Staff is recommending an “all-electric” reach code, to be applied at permit application for all newly-constructed buildings seeking construction permits after January 2020.

Under the all-electric reach code, all newly constructed residential and non-residential buildings would be required to be built all-electric, meaning that the buildings will have no natural gas or propane plumbing installed, and that electricity will be the sole source of energy for all space heating, water heating, cooking appliances, and clothes drying appliances. Several categories of buildings are excepted from the all-electric requirement, including factories, hospitals, laboratories, and “essential facilities.” These building types may not be able to meet the State’s cost effectiveness test for all-electric construction. More information on the cost-effectiveness studies is included later in this report. Additionally, nonresidential buildings with for-profit kitchens may apply for a modification from the all-electric requirement if they would have practical difficulties carrying out the all-electric requirement. Any buildings subject to these exceptions must prepare the location of natural gas appliances for future electrification.

The all-electric reach code is based on the recommendations of the Sustainability Commission, consideration of economic and social impacts in the community, and consultation with the public and stakeholders in the development community which will

be discussed further in this report. Model codes and technical guidance were provided by the California Energy Commission and SVCE. Staff has also engaged a consultant to provide analysis for the green building reach options.

Recommended: All-Electric Building Reach Code	Reach Code Requirement
Low-rise residential (includes single-family, duplex, townhomes, and multifamily three stories or fewer)	All-electric required. Includes heating/cooling, water heating, clothes dryer, cooking appliances, fireplace and outdoor fire pit.
High rise multifamily Mixed-use Hotel/Motel Office Retail	All-electric required. Includes heating/cooling, water heating, clothes dryer, cooking appliances, fireplace and outdoor fire pit. Exemption for Factories, Hospitals, Laboratories, and Essential Facilities as defined by the Cupertino municipal code. Building official has authority to grant modifications for for-profit kitchens. Any gas installed through exemptions shall provide electric circuiting for future electric appliances.

Alternative Approach: Electric-Preferred Reach Code

An alternative “electric-preferred” reach code ordinance was developed and formed Staff’s original recommendation to the Sustainability Commission. The “electric-preferred” reach code was developed based on one of the SVCE model codes. The electric-preferred reach code encourages electrification in both residential and non-residential buildings by requiring that mixed-fuel buildings be built “electric-ready.”

The electric-preferred requirements differ for low-rise residential buildings and non-residential buildings (which includes office buildings, retail, hotel/motel, and high-rise residential).

Non-residential buildings may be built as mixed-fuel or all-electric. Any gas appliances installed in non-residential buildings would be required to be wired for future electric appliances. Additionally, a mixed-fuel building must be built to use less energy than the state code requires, whereas all-electric buildings may simply comply with the state code. The energy efficiency requirements that apply to mixed fuel non-residential buildings are found in the following table, which was developed by City staff and consultants using energy modeling software to determine feasibility:

Occupancy Type	Compliance Margins
Office Building	10%
Retail	10%
Hotel/motel and High-rise residential	5%
Industrial/Manufacturing	0%
All other Nonresidential Occupancies	5%

These compliance margins have been found to be cost-effective by the Statewide studies and by Cupertino's engineering consultant.

For low-rise residential buildings, in contrast, the electric-preferred ordinance would require that they be built to utilize electricity for space heating and water heating, while allowing natural gas for cooking. Any gas stoves that are installed must be pre-wired for future electric appliances. This is known in the model code as the "electrically-heated" home.

The electric-preferred ordinance option is summarized in the following table:

Alternative: Electric-Preferred Building Reach Code	Reach Code Requirement
Low-rise residential (includes single-family, duplex, townhomes, and multifamily three stories or fewer)	Must provide electric space heating and water heating. Natural gas cooktops are allowed; however, any gas stoves must be pre-wired for future electric appliances. No energy efficiency requirements beyond the State Energy Code.
High rise multifamily Mixed-use Hotel/Motel Office Retail	All-electric buildings are approved if they meet the base code requirements. A mixed-fuel building is required to have a higher energy-efficiency performance. Any gas appliances shall provide electric circuiting for future electric appliances.

