DOCKETED	
Docket Number:	19-BSTD-06
Project Title:	Local Ordinances Exceeding the 2019 Energy Code
TN #:	243372-2
Document Title:	City of Emeryville - 2019 Staff Report
Description:	Plain text of the City of Emeryville staff report
Filer:	Danuta Drozdowicz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	6/1/2022 10:31:28 AM
Docketed Date:	6/1/2022

City of Emeryville
CALIFORNIA

MEMORANDUM

DATE: September 13, 2021

TO: Christine Daniel, City Manager

FROM: Nancy Humphrey, Environmental Programs Supervisor

SUBJECT: **Second Reading Of An Ordinance Of The City Council Of The City Of Emeryville Amending Chapter 10 ("Energy Code") of Title 8 ("Building Regulations") Of The Emeryville Municipal Code To Amend The 2019 California Energy Code Of The 2019 Edition Of The California Building Standards Code (California Code Of Regulations, Title 24, Part 6); CEQA Determination: Exempt Pursuant to CEQA Guideline 15061(b)(3)**

RECOMMENDATION

The first reading of the proposed ordinance was approved by the City Council on July 20, 2021. The Sustainability Committee and staff recommend the City Council approve the second reading and final adoption of the attached amendments to Chapter 10 of Title 8 of the Emeryville Municipal Code to amend the 2019 Energy Code portion of the 2019 Building Standards Code.

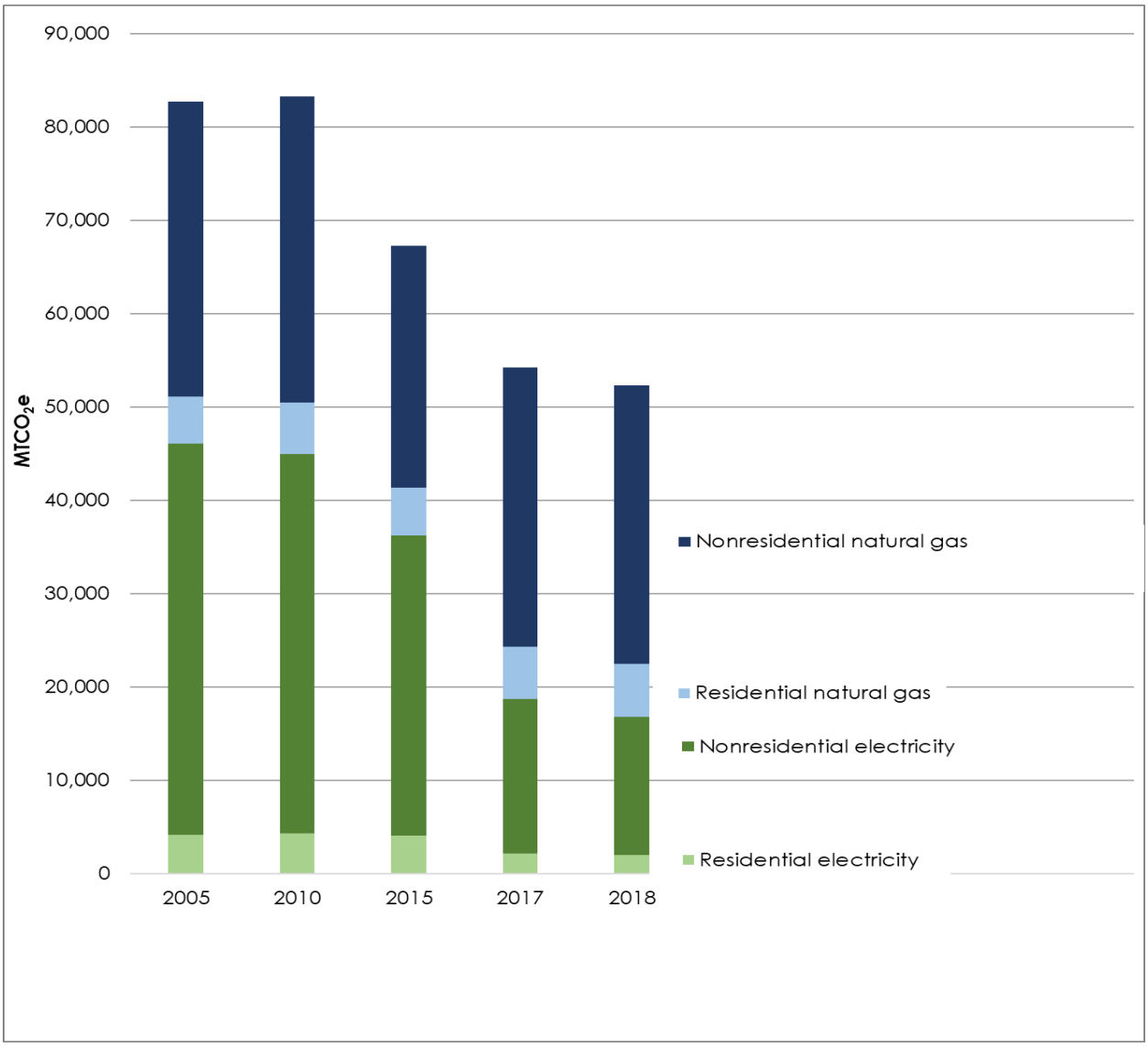
The proposed ordinance modifies Part 6 of the California Building Code (Title 24), which is adopted in the Emeryville Municipal Code as Chapter 10 (Energy Code) of Title 8. This report provides an overview of the statewide cost-effectiveness study for the energy elements as required by the California Energy Commission (CEC), and describes the required findings and justification for the proposed energy reach codes for new residential construction.

