

**DOCKETED**

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# City of Palo Alto

## City Council Staff Report

(ID # 10538)

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**Report Type: Action Items**

**Meeting Date: 11/4/2019**

**Summary Title: Energy Reach Code for Building Construction**

**Title: PUBLIC HEARING: Adoption of an Ordinance Repealing Chapter 16.17 of Title 16 (Building Regulations) Related to the California Energy Code and Adopting a New Chapter 16.17 Incorporating the 2019 California Energy Code With Local Amendments and Amendments to Title 24, Chapter 6 of the California Code of Regulations. The Subject Ordinance is Exempt From the California Environmental Quality Act (CEQA) in Accordance with CEQA Guidelines Sections 15061 (b) and 15308.**

**From: City Manager**

**Lead Department: Planning and Development Services**

### **Recommendation**

Staff recommends the City Council take the following actions:

1. Adopt an ordinance repealing and restating Palo Alto Municipal Code Chapter 16.17 and amending the 2019 California Energy Code, Title 24, Part 6, of the California Code of Regulations to include local amendments (Attachment A); and
2. Adopt a resolution declaring the City's intent to mandate all-electric service for new construction effective January 2022 (Attachment B).
3. Find that the proposed action is exempt from the provisions of the California Environmental Quality Act in accordance with Sections 15308 and 15061(b)(3).

### **Executive Summary**

Every three years the State of California requires the adoption of new building codes<sup>1</sup>, including energy codes. In addition to the mandatory updates, the State allows jurisdictions to adopt more stringent energy codes – or reach codes – to help meet greenhouse gas reduction targets<sup>2</sup>. The

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<sup>1</sup> A companion report is being presented to the City Council on November 4<sup>th</sup> that proposes ordinances adopting the State-mandated building code along with some locally initiated amendments.

<sup>2</sup> Following local adoption, the California Energy Commission must also approve any reach code based on demonstrated compliance with State-mandated energy requirements, a cost-effectiveness study, and compliance with environmental regulations. This State-review would occur prior to the effective of the more stringent standards.

City of Palo Alto has adopted reach codes to meet its local greenhouse gas emissions reduction goals set forth in the City's Sustainability and Climate Action Plan (S/CAP) for the past 3 code cycles (nine years).

The State-mandated energy codes being adopted in this code cycle are closer to the aggressive standards previously approved by the City Council and applied to new construction projects. Statewide feasibility studies<sup>3</sup> provide support for the adoption of more stringent codes beyond the State standard. However, as technological enhancements, energy efficiencies, and construction techniques continue to improve, the margin to achieve greater reductions in greenhouse gas emissions and energy efficiencies begins to narrow. Moreover, new construction only represents about 5% of the City's overall greenhouse gas emissions reduction strategy<sup>4</sup>.

Some communities have adopted reach codes that prohibit natural gas in new construction, but may include some exceptions for gas cooking ranges, fireplaces and outdoor grills in single family homes and still other exceptions for commercial kitchens and life science research facilities. The City of Berkeley adopted a gas ban for new construction through a regulatory approach outside of the reach code process.

For Palo Alto, staff recommends a multi-pronged approach to set a two-year target for all-electric new construction and, in the meantime, incentivize all-electric construction and require any mixed-fuel construction to meet the maximum standards found to be cost-effective. This strategy is intended to further the City's greenhouse gas emission reduction goals and improve overall building efficiency and, therefore, consume or demand less energy. This approach includes all of the following:

1. Exceed State-mandated energy codes by requiring new homes and low-rise multi-family buildings of three-stories or less be built using:
  - a. An all-electric design – no gas utility hookups; or,
  - b. Mixed-fuel (electric/gas) with a design to facilitate conversion to electrical utility service AND achieve a ten point energy reduction rating (EDR 10) beyond the state standard.
2. Exceed state-mandated energy codes by requiring new office and retail buildings be constructed using:
  - a. An all-electric design – no gas utility hookups; or,
  - b. Mixed-fuel with a design to facilitate conversion to electrical utility service AND increase building efficiency by a 12% margin beyond the state standard.<sup>5</sup>

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<sup>3</sup> 2019 Cost-effectiveness Study: Low-Rise Residential New Construction and 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study. Retrieved from: <https://localenergycodes.com/content/2019-local-energy-ordinances/>

<sup>4</sup> The S/CAP has a goal for reducing community-wide greenhouse gas emission to 150,430 MT by 2030.