Although this alternative is attractive because it offers greater flexibility, including the continued availability of gas for cooking in residential buildings, staff recommends adopting the all-electric reach code. The all-electric option follows the direction of the Sustainability Commission and more closely aligns with the City's sustainability goals. In

addition, the all-electric reach code aligns with the presumed direction of the 2022 California Building Codes which will more strongly mandate greenhouse gas reduction rather than the traditional focus on energy-efficiency.

Electric Vehicle Requirements and CALGreen Amendments

Local residents are showing a significant interest in electric vehicles. For example, the number of registered plug-in vehicles in Santa Clara County increased by 31% in 2018. By comparison, registrations for vehicles powered by fossil fuels shrank in 2018. Since 2016, the number of electric vehicles registered in Cupertino more than doubled. As of October 2018, Cupertino's electric vehicle ownership rate of 6% is higher than the County's overall rate of 4%.

Data from the State of California also indicates that we are on the verge of a transformation of the personal vehicle market. Current estimates put electric vehicles (EVs) and plug-in hybrid vehicles (PHEVs) market share to be 18-20% by 2030. Access to electric vehicles (EV) infrastructure is currently a major barrier for consumers' willingness to purchase electric vehicles. Results from a SVCE study show that costs for new construction were almost four times lower per spot compared to the retrofit scenario.

This data indicates that increasing code requirements for charging infrastructure could potentially save significant amounts of money to building owners in the new construction context rather than waiting for tenants to become interested in electric vehicles, at which point significant costs related to invasive demolition and electrical infrastructure replacement would be necessary.³ 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 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.

Both proposed ordinances described above would also include local amendments to Part 11 of Title 24, also known as the California Green Building Standards Code, or CALGreen. The amendments would establish a local Electric Vehicle reach code, which would exceed the requirements found in Chapters 4 and 5 of CALGreen. The amendments would also retain other local green building requirements made in previous code cycles.

The proposed local amendments to the state's electric vehicle requirements would require additional electric vehicle charging infrastructure beyond the State levels. Under the 2016

³ Electric Vehicle Infrastructure Cost Analysis Report for Peninsula Clean Energy (PCE) & Silicon Valley Clean Energy (SVCE), November 5, 2019. https://peninsulareachcodes.org/wp-content/uploads/2019/11/PCE_SVCE-EV-Infrastructure-Report-2019_11_05.pdf

code cycle, all new multifamily projects with 17 or more dwelling units which provide residential parking to the occupants must prewire 3% of these spaces for future EV charging station installation. This number will increase to 10% in the 2019 code cycle and the dwelling unit threshold will be removed. However, non-residential parking will not be affected by the 2019 base code update.

The proposed local amendments to the CALGreen Code would require the following electric vehicle infrastructure to be installed in newly constructed buildings, above and beyond the Statewide standards as described above.⁴

Electric Vehicle Reach Code	Reach Code Requirement
Low-rise residential (includes new one- and two-family dwellings and townhomes with attached private garages)	For each dwelling unit, install (1) Level 2 EV Ready Circuit and (1) Level 1 EV Ready Circuit.
Multi-family buildings less than or equal to 20 units	One parking space per dwelling unit with parking provided with (1) Level 2 EV Ready Circuit.
Multi-family buildings greater than 20 units	25% of dwelling units with parking spaces provided with (1) Level 2 EV Ready Circuit. Each remaining dwelling unit with parking space provided with (1) Level 1 Ready Circuit.
Office buildings	10% of available parking provided with Level 2 EV Charging Stations installed. An additional 10% provided with Level 1 EV Ready Circuits. An additional 30% are at least EV Level 1 Capable.
Other non-residential buildings	6% of available parking provided with Level 2 EV Charging Stations installed. An additional 5% are at least EV Level 1 Ready. Exception: Each Level 3 Fast Charger can substitute for some of the required spaces.

⁴ 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.

Other Cities' Reach Code Processes:

There are currently more than fifty cities in California that are considering or that have adopted reach codes for the next code cycle, including Menlo Park, San José, Mountain View, Berkeley, and Palo Alto. This is a marked increase in interest compared to previous code cycles. As of November 2019, 15 of these jurisdictions have already adopted either an all-electric or an electric-preferred reach code for 2020, mostly in Northern California. These are summarized in Table 1, following.