BACKGROUND

The City of Emeryville is among hundreds of municipalities, states, and countries worldwide that have committed to efforts to reduce GHG emissions (which are often expressed in carbon equivalents; the terms GHG and 'carbon' both describe these emissions). Emeryville is a signatory to the Global Covenant of Mayors, a group that grew out of the Paris Climate Accords to work together to achieve the goals of those Accords.

In addition, the state of California has a goal of a 40% reduction in GHG emissions over baseline levels by 2030, and a target of an 80% reduction by 2050. The goals in Emeryville's 2016 Climate Action Plan 2.0 mirror these state goals. In addition, Executive Order B-55-18 goes further, committing California to economy-wide carbon neutrality by 2045[1]. Just over a third (34%) of Emeryville's community-wide emissions come from building operations, and buildings built today will be in use far past the 2045 and 2050 target dates for GHGs.

[1] https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf



GHG Emissions from Energy Use in Emeryville 2005-2018
All values in metric tonnes CO_2 equivalent ($MTCO_2e$)

Natural gas use in buildings represents a rapidly increasing share of Emeryville's GHG emissions, as electricity service uses more renewable and carbon-free energy sources and sectors like transportation and waste improve technology and practice. In 2005, natural gas represented 44% of building energy emissions and 16% of total community emissions in Emeryville; by 2018, natural gas was responsible for 68% of building energy emissions and 25% of total community emissions.

Technology is available and cost-effective to move faster on achieving these climate and health goals. For these reasons and others, many cities have adopted or are considering adopting reach codes similar to the ordinance proposed in this report. Exhibit A is a current list of California cities' reach code efforts and progress.

Reach Code Adoption Process; Required Findings

Every three years, the State of California adopts new building standards that are organized in Title 24 of the California Code of Regulations, referred to as the California Building Standards Code. This regular update is referred to as a "code cycle." The last code cycle was adopted in 2019 and became effective January 1, 2020. Cities and counties can adopt reach codes at any time during a code cycle that include requirements that are above the minimum state code requirements.

In order to adopt local amendments that are more restrictive than the minimum standards of the state code, the local jurisdiction must make findings that the proposed changes are reasonably necessary because of local climatic, geologic, or topographical conditions[2]. The following section describes the findings that support the proposed ordinance.