<sup>5</sup> Increasing the building's energy efficiencies by a 5-12% margin beyond the minimum state requirements requires that the building design uses less energy by improving the proposed design of the building's energy systems, such as heating and cooling systems, better ventilation duct sealing and leakage testing, building envelope elements, such

3. Exceed State-mandated energy codes by requiring hotels, motels, and four-story multi-family buildings be constructed using:
  - a. An all-electric design – no gas utility hookups; or,
  - b. Mixed-fuel with a design to facilitate conversion to electrical utility service AND increase building efficiency by a 5% margin beyond the State standard.<sup>5</sup>
4. Promote voluntary electrification in existing homes and business (which represents 38% of the City’s GHG emissions reduction strategy) through:
  - a. Utility financial incentives; AND
  - b. Public outreach/education campaigns
5. Strengthen compliance with state and local reach codes by:
  - a. Requiring third-party compliance certification to ensure energy efficiency targets are achieved in new mixed-fuel buildings; AND
  - b. Define terms related to substantial remodels in the next 18 months to clearly distinguish when residential and non-residential remodels constitute new construction.
6. Declare a goal to enact an all-electric mandate for new construction effective January 2022 – one year ahead of the schedule for the next code cycle implementation.

This approach recognizes the strong community interest to reduce natural gas consumption and therefore reduce greenhouse gas emissions. It further balances this interest with homeowner desires for gas ranges and fireplaces, which are common features in new home construction and, compared to other appliances, produce less greenhouse gas emissions. The staff recommendation also leverages the City’s own utility service as a way to target existing homeowners and businessowners to encourage a voluntary transition toward all electric service which would have a meaningful impact on local greenhouse gas emission reductions and help the City achieve its 2030 S/CAP goal. To ensure better oversight of the reach code compliance, the modeling of the building energy design will require a Certified Energy Analyst (CEA) to perform the energy analysis report that is submitted to the City as part of the permitting process. The elements of this design will be enforced in the field through construction inspections. This newly added level of compliance exceeds state standards and previous Palo Alto code cycle requirements in which no CEA was required.

Lastly, the staff recommendation serves to provide advanced notice to prospective homebuilders and developers of the City’s intent to move quickly toward an all-electric design requirement.

The balance of this report provides more background and detailed information, including alternative recommendations should the Council be interested in less or more aggressive measures in its reach code.

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as cool-roof materials, low-e windows, increased wall and floor insulation, and quality insulation installation that require a third party inspector.

## Background

Palo Alto has a history of leadership in the area of sustainability and energy efficiency. Over the past three code cycles, Palo Alto has adopted local green building and energy reach code requirements that are more aggressive than the State's requirements. In April 2016, the City Council adopted a Sustainability and Climate Action Plan Framework (S/CAP), which includes an ambitious greenhouse gas reduction goal of 80% from the 1990 level by 2030. This goal is 20 years ahead of the state's goal of an 80% reduction by 2050. Subsequently, the City Council approved a three-year Sustainability Implementation Plan (SIP) spanning from 2018 to 2020, which directs staff to explore green building, energy efficiency, and electrification policy options that go beyond code minimum for the 2019 code cycle.<sup>6</sup> As shown in Figure 1, among the S/CAP emission reduction strategies, building electrification accounts for 43% of the 2030 greenhouse gas emissions reduction strategies.

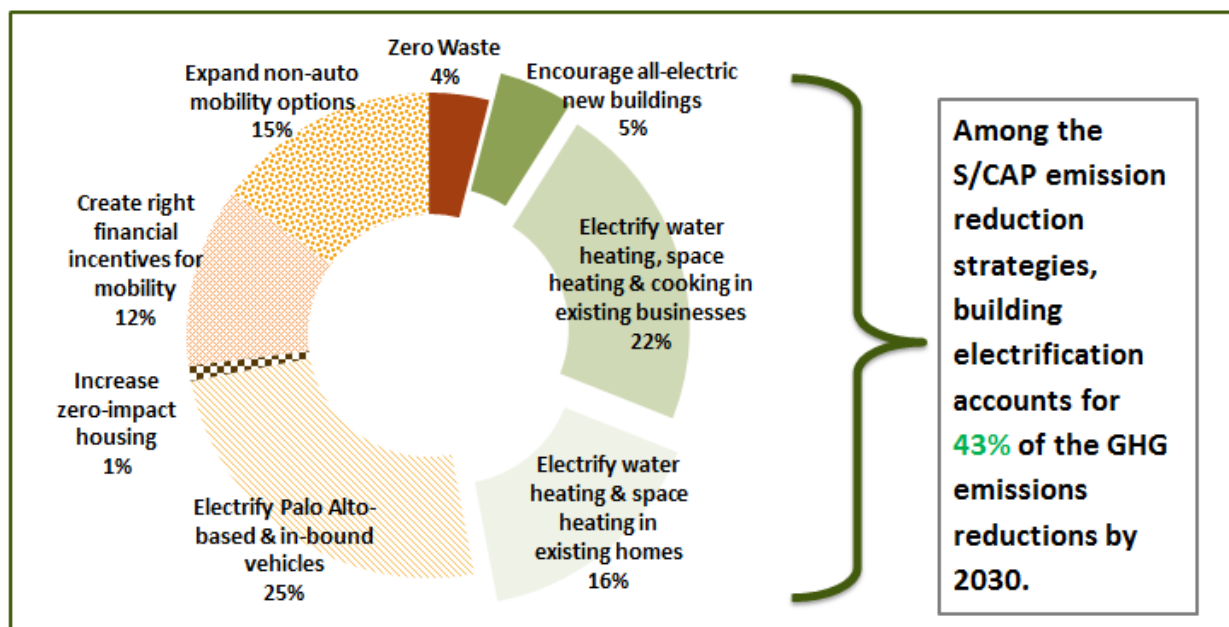


Figure 1: City of Palo Alto's S/CAP Emission Reduction Strategies.