Table 1. Selected California Cities Code Comparison Matrix as of 11/06/2019. "A" and "B" refers to a phased approach of the San Jose ordinance.

Jurisdiction	Status	Approach			Systems			Building Types							Add-Ons			
		Gas Infrastructure Ban	All-Electric Reach	Electric-Preferred	Whole Building	Water Heating	Space Heating	Low Rise Residential	City Owned Properties	High Rise Residential	Hotel	Retail	Office	Restaurant	Additional Solar	Battery Backup	Electric Vehicles	Natural Gas In Lieu Fee
Alameda	Adopted	X			X				X									
Berkeley	Adopted	X			X			X	X	X	X	X	X	X				
Carlsbad	Adopted	□	X			X		X							X			
Cupertino	First Reading		x		x			x	x	x	x	x	x	x			x	
Davis	Adopted			X	X			X										
Marin County	Adopted			X	X			X	X	X	X	X	X	X			X	
Menlo Park	Adopted		X			X	X	X	X	X	X	X	X	X	X			
Milpitas	Second Reading			X	X			X	X	X	X	X	X	X				
Morgan Hill	Adopted	X			X			X	X	X	X	X	X	X				
Mountain View	Second Reading		X		X			X	X	X	X	X	X	X	X		X	
Palo Alto	Second Reading	X			X			X	X	X	X	X	X	X			X	
San Jose	Adopted	A		B	X			A	B	B	B	B	B	B	B		X	
San Luis Obispo	Second Reading			X	X			X	X	X	X	X	X	X	X			X
San Mateo	Adopted			X	X			X					X		X		X	
Santa Monica	Adopted			X	X			X	X	X	X	X	X	X	X			
Windsor	Adopted		X		X			X										

As shown, local cities such as Menlo Park and Mountain View have moved towards adopting all-electric reach codes. San Jose, Palo Alto, and Berkeley have either adopted or are moving towards gas infrastructure bans which entail banning the installation of gas infrastructure as a condition of a land use application in the planning stages of a project.

The approaches can be further defined as:

All-Electric Reach Code: An approach that, through changes to the Energy Code rather than by banning gas infrastructure, requires projects to build using only electric appliances.

Electric-Preferred: This option builds a preference for all-electric construction into the permitting process. All-electric designs do not have additional energy efficiency requirements. Projects that use fossil fuels have additional requirements, though the requirement may vary slightly by city.

Gas Infrastructure Ban: This approach, first taken by the City of Berkeley, prohibits the use of new gas infrastructure as a condition of a land use application. It can be complemented by a reach code, which is the approach Palo Alto is considering.

Cupertino's Reach Code Public Outreach Efforts:

Below is a summary of reach codes discussions and public feedback opportunities through Council, Sustainability Commission (SC), and other public meetings in 2019:

- 1/17/19 Sustainability Commission ("SC") meeting: reach codes presented by staff to SC for Work Program consideration.
- 2/21/19 SC meeting: reach codes added to SC Work Program.
- 8/06/19 Council meeting: Presentation by Youth Climate Action Team, advocating for local reach codes.
- 8/29/19 SC meeting: Presentation on SVCE model codes. The Commission suggested that staff consider building electrification and additional infrastructure for electric vehicle (EV) charging. Commissioners expressed preference for more aggressive all electric measures, but with consideration of the implications for home renovation and housing affordability. The Commission also provided feedback to staff to consider higher tiers of green building performance such as CALGreen Tier 1 or Tier 2, or some combination of both. Staff studied the CALGreen Tier 1 and Tier 2 voluntary measures for further environmental performance. However, staff found that the existing Cupertino green building ordinance, which requires third-party green building certification (LEED or GreenPoint Rated) for new construction is already quite robust, and therefore would not be enhanced by any of the CALGreen voluntary tiers.
- 9/10/19 Planning Commission meeting: Staff presentation on reach codes, the Cupertino Climate Action Plan, and the most recent community greenhouse gas inventory. The approved minutes and video recording of that meeting are [available for review](#)⁵. The Planning Commissioners provided feedback and questions on topics including ADUs, productive roofs, CALGreen Tier 2, off grid considerations, restaurants and electric cooking, gas ban, and Level 3 electric vehicle charging. Public comment was also received at this meeting.
- 9/19/19 SC meeting: Continued discussion on reach codes. Details of the Silicon Valley Clean Energy reach code were discussed including "all-electric" vs. "electric-preferred," gas ban, and other alternatives being pursued by cities in the region.