The proposed reach codes reduce the GHG emissions associated with natural gas production, transmission, and combustion within Emeryville by requiring all electric energy in new residential construction. GHG emissions are a proven contributor to climate change, which is already impacting Emeryville climactically and topologically through sea level rise, extreme weather, and increased wildfire. The following are the findings required to amend the building code:

- Climactic findings: Local seasonal climactic conditions, exacerbated by climate change, present the risk of higher-intensity winter storms and sea level rise, threatening critical infrastructure in Emeryville, along with increased fire risk in hotter dry seasons. The San Francisco Bay Conservation and Development Commission (BDCD)'s 'Adapting to Rising Tides' studies[3] describe five climate impacts on Alameda County shorelines from the GHG-influenced sea level rise currently underway and projected to continue: more frequent floods, more extensive, longer-duration flooding, permanent inundation in some shoreline areas, increased shoreline erosion, and elevated groundwater and salinity intrusion to coastal-area groundwater and aquifers.
- Geologic findings: Because Emeryville is located in close proximity to the Hayward and San Andreas Faults, the City has an increased risk of fires caused by breaks in natural gas lines during seismic activity. A large earthquake in the region is estimated to be 63% likely in the next 26 years.[4] It is estimated that one in four fires after earthquakes are related to natural gas leaks.[5] Reducing the reliance on natural gas in new construction will decrease the risk of fires caused when gas lines rupture or break in seismic-related events.
- Topological findings: The topology of Emeryville, with its San Francisco Bay shoreline, makes it vulnerable to climate-caused sea level rise and associated risk to key transportation and other infrastructure.

[2] Health & Safety Code sections 17958.5, 17958.7, 18941.5
[3] http://www.adaptingtorisingtides.org/wp-content/uploads/2016/03/ARTClimateStatements_update.pdf
[4] https://seismo.berkeley.edu/hayward/hayward_hazards.html
[5] https://www.earthquakecountry.org/step1/gassafety/

The findings above demonstrate that the proposed reach codes, which will reduce natural gas use, transmission, transportation and combustion, are reasonably necessary to address climatic, geologic and topologic conditions in Emeryville.

In addition to the findings above, the California Energy Commission (CEC) requires that a cost-effectiveness study be conducted and filed in the case of local amendments to the Energy Code (Title 24, Part 6). The City must demonstrate to the CEC, using a cost-effectiveness study, that the amendments to the code are financially responsible (cost effective) and do not represent an unreasonable burden to residential applicants, and do not result in buildings that consume more energy than is permitted by Title 24. Cost-effectiveness studies in Emeryville's climate zone demonstrate that the proposals meet those requirements. Those studies are described in more detail below in the section titled: Statewide Cost-Effectiveness Study for Energy Code Reach Codes.

DISCUSSION

Health Impacts of Natural Gas Appliances

Fossil fuel use creates both indoor and outdoor air quality concerns. A study released in April 2020 by the UCLA Fielding School of Public Health made the following findings[6]:

Indoor Air Quality

- Gas appliances emit a wide range of air pollutants, such as carbon monoxide (CO), nitrogen oxides (NOx, including nitrogen dioxide (NO_2)), particulate matter (PM), and formaldehyde, which have been linked to various acute and chronic health effects, including respiratory illness, cardiovascular disease, and premature death.

- Under a hypothetical cooking scenario where a stove and oven are used simultaneously for one-hour peak concentrations of NO2 from cooking with gas appliances exceed the levels of acute national and California-based ambient air quality thresholds in more than 90% of modeled emission scenarios.

- Concentrations of CO and NO_2 resulting from gas cooking are the highest for apartments, due to a smaller residence size. This presents an additional risk for those in smaller units, who are often lower-income.

- Increases in indoor air pollutant concentrations can be driven by insufficient ventilation. Surveys show that fewer than 35% of California residents use range hoods when cooking — and many homes in the U.S. are lacking range hoods or ventilation altogether.

- The use of kitchen appliances for supplemental heating can increase exposure risks, and there is evidence this disproportionately affects low-income households, though more data on the frequency of use is needed to quantify the risk to various populations.

[6] https://coeh.ph.ucla.edu/effects-residential-gas-appliances-indoor-and-outdoor-air-quality-and-public-health-california

- Environmental justice communities disproportionately experience poor housing conditions which can be detrimental to health. Concerns related to gas appliance use include: the presence of old and unmaintained appliances in households, smaller and overcrowded residences where air pollution can reach higher concentrations, and challenges faced by renters to control appliance choices or afford maintenance. These populations already face cumulative effects associated with health and environmental injustices more broadly, and gas appliance issues can compound this. There are significant data gaps regarding equity and the health effects of gas combustion on low-income and minority populations, which should be further explored to facilitate a just transition to a low-carbon future.