In order to meet the S/CAP goal, an interdepartmental staff team collaborated to develop a multi-faceted strategy to expedite electrification in Palo Alto. Integral to this process was a thorough public engagement strategy through which staff sought input from the Green Building Advisory Group (GBAG)<sup>7</sup>. The GBAG is a group of green building professionals and stakeholders who has met regularly since 2013 to develop recommendations for Palo Alto's green building policies.

<sup>6</sup> City of Palo Alto. (2017, December 11). City of Palo Alto Sustainability Implementation Plan (SIP) Key Actions 2018-2020. Retrieved from

[https://www.cityofpaloalto.org/services/sustainability/sustainability\\_and\\_climate\\_action\\_plan/default.asp](https://www.cityofpaloalto.org/services/sustainability/sustainability_and_climate_action_plan/default.asp)

<sup>7</sup> Climate/Sustainability and Climate Action Plan, Green Building Update Staff Report. Retrieved from

<https://www.cityofpaloalto.org/civicax/filebank/blobdload.aspx?t=59283.07&BlobID=70007>

The 2019 California Building Energy Efficiency Standards contains new mandated energy efficiency standards and has a target effective date of January 1, 2020. The state’s 2019 Building Energy Standards are more stringent than the 2016 standards. The 2019 standards require rooftop photovoltaic systems (PV) in new low-rise residential buildings (up to three stories high). Single-family homes built under the 2019 standards will use about 7 percent less energy than those under the 2016 standards due to improved energy efficiency standards. After factoring in the rooftop solar electric generation, homes built under the 2019 standards will use about 53 percent less energy than those under the 2016 standards. Nonresidential buildings will use about 30 percent less energy, due mainly to lighting upgrades.<sup>8</sup>

To achieve the state’s energy efficiency and greenhouse gas reduction goals, the California Energy Commission (CEC) has encouraged cities to adopt “energy reach codes” that are more stringent than the baseline statewide requirements. Public Resources Code Section 25402.1(h)(2) and Section 10-106 of the Building Energy Efficiency Standards establish a process that allows local adoption of energy standards that are more stringent than the statewide standards. Under this process, the CEC requires any local amendments to the California Energy Code that affect energy use in regulated buildings to be cost effective (i.e. do not create additional financial burden to building owners) and use less energy than the standard requirements. Cost effectiveness and energy use findings of the proposed Energy Reach Code are provided later in this report and in the Reach Code Ordinance.

In late 2018, Palo Alto joined the statewide reach code cost effectiveness study (Statewide Study), led by the California Codes and Standards Local Ordinance Team, with participation from investor-owned utilities including Pacific Gas & Electric and Southern California Edison. The Statewide Study covers residential and non-residential new construction projects to inform local governments to develop local energy reach codes. This Statewide Study is also being used by other cities including Menlo Park, San Francisco, and San Jose to implement reach codes.<sup>9</sup> The final reports of the Statewide Study were released in late July and early August 2019.<sup>10</sup> The non-residential study report includes cost effectiveness results using Palo Alto utility rates, while cost effectiveness results for residential new construction projects using Palo Alto rates are separately provided in an addendum report.<sup>11</sup>

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<sup>8</sup> California Energy Commission 2019 Building Energy Standards Frequently Asked Questions. Retrieved from [https://ww2.energy.ca.gov/title24/2019standards/documents/2018 Title 24 2019 Building Standards FAQ.pdf](https://ww2.energy.ca.gov/title24/2019standards/documents/2018_Title_24_2019_Building_Standards_FAQ.pdf)

<sup>9</sup> When adopting energy reach codes, local governments must ensure that the code requirements are cost effective, meet the state’s minimum Building Energy Standards, and do not exceed federal appliance efficiency standards. The CEC requires that local government undertake a cost-effectiveness study to demonstrate that the proposed energy reach code do not create additional financial burden to building owners while meeting the state’s Building Energy Standards. See California Energy Codes and Standards. (2019, August 1). Title 24, Parts 6 and 11

<sup>10</sup> 2019 Residential New Construction Cost-Effectiveness Study (2019, August 1) and 2019 Nonresidential New Construction Cost-Effectiveness Study (2019, July 25). Retrieved from:

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

<sup>11</sup> Attachment C: 2019 Draft Cost Effectiveness Study: Low-Rise Residential Addendum – CPAU Analysis (2019, April 5)

For Palo Alto, the study found that all-electric single family and low-rise multifamily new construction projects are cost effective. For non-residential new construction projects, the study also found that all-electric medium office buildings (prototype is a 3-story, 54,000 sq.ft. office building) and medium retail buildings (prototype is a 1-story, 25,000 sq.ft. retail building) are cost effective; and mixed-fuel office and retail buildings with up to a 14% compliance margin<sup>12</sup> are cost effective. All-electric small hotels (prototype is a 4-story, 43,000 sq.ft. hotel) are not cost effective, although mixed-fuel hotels with up to a 6% compliance margin are cost effective. To meet the CEC’s cost effectiveness requirements for local energy reach code, there must be one cost effective compliance pathway for each building type. For example, Palo Alto could require a compliance margin of 20% for new medium office buildings even when that is not cost effective, as long as an all-electric new medium office building is cost effective.