⁵ <https://cupertino.legistar.com/MeetingDetail.aspx?ID=656669&GUID=6DDD5D3F-0315-4DDE-8644-6C1511E7F842&Options=&Search=>

- 10/15/19 Council meeting: Chief Building Official presented statewide building standards slated for adoption; staff answered Council questions on the reach code process. The video recording of that meeting is [available for review](#)⁶.
- 10/16/19 SC public workshop: The Sustainability Commission reach codes subcommittee hosted a public workshop, including presentations from staff and experts and table-top discussions to receive feedback from the public. Approximately twenty members of the public attended, including representatives of the real estate development, architectural, and engineering community, Cupertino residents, corporate representatives, and sustainability advocates.
- 10/24/19 SC meeting: discussion of staff policy recommendation of an “electric-preferred” reach code. The reach code subcommittee also gave an overview of their findings. The Commission received public comment, deliberated, and voted unanimously to recommend that Council adopt an “all-electric” reach code.

Staff worked closely with the Sustainability Commission's reach code subcommittee to review policy options and guide outreach efforts. Staff has engaged with the public through a variety of avenues, including public meetings, social media, and the reach codes [outreach website](#)⁷, posted in September 2019. The website directed interested members of the public to the outreach calendar, regional resources, and it offers direct contact information for stakeholders to contact the Sustainability division staff in order to provide feedback.

Staff has received public feedback throughout the development of the draft reach code ordinance through official public meetings, one on one discussions, emails, and a public event hosted by the Sustainability Commission reach codes subcommittee on October 16, 2019. Staff in the Cupertino Building, Planning, and Economic Development divisions have conducted direct outreach for stakeholders in the business, development, and architectural/engineering communities. Sustainability Division staff had direct stakeholder conversations with three business representatives, including a code consultant and a property developer, and have received interest from several others in the development community. The feedback received from the development community has expressed a more favorable outlook on the “electric-preferred” alternative reach code, which allows for more consumer flexibility.

The feedback received by staff can be summarized below.

- General concerns / questions on resilience and disaster preparation in light of the recent PG&E Public Safety Power Shutoff event;
- A need for reassurance that the codes do not affect existing residences and buildings or projects that have already gone through the permitting process;
- A desire to support as much EV charging as possible;

⁶ <https://cupertino.legistar.com/MeetingDetail.aspx?ID=656103&GUID=A3A6EE7B-4C67-4738-BFE3-7D6832F3A432&Options=&Search=>

⁷ <http://cupertino.org/reachcodes>

- Questioning if we can allow for gas infrastructure for next 2-3 years and then require that buildings upgrade to electric at a later date;
- A desire to exclude ADUs from the requirements – don't want to discourage construction;
- A less-frequently expressed desire to include ADUs in scope;
- Concern over cost mainly due to construction related delays – e.g. inspections, permitting, utility which may be addressed with a simpler reach code – e.g. the all-electric construction requires fewer items to be inspected;
- Expressing a desire to require electric appliances upon any replacement/upgrade;
- Consider Tier 2 efficiency requirements;
- Consider productive roofs;
- Incentivize more level 3 EV charging;
- Allow appropriate exemptions;
- Further study on electric cooking for restaurants; and
- A desire to explore the natural gas infrastructure ban as was adopted in Berkeley.

Staff presented the electric-preferred reach code policy recommendations to the Sustainability Commission at its October 24th Special Meeting. After deliberation and public comment was heard, the Commission voted unanimously that the City should take further steps and recommended an all-electric reach code to the Council for adoption. Staff is bringing this all-electric ordinance to Council at this time. The Sustainability Commission recommended a modification to provide exemptions for Essential Facilities, Factory/Industrial, Laboratories, and Hazardous Facilities building types. These exempted building types would not likely meet the cost-effectiveness test required by the State.