Outdoor Air Quality

- Gas appliances are also a source of outdoor air pollution, and literature shows that the pollutants released by combustion can lead to illness and premature death.

- The UCLA study found that approximately 12,000 tons of CO and 15,900 tons of NO_X were emitted to outdoor air from the use of residential gas appliances in California in 2018.

- If all residential gas appliances were immediately replaced with clean electric alternatives, the reduction of outdoor NO_X and particulate matter (PM2.5) would result in 354 fewer deaths, as well as 596 fewer cases of acute bronchitis and 304 fewer cases of chronic bronchitis annually in California. This is equivalent to approximately $3.5 billion in monetized health benefits over the course of one year. These numbers only account for changing exposures from outdoor air as a result of residential electrification; a full exposure assessment accounting for indoor exposures would increase the total health benefits and the associated economic benefits of residential electrification.

Greenhouse Gas Emissions

GHGs cannot be removed from natural gas, and the impact of natural gas production, distribution and use is a major contributor to GHG emissions everywhere it is used. Conversely, our electric grid is capable of delivering GHG-free electricity. Given the large impact that natural gas has on GHG emissions, along with the indoor air hazards and the community safety risks associated with natural gas infrastructure,[7] a switch away from natural gas is a critical step in reducing GHG emissions and climate impact longer-term. Buildings constructed in 2022 are expected to be in use well beyond 2045, the State of California's target date for carbon neutrality.

As shown in the data above, natural gas use in buildings is one of the largest sources of GHG emissions in Emeryville. In most building uses, natural gas can be replaced with electric power in a cost-effective way, with no loss of function. The state's electric system is rapidly becoming cleaner, driven by escalating renewable portfolio standards and cleaner product offerings by the utilities and community choice aggregators (CCAs) including East Bay Community Energy (EBCE), which offers a 100% renewable, GHG-free electricity option for residents and businesses in Emeryville.

In addition, advances in electric heat pumps and other electrical equipment are yielding much higher overall efficiencies than their natural gas counterparts. Electric heat pumps, unlike traditional electric resistance heaters, do not generate heat, but concentrate and transfer it for end uses such as space conditioning and water heating. This process uses less primary energy and emits much less carbon, particularly when it is powered by renewable energy.

Recommended Energy Reach Codes for Residential New Construction

<u>New Construction</u>
The Sustainability Committee and staff recommend that the City Council adopt "reach codes" to require certain cost-effective measures in new residential construction as follows.

All-Electric Construction of New Residential Occupancies

New construction of residential occupancies (including all occupancies defined as R-1 through R-4 in California Building Code) must be all-electric, meeting current energy code requirements. No mixed-fuel pathway would be allowed except for:

a. Free-standing Accessory Dwelling Units smaller than 400 square feet.
b. Projects that have been received a Planning Permit, or Zoning Compliance Review prior to the effective date of the ordinance adopting reach codes. Projects which do not require planning approval, and for which a building permit application has been filed prior to the effective date of the ordinance adopting reach codes.

[7] https://www.nrdc.org/experts/amy-mall/pipeline-incident-statistics-reveal-significant-dangers

c. Projects demonstrating practical infeasibility, subject to Building Official approval

Where exemptions apply, wiring or conduit would be required to enable future electrification. The all-electric readiness requirements are designed to enable buildings initially equipped with natural gas appliances to replace them with electric appliances at a later time without having to make electrical capacity upgrades or make other changes to the building. The all-electric readiness requirements are based on findings in studies funded by the California Public Utilities Commission (Exhibits B and C) that all-electric buildings cause fewer GHG emissions. There are no cost-effectiveness findings for these provisions since, by themselves, they do not reduce energy. Including these is prudent as they are relatively inexpensive at the time of initial construction while enabling buildings to avoid much higher conversion costs in the future.
In new residential construction, no permanent natural gas infrastructure or use would be permitted. Backup power generation and outdoor cooking fueled by a free-standing Fuel Gas tank and which are not plumbed to a building, gas line or gas main would be allowed.

Additional requirements for installation of solar panels/photovoltaic systems (PV). PV installation is currently required for new residential construction up to three stories, and PV-ready construction is currently required for projects up to ten stories[8]. The recommended code would require solar PV installation on the entire solar zone, as defined in 24 CCR 6 § 110.10 (b), for all newly-constructed 100% residential occupancies up to ten stories.