Once Council adopts the proposed Energy Reach Code ordinance, staff will file an application to the CEC to approve the local energy standards, along with documentation to demonstrate that the proposed local energy standards are cost effective and consume no more than energy than permitted by the Building Energy Standard. The CEC will post the locally adopted energy standards for a 60-day public comment period prior to approving the standards at a CEC business meeting. After obtaining CEC approval, staff will file the local energy standards with the Building Standards Commission. Based on this process, staff anticipates an effective date of the proposed Energy Reach Code of March 1, 2020.

## Discussion

The proposed reach code ordinance will encourage all-electric design and increase the minimum requirements for building energy performance for mixed-fuel design compared to the 2019 California Energy Code. The proposed energy ordinance adopts cost-effective compliance options and would be triggered on permit application for the following project types: 1) new one- and two-family residential, 2) new low-rise multi-family residential, 3) new commercial “non-residential” office and retail, 4) new high-rise hotel/ motel construction. A summary of the proposed standards is provided in the following table:

**Table 1. Proposed Reach Code Components**

	All- Electric Design	Mixed-Fuel Design
New One- and Two-Family Residential Buildings	No additional efficiency requirements above the Standard Building Design	<ul style="list-style-type: none"> <li>● Increase building efficiency to achieve an EDR 10 points less than the Standard Building</li> </ul>

<sup>12</sup> The compliance margin represents the percentage of energy savings compared to the state’s Building Energy Standard, e.g. a 5% compliance margin means that the proposed building will use 5% less energy than the standard design

	(16.17.110 (b)1.A)	<p>Design</p> <ul style="list-style-type: none"> <li>● Electrification ready for water and space heating, cooking and clothes drying</li> </ul> <p>(16.17.110 (b)1.B)</p>
New Low- Rise Multi-Family Buildings (3-Stories of less)	<p>No additional efficiency requirements above the Standard Building Design</p> <p>(16.17.110 (b)1.A)</p>	<ul style="list-style-type: none"> <li>● Increase building efficiency to achieve an EDR 10 points less than the Standard Building Design</li> <li>● Electrification ready for water and space heating, cooking and clothes drying</li> </ul> <p>(16.17.110 (b)1.B)</p>
New Office/ Retail Buildings	<p>No additional efficiency requirements above the Standard Building Design</p> <p>(16.17.080)</p>	<ul style="list-style-type: none"> <li>● Increase building efficiency to achieve 12% margin above the Standard Building Design</li> <li>● Electrification ready for water and space heating, cooking and clothes drying</li> </ul> <p>(16.17.080 Table 140.1-A)</p>
New Hotel/Motel/ Multi-Family Buildings 4-stories or more	<p>No additional efficiency requirements above the Standard Building Design</p> <p>(16.17.080)</p>	<ul style="list-style-type: none"> <li>● Increase building efficiency to achieve 5% margin above the Standard Building Design</li> <li>● Electrification ready for water and space heating, cooking and clothes drying</li> </ul> <p>(16.17.080 Table 140.1-A)</p>

There are two methods for demonstrating compliance with the 2019 California Energy Code. The first type of compliance is called the “performance approach” and the second type is the “prescriptive approach”.

The performance approach is required to develop an energy budget that assigns a maximum amount of energy that a building can use within the design. Each budget is unique to the project and is based on many factors. Examples of components that contribute to an energy budget include location, size and orientation, building geometry, exterior wall design, and heating and cooling system design. The allowable energy budget for a building is referred to as the “standard”



design. The actual energy budget for the design of a building is referred to as the “proposed” design.

The prescriptive approach can also be used for new construction, additions and alterations and it prescribes a set of standard requirements for all the energy components of the building design and accounts for the climate zone of the building’s location. The prescriptive approach is typically more conservative and less flexible than the performance approach.

The proposed energy reach code ordinance (see Attachment A) encourages all-electric new construction projects and will require higher energy efficiency standards than the 2019 Building Energy Standards and all-electric readiness for newly-constructed residential and non-residential buildings with connected natural gas service. The efficiency requirements will vary by building type.