At the same meeting, staff presented policy recommendations to adopt the Silicon Valley Clean Energy (SVCE)'s model reach code for electric vehicle (EV) charging infrastructure. Discussion on the topic included Cupertino's strong consumer support for electric vehicles and considerations of systemic barriers for more equitable and widespread adoption of electric passenger vehicles, especially in new multifamily developments. The Sustainability Commission unanimously voted to recommend that Council adopt the SVCE model EV reach code policy as presented.

Statewide Cost-Effectiveness Study for Energy Code Reach Codes

As explained above, an energy reach code may only be adopted if it is determined that the proposed requirements are cost effective. Both proposed energy reach codes, the "all-electric" option and the "electric-preferred" option, have been found to be cost-effective, as discussed below. Additionally, both options would result in buildings designed to use no more energy than is permitted by the state standards, as required by California Health & Safety Code section 25402(h)(2).

Funded by the California investor-owned utilities (IOUs), the California Statewide Codes and Standards Program (Statewide Program) led the development of a cost-effectiveness study for Energy Code reach codes that examined different performance-based approaches for new construction of specific building types. There are two kinds of reach code approaches: performance-based ordinances and prescriptive ordinances. Performance-based ordinances mandate an increase in the overall energy efficiency required but leave flexibility for the builder on how to achieve this goal. In contrast, prescriptive ordinances mandate implementation of a specific measure (such as solar panels or cool roofs). The Statewide Program's analysis focused on performance-based ordinances but some conclusions about prescriptive measures can be made from the results.

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 calculated⁸.

The Statewide Program's analysis estimated cost-effectiveness of several building prototypes including one-story and two-story single-family homes, a two-story multifamily building, a three-story office building, a one-story retail building, and a four-story hotel. An engineering consultant was also engaged by Cupertino to develop a study of additional building types, including a large office building and a high-rise multi-family building. Notably, it was found that all-electric construction provides capital cost savings in our climate zone for all of the building types studied. [The Statewide cost effectiveness studies are available for review⁹](#). The relevant results are summarized in table 3, below.

All-Electric Buildings Offer Consumer and Environmental Benefits

All-electric buildings are one of the key strategies to decarbonizing Cupertino's building stock. The State's electric system is rapidly becoming cleaner, driven by escalating renewable portfolio standards and cleaner electricity by SVCE, the retail provider for electricity in Santa Clara County. The interest in building electrification stems from the fact that Silicon Valley Clean Energy is providing 100% carbon-free electricity and eliminating the use of natural gas can greatly reduce greenhouse gas emissions from the

⁸ 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."

⁹ <https://localenergycodes.com/content/2019-local-energy-ordinances/>

building sector. In addition, technology developments in electric heat pumps, solar photovoltaics, battery storage, and induction cooking, are all features in a modern all-electric building. These features were found to be highly desired during the public outreach period.

For multiple reasons including health, safety, economics, and environmental benefits, there is considerable interest in mandating all-electric new construction, which means that the buildings would not have any natural gas services. All-electric buildings have electric appliances for space heating, water heating, clothes-drying, and cooking. To date, Cupertino does not often see all-electric buildings constructed.

On a unit basis, electricity is approximately three times more expensive than natural gas. However, commonly available electric heat pump equipment is approximately three times more efficient in space heating and water heating than similar natural gas-powered equipment. The more significant cost savings associated with building electrification come from the avoided infrastructure and plumbing needed to serve a building with natural gas. The relevant findings from the Statewide cost-effectiveness studies are summarized in table 3, below. A cost effectiveness ratio greater than 1 indicates that both the all-electric and the electric-preferred ordinances proposed here are found to meet the CEC cost-effectiveness test.

Table 2. Summary of Statewide TDV cost effectiveness ratios, climate zone 4.

