



Office of the City Manager

ACTION CALENDAR
October 15, 2024

To: Honorable Mayor and Members of the City Council

From: Paul Buddenhagen, City Manager

Submitted by: Jordan Klein, Director, Planning and Development Department

Subject: Amendments to the of Berkeley Green Code to require all newly constructed buildings to be Zero NOx Emission Buildings

RECOMMENDATION

1. Adopt first reading of an Ordinance amending the Berkeley Green Code, BMC Chapter 19.37, to require all newly constructed buildings to be Zero NOx Emission Buildings with two exceptions: 1. for industrial or manufacturing processes; and 2. for cooking equipment serving nonresidential occupancies in buildings; and
2. Adopt a Resolution setting forth findings of local conditions that justify more stringent regulations than those provided by the 2022 California Green Building Standards Code with Mid-Cycle Supplements.

SUMMARY

The proposed legislation would require that all newly constructed buildings be Zero NOx Emission Buildings. If adopted, the Ordinance would take effect January 1, 2025, and would not impact previous local amendments to the California Green Building Standards Code (CALGreen), last adopted with “Mid-Cycle Supplements” through Ordinance No. 7,906-N.S., which became effective July 1, 2024.

FISCAL IMPACTS OF RECOMMENDATION

The proposed Ordinance will modestly increase the plan check and inspection workload. Costs would be covered by existing fees paid by permit applicants. There are no net fiscal impacts from this amendment of the Berkeley Green Code.

CURRENT SITUATION AND ITS EFFECTS

On May 7, 2024, City Council referred to the Health, Life Enrichment, Equity & Community (HLEEC) Policy Committee to consider local amendments to CALGreen to require all newly constructed buildings to be Zero NOx Emission Buildings. On July 29, 2024, the HLEEC Policy Committee unanimously voted to send Council a qualified, positive recommendation for the Zero NOx CALGreen reach code, noting also that

Council should consider a commercial kitchen exemption, or as an alternative, consider a single margin energy reach code.

HEALTH IMPLICATIONS

The proposed Ordinance would require all newly constructed buildings of all occupancies to meet the definition of a Zero NO_x Emission Building: a newly constructed building that exclusively uses Zero NO_x Emission Appliances. Nitrogen Oxides are defined as the sum of nitrogen oxide (NO) and nitrogen dioxide (NO₂), collectively expressed as NO_x, which is a harmful air pollutant. Short-term exposure can aggravate asthma and other respiratory illnesses, and can lead to hospital admissions and emergency room visits.¹ Long-term exposure can cause asthma and potentially increase susceptibility to respiratory infections.² Further, NO_x contributes to acid rain and is one of the building-blocks of ozone, an air pollutant, a greenhouse gas, and a major component of smog.³ This Ordinance would set a higher standard for health and environmental protection by improving air quality. This is consistent with the published purpose of the California Green Building Standards Code “to improve the health, safety and general welfare by enhancing the design and construction of buildings through the use of concepts having a reduced negative impact.”

This proposed ordinance addresses an immediate health concern of growing importance for Berkeley residents. The Bay Area Air Quality Management District (BAAQMD) notes that: “In 2019, emissions from residential natural gas combustion accounted for roughly the same amount of NO_x emissions as passenger vehicles.”⁴ However, shifts in remote work practices since 2019 have likely increased that percentage, both due to increased work from home hours and reduced work commutes. BAAQMD further notes that, “Through the reduction of NO_x and particulate matter emissions, the proposed [BAAQMD Zero NO_x appliance] amendments are projected annually to prevent up to 85 premature deaths and save up to \$890 million in health impacts.”⁵ In summary, the proposed Berkeley amendment for Zero NO_x Emission Buildings advances towards a built environment consistent with current understanding of human disease prevention and environmental health.

Cooking equipment, such as ranges, cooktops, and ovens that emit NO_x, exposes users to the NO_x emissions and impacts their health. The use of exhaust fans and vent hoods while cooking limits exposure indoors, but does not remove it completely. The highest cited capture efficiency rate of residential kitchen vent hoods in the Energy Code is 85%, meaning cooks will inhale some combustion byproducts when a NO_x

¹ <https://www.epa.gov/no2-pollution/basic-information-about-no2>

² *ibid*

³ <https://www3.epa.gov/airnow/mediakits/ozone/facts.pdf>

⁴ https://www.baaqmd.gov/~media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20230522_faq_appliance-rules_final-pdf.pdf?rev=b425fe938f644fa7839f8d938cad41fd&sc_lang=en

⁵ *ibid*

emitting appliance is being used. Residential and commercial kitchen vent hoods exhaust the NOx emissions to the outside.

From a health and safety standpoint, using Zero NOx Emitting cooking equipment, whether in homes or restaurants, offers the greatest health benefit. Allowing an exception from Zero NOx for cooking equipment serving nonresidential occupancies may provide other types of benefits. For example, it may be more economically attractive to restaurant owners due to factors such as equipment availability and familiarity, as well as purchase and operating costs. Restaurant operators in Berkeley have seen increases in expenses in recent years due to leases, costs of food, staff, and increasing regulatory compliance (e.g., utilizing compostable or reusable takeout containers to eliminate single use disposables). Also, an exception for cooking equipment serving nonresidential occupancies affords the building owner the greatest flexibility to attract the widest range of tenants. Berkeley's commercial vacancy rates have not yet rebounded to pre-pandemic levels.