In the 2019 California Energy Code, there will be a new rating for the energy performance for new residential buildings. New low-rise residential construction will be measured by an Energy Design Rating (EDR) and will be used in the energy modelling software. The EDR score is a metric for energy performance measured on a scale of zero (0) to one hundred (100). A score of zero is a zero-net-energy building and a score of 100 represents an inefficient building with the energy consumption of a building built to the requirements of the 2006 International Energy Conservation Code. The lower the EDR index score, the better.

For new one and two-family dwellings and low-rise multi-family residential buildings of three stories or less, the design performance approach of these buildings will increase the building’s energy efficiency by reducing the building’s required Energy Design Rating (EDR) score. The proposed building’s EDR score will be required to be lower than the Standard Building EDR based on the building type and use (see Table 1). This design approach will include certain exceptions to account for limited solar access. Staff recommends that the energy analysis report or the Certificate of Compliance is required to be performed by a Certified Energy Analyst, who is registered with the California Association of Building Energy Consultants, as an added assurance for compliance.

In lieu of the performance method, a prescriptive compliance approach can be utilized for low-rise residential construction, that specifies additional measures and higher standards for the building’s energy systems and components, such as higher efficiency space and water heating systems, increased floor slab insulation to reduce heat loss, cool-roof products with increased solar reflectance for less heat absorption and lower cooling loads, duct system sealing and leakage testing to increase efficiency, ducts located in conditioned space to reduce heat loss, and ducted central force air heating systems for better efficiency. (See Attachment A, 2019 Energy Code Ordinance for Low-Rise Residential Prescriptive Standards 16.17.110).

New nonresidential buildings, such as office, retail, hotels, motels and high-rise residential buildings of four stories or more, will have performance design requirements that increase the

building's energy performance standards by reducing the building's energy budget compared to the Standard Building Design by 5-12%, depending upon the occupancy type (see Table 1). The increased efficiency margins have found to be cost-effective for Palo Alto's climate zone 4 as referenced in the Statewide Cost-Effectiveness Study<sup>13</sup>. Staff also recommends that this performance approach should require a Certified Energy Analyst to perform the energy analysis report or Certificate of Compliance.

Similarly, as an alternate to the performance design approach, prescriptive compliance measures that provide additional and higher performance requirements for some of the building components can be used, such as cool roof products, economizers for air-handling systems, reduced lighting densities, daylight dimming controls, drain water heat recovery devices, etc. (See Attachment A, 2019 Energy Code Ordinance, 16.17.090, Section 140.2).

The all-electric readiness requirements apply only to new buildings that will be connected to natural gas service. This means that in order to meet the Reach Code's requirements, these buildings with gas connections must include electric circuits and/or conduit for water and space heating equipment, cooking equipment and clothes dryers, as well as space requirements for water heaters in preparation for an eventual conversion from gas to electric appliances.

The residential energy reach code ordinance for one- and two-family dwellings do not apply to additions and Accessory Dwelling Units, ADUs. This is an effort to encourage and not restrict the construction of ADU's to alleviate the housing shortage within Palo Alto. Residential additions and alterations are also not subject to the energy reach code. Retrofitting existing buildings for electrification was not part of the statewide cost-effectiveness study. It is difficult to mandate electric-readiness, which would require upgrading the service panel to 200 amps and installing electrical conduits to all existing gas appliances, for remodel projects on existing buildings that did not incur any electrical work. Staff has discussed with the Energy Commission staff and with the City's energy consultant on how to apply electrification readiness to existing buildings, with no reasonable approaches identified to date. The Energy Commission staff is aware of these challenges and plans future studies to address electrifying existing buildings.

In addition, new non-residential industrial and manufacturing buildings do not fall under the reach code and are not required to be designed with a higher efficiency margin than the standard design. These buildings were not part of the cost-effectiveness study<sup>14</sup> and thus cannot be shown to be cost-effective with the proposed ordinance, as required by the California Energy Commission.

The all-electric design will be the preferred design for all building types, residential and non-residential. As such, an all-electric building is only required to meet the performance standard

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<sup>13</sup> 2019 Nonresidential New Construction Cost-Effectiveness Study (2019, July 25). Retrieved from:

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

<sup>14</sup> 2019 Nonresidential New Construction Cost-Effectiveness Study (2019, July 25). Retrieved from:

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

of the Standard Building Design with no additional energy efficiencies or increased prescriptive requirements or measures required.

### Comparison to Other Jurisdictions

More than fifty communities in California are considering adopting reach codes. Some cities have been exploring the feasibility of an all-electric reach code where new buildings are not permitted to have natural gas beginning in January 2020. The local ordinances of these cities have many provisional conditions that allows gas infrastructure in new construction projects.

In July, the City of Berkeley adopted an ordinance banning natural gas infrastructure in new buildings. Exemptions to the ordinance include building systems that have not been modeled for all electric design by the CEC, internal ADUs, and an exemption for cases natural gas use is shown to serve the public interest.<sup>15</sup> As part of the gas ban adoption, the City of Berkeley has also approved an allocation of \$238,341 per year to fund a two-year position in the building division to assist with implementing the gas prohibition ordinance and reach codes, including training staff and assisting permit applicants.