Statewide Cost-Effectiveness Study for Energy Code Reach Codes
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 (Exhibits B and C). 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 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.

Building Prototypes
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 five-story multifamily building, and a four-story hotel. These prototypes are directly applicable to Emeryville development.

Statewide Study Findings

Building Appliance Electrification Reach Codes:

[8] https://ww2.energy.ca.gov/2015publications/CEC-400-2015-033/chapters/chapter_09_solar_ready.pdf

Staff have worked closely with EBCE's consultants to interpret the study's results and infer what options may or may not be cost-effective for the building types that are prevalent in the City of Emeryville, but were not analyzed by the team. EBCE has also provided consultant support to assist cities in understanding the cost-effectiveness study results and adopting reach codes. The proposed reach codes meet the requirements of the CEC for cost-effectiveness, and are also a cost-effective approach for constituents, contractors, and developers pursuing new construction with the city limits. In addition, the analysis results show that all-electric buildings are typically less expensive to construct. Costs include incremental capital costs, and, in some cases higher energy costs. In general, the first costs of an all-electric building are lower than a mixed-fuel building due to the lack of gas plumbing.

Environmental Impacts

The studies find that all-electric buildings, even those with no other energy performance enhancements, provide significant GHG reductions. The addition of energy efficiency and more solar can drive net energy use to nearly zero from some building types and GHG emissions to less than a third of a mixed-fuel 2019 State code compliant building. The chart below compares the total GHG emissions and net energy consumption (after onsite generation) of the single-family home using estimated emissions from PG&E. Results are similar for other building types.

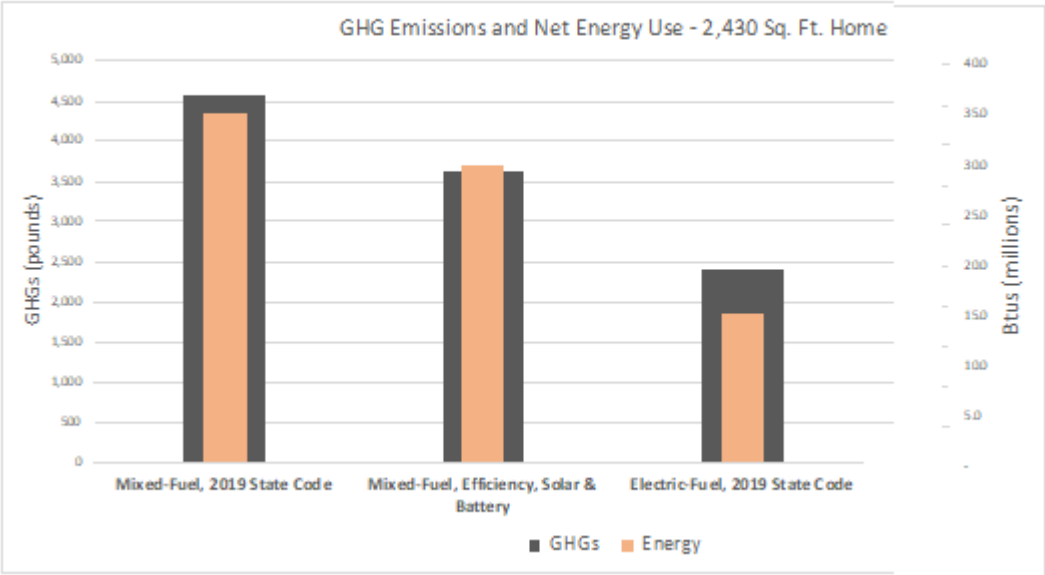


Figure 1: GHG and Energy Impact, Single Family Home

Electrification will reduce emissions even further for customers who procure power from EBCE, which currently serves a minimum of 86 percent carbon free electricity.