Summary of Statewide Cost Effectiveness Ratios, Climate Zone 4			
Building Type	Modeling Package	TDV Cost-Effectiveness Ratio	Source Data
Hotel	2: All-electric federal code minimum	24.5	A
Hotel	1A: Mixed-fuel + energy efficiency	1.1	A
Retail	2: All-electric federal code minimum	104.2	A
Retail	1A: Mixed-fuel + energy efficiency	10.4	A
Office	2: All-electric federal code minimum	1.7	A
Office	1A: Mixed-fuel + energy efficiency	1.4	A
Residential	Single family mixed-fuel non-preempted	1.2	B
Residential	Single family all-electric	1.8	B
Residential	Multifamily mixed-fuel non-preempted	1.2	B
Residential	Multifamily all-electric non-preempted	1.5	B

Note: TDV cost-effectiveness >1 indicates cases where there are both first cost savings and annual utility bill savings. Federal code minimum indicates that the compliance modeling package does not rely on appliances that are higher efficiency than the federal minimum, thereby avoiding any federal pre-emption in the ordinance.

A: 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study. July 25, 2019

B: 2019 Cost-effectiveness Study: Low-Rise Residential New Construction. August 1, 2019

Conclusion

Encouraging or requiring electrification of buildings is a key step toward reducing the emissions associated with the City's building stock. The two options proposed by staff offer different approaches, each with their own advantages and disadvantages.

Sustainability Impact

As described above, the proposed reach codes would be expected to assist Cupertino in achieving the goals it set out in its CAP. These local reach codes anticipate that building decarbonization is quickly becoming the policy of the State of California¹⁰, and Cupertino has the ability to avoid risks of additional gas installations in buildings, which may become a liability under these future policy scenarios. In addition, local reach codes are an important mechanism whereby markets are transformed by accelerating and scaling adoption of low-carbon technologies.

Fiscal Impact

The proposed reach codes are not anticipated to result in additional costs to the City. Building officials are already transitioning to enforcement of the new California Building Standards as occurs normally on a three-year cycle. The introduction of an all-electric building requirement does not represent a significant increase in staff time to review any new permit applications. One advantage of the all-electric ordinance may be to reduce the number of items that need to be inspected in the field (for example air vents and shutoff safety elements for gas appliances), which could reduce plan check and inspection time. In addition, SVCE and local partners have offered support to building officials to develop inspection checklists for any of the model codes under consideration in our region.

Some stakeholders have expressed concern for the first costs of implementing the 2019 energy and green building codes, in addition to local reach codes, and have expressed a desire for additional incentives and financing options. Beyond the findings from the cost-effectiveness studies summarized above, it should be noted that the State of California allows for PACE (Property-Assessed Clean Energy) financing for new building developments, and can provide an attractive capital source for sustainability features such as solar PV, domestic hot water, LED lighting, energy efficient HVAC systems and windows.¹¹ California first enabled PACE in 2007 with the passage of AB811, which amended the state's existing laws to allow PACE financing for renewable energy and energy efficiency improvements to homes and businesses. Residential and commercial PACE has flourished in the state since then, financing billions of dollars in clean energy projects.¹² It is also anticipated that in the second half of 2020, the utility

¹⁰ <https://www.cpuc.ca.gov/BuildingDecarb/>

¹¹ <https://www.prnewswire.com/news-releases/pace-equity-funds-first-new-construction-pace-project-in-california-300645422.html>

¹² <https://pacenation.org/pace-programs/#!US-CA>

incentive programs will begin offering rebates specifically targeting building electrification.

Environmental Review

Exempt. Neither proposed ordinance would be deemed a project under the requirements of the California Quality Act of 1970 or the State CEQA Guidelines (collectively, "CEQA") because it has no potential for resulting in physical change in the environment, either directly or ultimately. In the event that either Ordinance is found to be a project under CEQA, it is subject to the CEQA exemption contained in section 15061(b)(3) of the CEQA Guidelines, Title 14 of the California Code of Regulations, because it can be seen with certainty that there is no possibility that the project will have a significant effect on the environment. CEQA applies only to projects which have the potential of causing a significant effect on the environment. In this circumstance, the amendments to the City Code would have no or only a de minimis impact on the environment. Either proposed ordinance is also exempt from CEQA under CEQA Guidelines section 15308, because it is a regulatory action for the protection of the environment.

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Attachments:

- A – Cupertino City Council Resolution No. 18-094, Declaring a Climate Emergency
- B – Reach codes presentation delivered at the public outreach workshop on October 16, 2019
- C – Written communications received on the reach code topic to date
- D – Signed letter of intent for Cupertino to participate in the model reach code development process
- E – Recommendation of the Cupertino Sustainability Commission