In September, the City of Menlo Park adopted a reach code ordinance that requires residential buildings (three stories or less) to be electrically heated or all-electric. These residential buildings are still allowed to use gas for stoves, fireplaces, or other appliances if desired provided there is pre-wiring for electric appliances. The ordinance also requires non-residential buildings and high-rise residential buildings to be all-electric with a few exceptions. Life science buildings may use natural gas for space heating and public agency owned and operated emergency operations centers may use natural gas if they demonstrate that an all-electric design is not cost effective and feasible. In addition, Menlo Park's ordinance allows non-residential kitchens to appeal to use natural gas stoves.<sup>16</sup>

Also in September, the City of San Jose adopted a reach code ordinance that requires new mixed-fuel buildings using natural gas to meet higher efficiency requirements and be pre-wired for electrification; all-electric buildings are exempt from these requirements.<sup>17</sup> San Jose City Council

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<sup>15</sup> City of Berkeley. (2019, July 9). City Council Agenda Action Calendar Item C “Adopt an Ordinance adding a new Chapter 12.80 to the Berkeley Municipal Code Prohibiting Natural Gas Infrastructure in New Buildings.” Retrieved from [https://www.cityofberkeley.info/Clerk/City\\_Council/2019/07\\_Jul/Documents/2019-07-16\\_Revised\\_Packet\\_2019-07-16\\_Item\\_C\\_Adopt\\_an\\_Ordinance\\_adding\\_a\\_new\\_Chapter\\_pdf.aspx](https://www.cityofberkeley.info/Clerk/City_Council/2019/07_Jul/Documents/2019-07-16_Revised_Packet_2019-07-16_Item_C_Adopt_an_Ordinance_adding_a_new_Chapter_pdf.aspx)

<sup>16</sup> City of Menlo Park. (2019, September 24). City Council Meeting Agenda Item J-3 “Adopt Ordinance No. 1057 to establish local amendments to the 2019 California Energy Code that require higher levels of building electrification and solar production for newly constructed buildings to reduce greenhouse gas emissions effective January 1, 2020.” Retrieved from <https://www.menlopark.org/DocumentCenter/View/22922/J3---Second-reading-and-adoption-of-reach-code-ord-CC?bidId=>

<sup>17</sup> City of San Jose. (2019, September 17). City Council Meeting Agenda Item 7.3 “Building Reach Code for New Construction.” Retrieved from <https://sanjose.legistar.com/LegislationDetail.aspx?ID=4123955&GUID=2028B4BB-E839-4E3C-A340-066CE3452D29&Options=&Search=>

also directed staff to introduce a companion ordinance in October that will require all new municipal buildings to be all-electric, as well as requiring all new single-family and low-rise multi-family housing to be all-electric.

### Goal of 2022 All-Electric Mandate for New Construction Projects

Attached is a proposed resolution expressing the City Council's goal to adopt an all-electric mandate for new residential and non-residential buildings with an effective date of January 2022.

With ongoing active promotion of the many benefits of all-electric buildings, including lower construction costs, improved indoor air quality and safety, and avoided greenhouse gas emissions, staff expects that a majority of the new construction projects in Palo Alto in 2020 and 2021 will be all-electric design. During this time, city staff will also research and develop practical solutions to encourage electrification and energy efficiency upgrades in existing buildings. Calendar years 2020-2021 would serve as a transitional period for the building industry to gain experience with all-electric design, and for equipment suppliers to plan their inventory to meet industry needs and prepare to solve some the current challenges to an all-electric mandate.

There are several challenges to all-electric mandates for commercial buildings. As an example, heat pump equipment to meet the air conditioning load for life science and laboratory buildings is currently not commercially available or could be very costly for other large commercial buildings<sup>18</sup>. Many restaurant owners continue to prefer gas equipment for cooking and other food preparations. Additionally, the compliance software<sup>19</sup> for Title 24 Building Energy Standard currently does not accommodate central heat pump space heating and water heating, which would make compliance with an all-electric mandate very difficult for large commercial buildings and high-rise multifamily buildings. The California Energy Commission is aware of this limitation and is working to include these systems in a future release of the compliance software.

Some challenges also remain to an all-electric mandate for the residential sector. Residential consumers are likely to have limited awareness of efficient electric alternatives to space and water heating and continue to express a passion for gas cooktops and gas fireplaces. There are limited equipment options for heat pump radiant floor heating and many contractors are unfamiliar with these systems.

For large nonresidential buildings, central heat pump space and water heating systems are not modeled in the energy compliance software; until the software can model these systems, all-

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<sup>18</sup> Letter from Stanford Real Estate on Potential All-Electric Mandate for Non-Residential Buildings in Palo Alto, September 27, 2019.