Economic Impacts

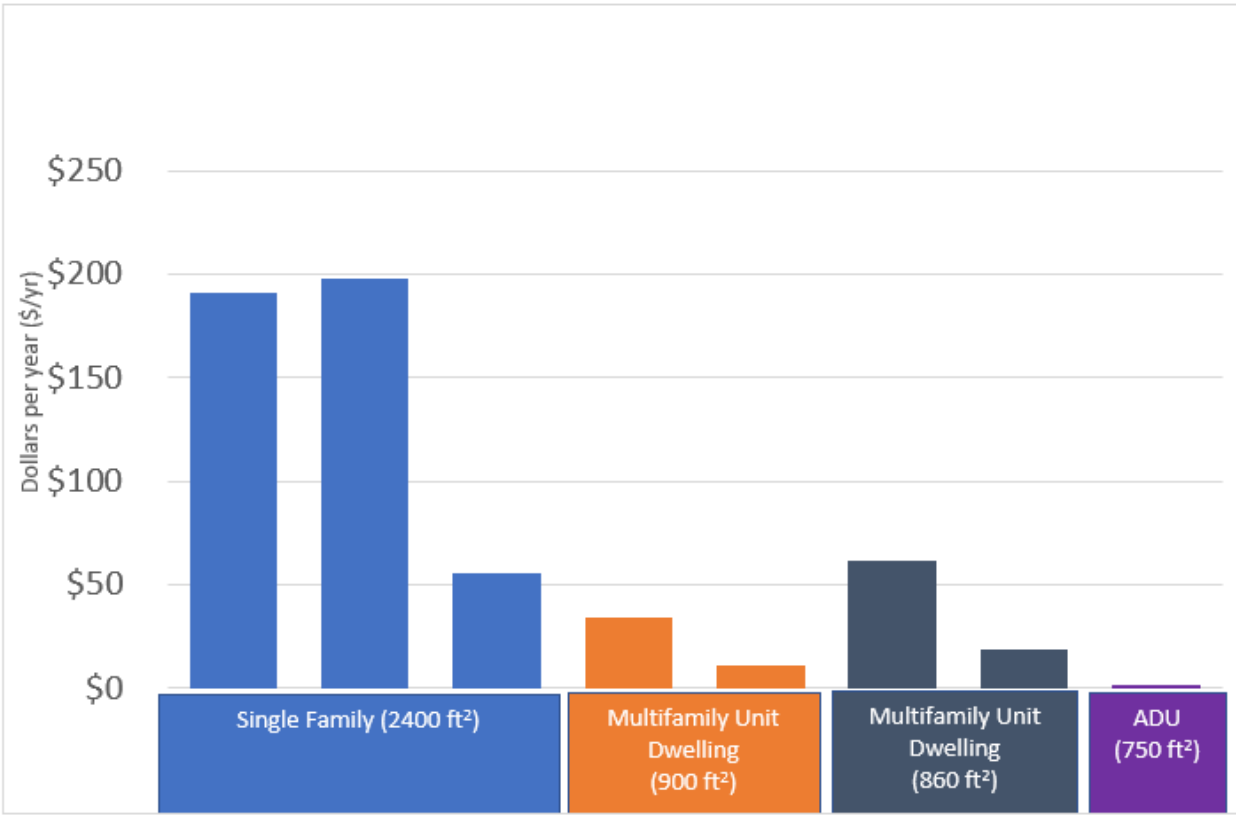
All-electric buildings are generally cheaper to build due to the elimination of running expensive gas plumbing to the building. These lower first costs generally make all-electric

construction more cost-effective on a life-cycle basis. This is particularly true for low-rise residential buildings, where it is also often increasingly more cost-effective for the owner to exceed the code by improving efficiency and adding solar. In fact, if one invests the savings from the gas infrastructure in additional PV capacity to offset more of the electricity load, in many cases the building is cost-effective for the owner and society from day one, meaning the building is both less expensive to build and cheaper to operate.