<sup>19</sup> The CEC creates computer software for new construction projects to demonstrate compliance with the state's Building Energy Standards. To apply for a building permit for a proposed new construction project, the designer needs to use the compliance software to show that the simulated energy usage for the building based on the envelope design, energy systems, etc. does not exceed the energy usage of a similar building that meets the state's efficiency requirements (baseline requirements).

electric mandate will need exceptions. It is currently difficult to find commercially available heat pump equipment for these spaces.

### Customer Programs and Education Campaign

Palo Alto is a fully built-out city, with less than 1% of the building stock being torn down and rebuilt each year. To meet the City's aggressive greenhouse gas reduction goals, it is necessary to address emissions from existing building stock in addition to major reconstruction. The Utilities Department (CPAU) offers customer programs and education campaigns to promote and facilitate building electrification targeting the existing building stock, but an expansion of these programs will incentivize electrification of existing buildings and complement the Reach Code.

CPAU's existing programs include rebate programs and technical assistance. CPAU launched a Heat Pump Water Heater (HPWH) Rebate pilot in 2016 to promote the replacement of gas water heaters with heat pump water heaters. CPAU will be launching a Home Electrification Readiness assessment at the end of 2019 to help homeowners evaluate their energy use and assess the master electric panel for home electrification.<sup>20</sup> This service will be offered as part of CPAU's Home Efficiency Genie program.

Over the next 12 months, CPAU plans to launch a broader suite of electrification incentives to drive electrification of existing buildings. These incentives will cover air source heat pumps for space conditioning, induction cooking, and high efficiency electric clothes dryers. In addition, CPAU plans to offer a rebate to homeowners who install an EV charger and upgrade their master electric panel at the same time, which makes additional electrification measures easier to implement. Having a menu of home electrification incentives gives homeowners the option to either replace home appliances one at a time as appliances reach the end of useful life or do it more comprehensively as part of a remodeling project to fully electrify the house and disconnect the gas meter.

To complement the home electrification incentives, CPAU will actively promote an education campaign to raise the awareness of the benefits of an all-electric home. Recently, CPAU launched a Home Electrification webpage<sup>21</sup> as an online resource for homeowners. Staff plans to build on this webpage as new electrification incentive becomes available for each type of appliance, along with home efficiency improvement tips to improve comfort and minimize utility bills. Aside from the website, CPAU will undertake extensive community outreach including customer workshops, neighborhood meetings, and targeted social media campaigns to educate the public on the benefits of electric appliances. An example of this type of outreach is the Electrification Expo held on October 10 where representatives from various appliance manufacturers, contractors, environmental advocacy groups and energy consultants were available to answer questions.

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<sup>20</sup> Most older homes in the city have electric panels with a limited capacity of 100 amps. While this is sufficient for homes with gas water heating, gas space heating and gas cooking, a 100amp panel is insufficient to handle the additional power draw when gas appliances are replaced with electric alternatives and also for EV charging. A minimum master electric panel capacity of 200amp is recommended for panel upgrade in single family homes.

<sup>21</sup> <https://www.cityofpaloalto.org/electrification>

Leading experts on building electrification gave presentations to explain why and how to electrify homes (see Attachment F for the keynote presentation). The Expo was free to the public and attracted over 400 attendees. CPAU plans to organize similar events in the future to promote building electrification. CPAU also plans to work with other local governments and environmental advocacy groups to get the maximum exposure of the building electrification campaign across the Bay Area.

Currently, program delivery models are primarily based on rebates and technical assistance, but as opportunities present themselves, CPAU will partner with other agencies and/or supply chain actors to facilitate building electrification. For example, the City is collaborating with the Bay Area Regional Energy Network (“Bay REN”) to launch a regional HPWH market transformation program in 2020 that offers incentives to distributors and contractors to install HPWHs. Midstream incentives lower the inventory cost of stocking HPWH units to distributors and contractors, and therefore helps to encourage contractors to promote HPWH as a water heater replacement option. CPAU will also explore on-bill financing in the future when the new utility billing software enables this function.

These customer programs will support the more significant next step in an overall transition to electrification, the development of pathways for segments of existing natural gas customers to transition to all-electric. Staff is currently engaged in discussions of such pathways and related policy issues at a statewide level. Locally, staff is exploring opportunities to leverage the Cool Block initiative as a foundation for exploring neighborhood-level interest in electrification. This could support development of models that support cost-effective transitions at a utility scale.

### **Resource Impact**

In preparation of this request, the former Development Services Department engaged the services of an energy consultant who performed a Cost Effectiveness Study at a cost of \$80,000 and Green Building Consultant who provided support for program development and implementation at a cost of \$73,000. These costs spanned two fiscal years and were covered by the department budget which is fully fee funded. Staff estimates that it will cost an additional \$25,000 annually for Green Building Consultants to continue program implementation for the attached ordinance. The budget to cover these annual costs is included in the Planning and Development Services base budget. In Fiscal Year 2022, in preparation for the 2023 code adoption cycle, staff will need to complete another Cost Effectiveness Study which is anticipated to also cost approximately \$80,000. If additional budget is needed at that time, staff will include the request in the Fiscal Year 2022 Proposed Operating Budget and adjust fees accordingly so that appropriate costs are recovered through fees. If the City Council expands the scope of ordinance, either upon approval of this ordinance or directs staff to increase the scope (home electrification) prior to 2023, staff will need to access the new scope, obtain cost estimates and return to City Council for additional resources and realignment of fees to cover the costs.

Staff time and other resources will be required to implement the utility programs intended to complement the Reach Code effort. The cost of the home electrification incentives in year 1, 2

and 3 is estimated at around \$500K, \$600K, and \$800K respectively. It will require 0.75 FTE to 1.0 FTE to administer the incentive programs, implement a marketing/education campaign, and manage technical assistance, as well as the cost of the marketing and outreach. Customer incentives account for the biggest fraction of this cost, increasing from 55% in year 1 to 85% in year 3. The total 3-year costs were estimated at \$1.9 million. Various funding sources are available for these programs depending on program benefits and terms, including Low Carbon Fuel Standard funds and certain revenues related to Cap and Trade Program activities. Staff is evaluating possible funding sources and prioritizing funding sources (like Low Carbon Fuel Standard funds) that do not result in rate increases. The budget for these utility programs will be reviewed internally, examined in the context of departmental priorities and capacity, and evaluated through the development of the FY 2021 Budget and brought forward through the budget process as appropriate.

### **Policy Implications**

Based on the proposed reach code, staff estimates annual avoided greenhouse gas emissions of 280 MT (Million Tons), 307 MT and 325 MT in year 1, 2 and 3 respectively of the 3-year code cycle. Assuming a 50-year building life, the total avoided greenhouse gas emissions are estimated at 48,750 MT.

For the proposed building electrification incentive programs, staff estimates annual avoided greenhouse gas emissions of 62 MT, 110 MT, 188 MT for rebates processed in year 1, 2 and 3. We expect that electric appliances will remain in place after the initial fuel switch and therefore the total avoided greenhouse gas emissions over a 50 year period is estimated at 18,025 MT.

The proposed reach code supports the City's S/CAP Framework and the greenhouse gas reduction goal of 80% from the 1990 level by 2030. It is also consistent with the key action EGY 5 in the 2018-2020 Sustainability Implementation Plan ("Develop programs that will result in even greater efficiency savings and decarbonization from 2020 to 2030. Potential evaluations include higher efficiency standards for new and existing buildings.")

Given that new home construction represents less than a 1% per year turnover of the existing residential building stock (and less than that for commercial customers), staff expects only a small impact to the gas utility from an all-electric mandate for new construction. Staff is working to assess the long-term impacts of building electrification on the gas utility in the coming years, including participating in a working group on this issue with various stakeholders from across the State. Such an assessment is included in the Utilities Department's strategic plan.

### **Stakeholder Engagement**

On February 22, 2018, the City of Palo Alto hosted the "Green Building Summit" at Mitchell Park Library. Approximately 100 community stakeholders gathered to explore ways to address priorities in the 2019 update of local green building and energy reach code. Areas covered during the summit included: Energy, Water Efficiency, Electrification, Emissions, Indoor Air Quality, Construction Debris, Demolition, and Salvage. Following the Green Building Summit, the

Technical Advisory Committee (TAC), a sub-committee of the GBAG, continued to meet between May and September 2018 to develop the requirements of Palo Alto's green building ordinance and energy reach code.

During the summer of 2019, the City held meetings with the public in addition to meetings with technical stakeholders to describe the proposed reach code requirements and collect feedback on any questions and concerns. The city used various communication channels to alert the public about the event, including online calendars, community list servers, newsletters, city website posts Printed fliers, and social media platforms (Nextdoor, Twitter, and Facebook). Two public engagement meetings were held in August and attended by 25-40 community members. The TAC was reconvened in August and October to support refinement of the staff recommendation for the 2019 Energy Reach Code.

At the October 2 Utilities Advisory Commission (UAC) meeting, staff gave an overview of the background of energy reach code, the 2019 reach code development process, reach code options adopted by other cities, and proposed utility initiatives to support building electrification. (see UAC presentation in Attachment E)

## **Environmental Review**

This action is exempt from the California Environmental Quality Act under CEQA Guidelines section 15308 as an action by the City for protection of the environment, and under section 15061(b)(3) on the grounds that the proposed standards are more stringent than the State energy standards, there are no reasonably foreseeable adverse environmental impacts and there is no possibility that the activity in question may have a significant effect on the environment.

### **Attachments:**

- Attachment A: Ordinance Repealing and Restating Ch 16.17 Energy Code
- Attachment B: CPA All Electric Resolution
- Attachment C: 2019 Low Rise Reach Code Analysis CPAU Rates
- Attachment D: 2019 Reach Code-Handout
- Attachment E: 2019 Reach Code Presentation- Oct 2 UAC meeting
- Attachment F: 2019 CPA Electification Expo Keynote Presentation 10.10.19