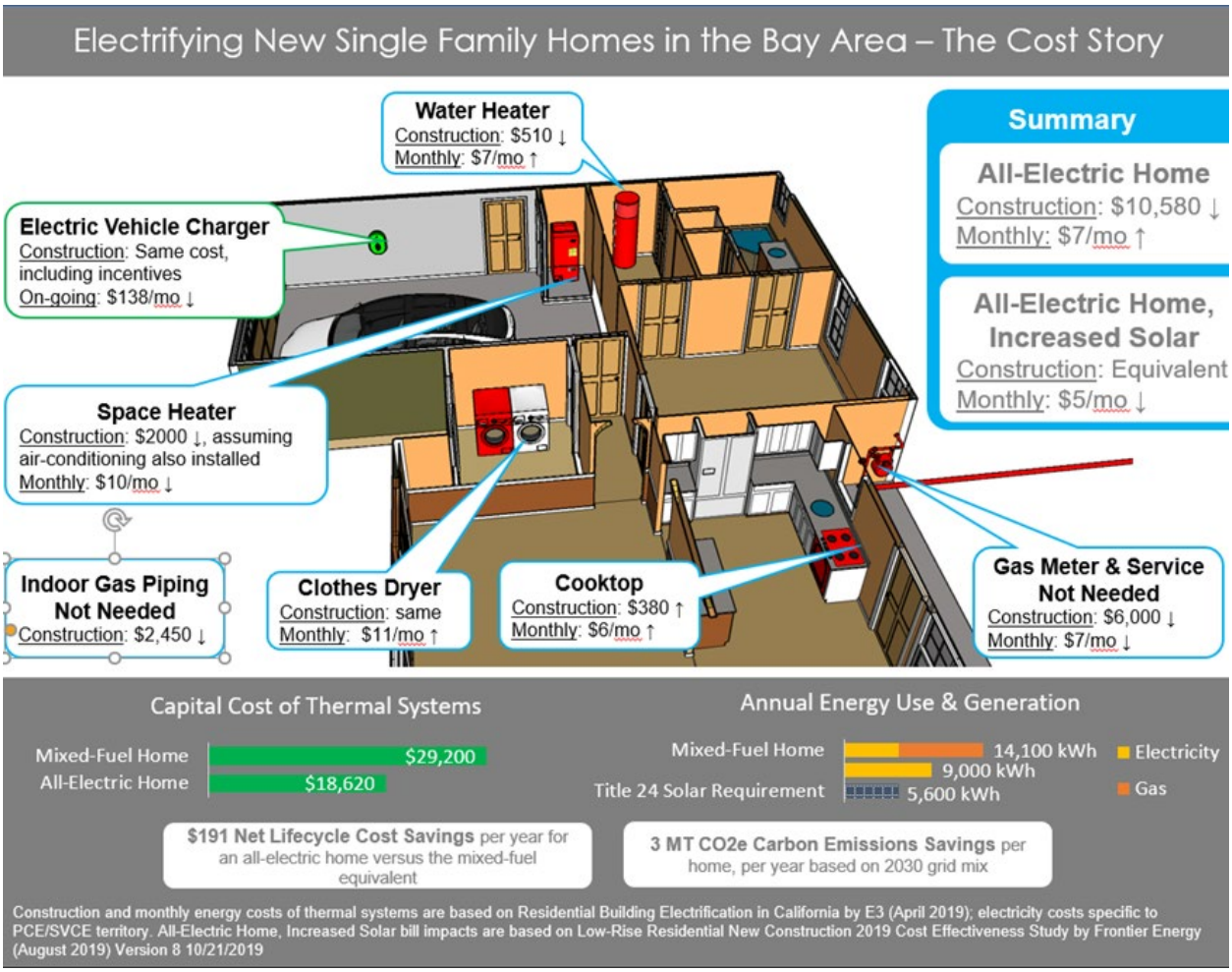
The figures below depict the incremental net present value of incremental construction costs and savings of various designs of a single-family home relative to a State-code-compliant mixed-fuel design. The analysis examines cost effectiveness in construction and in operation.

Solar PV is required to be installed on residential construction of up to three stories under current State code. For residential buildings of 4-10 stories, the data show that the 'all-electric efficiency-only' (no solar PV) building has lower construction costs compared to a mixed-fuel building. These cost savings are greater than the bill increases that the 'all-electric efficiency-only' building would experience. If a requirement to install solar PV is included, as proposed in this ordinance, construction costs for a 4-10-story 'all electric with solar PV' building are equivalent to construction costs for a mixed-fuel building without solar PV, and on-bill savings are achieved when including solar PV as proposed. Findings are similar for all other building types examined in the cost effectiveness studies thus far, and can reliably apply to building types such as smaller single-family homes or larger multi-family units than were expressly included in the studies.

Residential All-Electric Building, Life Cycle Net Present Savings of Construction Costs and On-Bill Impacts – Compared to a Mixed-Fuel Building



All-electric	X	X	X	X	X	X	X	X
High-efficiency appliances	X							
Above-code Solar PV		X	X	X		X	X	X
Building Efficiency Measures		X		X	X			X



Resilience and Electrification

With widespread wildfires and Public Safety Power Shutoffs common and expected to continue, resiliency is a critical concern in energy production, distribution, and use. There is some sentiment among the public that natural gas appliances may be more reliable than electric appliances in this new reality, but research finds that there are circumstances that favor electric power even in these conditions.

- New gas-powered water heaters, stoves and heaters all have electric ignitions since pilot lights are no longer legal. As a result, they do not work when the electricity is off regardless of their primary fuel source.
- Gas stoves can sometimes be lit with a match during a power outage; however, the exhaust fan will not work, making the stove unsafe to operate.
- All-electric appliances can easily be set up to use a backup power source including generators or solar-powered batteries.
- Heat pump water heaters, like other tank-style water heaters hold substantial amounts of hot water, ready to use in case of service disruption.
- Gas negatively impacts disaster recovery time. Not only are gas lines and leaks a dangerous liability during fires, but gas service typically takes longer to become

operational again after a safety shutoff or disaster-related inspection and repair, compared to electricity.

Ordinance Development Process

The proposed scope of a reach code ordinance for Emeryville is similar to the approach other local governments are considering or have adopted (see Exhibit A). It is based in part on a model ordinance developed through a collaborative effort involving the City of Emeryville, California Energy Commission, the State's major utilities, several community choice aggregators including EBCE, and representatives from local governments and energy policy agencies (notably StopWaste), as well as input from staff in many local and California-wide jurisdictions.

These proposed reach codes would apply to any project for which a building permit is issued after the reach codes' effective date. Exceptions to the effective date apply to:

- Projects for which a Planning Permit, as defined in the Planning Regulations at Section 9-8.216(y) of Title 9 of the EMC, has been approved prior to the effective date of the ordinance.
- Projects for which a Zoning Compliance Review, as defined in the Planning Regulations at Section 9-8.226(e) of Title 9 of the EMC, has been approved prior to the effective date of the ordinance.
- Projects which do not require planning approval, and for which a building permit application has been filed prior to the effective date of the ordinance.
- Projects demonstrating practical infeasibility, subject to Building Official approval.
- Free-standing Accessory Dwelling Units smaller than 400 square feet.

ENVIRONMENTAL REVIEW

This ordinance is exempt from CEQA under 15061(b)(3) on the grounds that these standards are more stringent than the State energy standards and would result in reduced GHG emissions with no new environmental impacts. There are no reasonably foreseeable adverse environmental impacts from these proposals as compared to existing code and practice.

FISCAL IMPACT

The energy performance amendments parallel the structure and terms of the State code and as such any incremental plan check and inspection time should be minimal. The electric readiness provisions will require plan checkers and inspectors to apply additional check lists to mixed-fuel buildings. These items are relatively simple and are not expected to require very much additional staff time. Any incremental costs of administering these requirements will be covered through existing permit fees.

STAFF COMMUNICATION WITH THE PUBLIC

Prior to the first reading of this Ordinance on July 20, 2021, these proposals have been discussed at meetings of the Sustainability Committee including on November 9, 2020,

April 12, 2021, and May 10, 2021; in a City Council Study Session on November 18, 2019, and in a City Council Meeting on March 2, 2021. In addition, a widely publicized informational webinar was held on October 19, 2020.

CONCLUSION

In response to the climate crisis and with an awareness of the long lifespan of the built environment, the Sustainability Committee and staff recommend the proposed ordinance as a prudent approach to addressing operational GHG emissions of residential buildings.

PREPARED BY: Nancy Humphrey, Environmental Programs Supervisor

APPROVED AND FORWARDED TO THE CITY COUNCIL OF THE CITY OF EMERYVILLE:

Christine Daniel, City Manager

ATTACHMENTS

- Proposed Ordinance
- Exhibit A: List of Cities' Reach Codes
- Exhibit B: 2019 Cost-Effectiveness Study: Low-Rise Residential New Construction
- Exhibit C: 2019 Mid-Rise New Construction Reach Code Cost-Effectiveness Study