In addition to its direct health impacts, NOx is one of the building blocks of ozone, a potent greenhouse gas with a Global Warming Potential (GWP) of 520. The Bay Area is currently out of compliance with federal standards for ozone. The provisions for Zero NOx Emission Buildings made by Chapter 19.37 would have the effect of reducing the emission of ozone, because NOx reacts in sunlight with other volatile organic compounds to create ozone. If adopted, the Ordinance will result in a reduction in ozone and a corresponding reduction in greenhouse gas emissions.

OPTIONS

The Ordinance proposed with this staff report is the Zero NOx CALGreen reach code with two exceptions: 1. for industrial or manufacturing processes; and 2. for cooking equipment serving nonresidential occupancies in buildings. Alternatively, Council could strike Section 5.106.13.1 Exception 2 and adopt the Ordinance without exempting cooking equipment serving nonresidential occupancies from Zero NOx requirements.

CODE AMENDMENTS

The current three-year building code cycle and any effective amendments thereto are effective through December 31, 2025. The local amendments proposed with this Ordinance do not negate or otherwise affect previously adopted amendments; they introduce new amendments to the 2022 California Green Building Standards Code pertaining to NOx emissions only. Under state law, local jurisdictions may adopt stricter code provisions if justified by findings of local climatic, geological or topographical conditions.

The proposed ordinance would take effect on January 1, 2025. It would apply to any project for which a building permit application for a newly constructed building, or for an alteration or addition to an existing Zero NOx Emission Building, is submitted on or after the effective date of the ordinance. This proposed ordinance would not apply to buildings whose building permit applications were submitted prior to January 1, 2025.

The proposed ordinance supports the City's Strategic Plan Goals to create a resilient, safe, connected, and prepared city, and to be a global leader in addressing climate change, advancing environmental justice, and protecting the environment. The proposed ordinance also supports City Council directives and policies related to fire and life safety, resilience, and climate protection, and is supported by the resolution adopting findings of local conditions.

BACKGROUND

City Council adopted the California Green Building Standards Code with local amendments on November 29, 2022, and readopted this code on June 4, 2024, with State Mid-Cycle Supplements and further local amendments (effective July 1, 2024).

Proposed amendments to the Berkeley Green Code were discussed by the Environment and Climate Commission (ECC) at its April and May 2024 meetings. ECC considered options including a Zero NO_x CALGreen reach code and a Single Margin Energy reach code. Several Commissioners indicated support for a Zero NO_x CALGreen reach code, without an exception for cooking equipment used in commercial kitchens, citing potential benefits including alignment with BAAQMD's Zero NO_x appliance rules, appreciation of future preparedness that a reach code brings, and facilitation of neighborhood decarbonization efforts tied to seismic safety and other health and safety benefits.

This proposed Zero NO_x Emission Building amendment to CALGreen builds upon the first such local ordinance, from the City of Los Altos Hills, by adding the requirement for nonresidential occupancies to meet the Zero NO_x Emission Building standard, and requiring Zero NO_x cooking equipment for residential occupancies. The first Zero NO_x appliance regulation provision of BAAQMD Regulation 9 Rule 6 will become effective on January 1, 2027 for tanked water heaters <75kBtu.⁶

On June 26, 2024 staff hosted a virtual roundtable for design professionals, property owners, and developers who have recently built new buildings in Berkeley. This group of stakeholders, who had experience with designing and/or building a variety of buildings types, voiced support for a healthy environment and healthy buildings. Discussion topics included future code requirements, the housing crisis, recommendations for grid resilient design and battery storage, economic and technical challenges, and PG&E's interconnection timelines. The opinions in this group varied, but a Zero NO_x reach code with an exception for commercial kitchens had the most interest. Several developers voiced that having natural gas available in commercial spaces can help them attract a wider range of restaurant and cafe tenants.

⁶ <https://www.baaqmd.gov/rules-and-compliance/rules/reg-9-rule-6-nitrogen-oxides-emissions-from-natural-gasfired-water-heaters>

On July 29, 2024 the HLEEC Policy Committee discussed reach code options with staff. The Committee voted to send the item to Council with a qualified positive recommendation for the Zero NO_x CALGreen reach code, noting also that Council should consider a commercial kitchen exemption, or as an alternative, a Single Margin Energy Reach Code.

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE IMPACTS

This proposed ordinance aligns with Berkeley's health, safety, and climate goals. It supports the Climate Action Plan, Berkeley Resilience Strategy, and Fossil Fuel Free Berkeley goals. Zero NO_x Emission Buildings reduce the human health, environmental, and climate impacts of emissions associated with occupying and using the new buildings.

RATIONALE FOR RECOMMENDATION

Local policies such as the proposed Ordinance provide a higher level of safety than are achieved through the State's Building Codes. Fire risk, risks to the health of building occupants, the accumulating and compounding risks of climate change to the San Francisco Bay Area, its residents, its coastal and littoral zones, and broader risks of degraded air quality justify adoption of Berkeley code amendments that are stricter than the California Building Standards Code.

The proposed ordinance, a Zero NO_x amendment to CALGreen, regulates emissions from appliances and equipment. It does not regulate the energy use of appliances. Generally, electric appliances will meet Zero NO_x Emitting Equipment requirements, as would natural gas fired appliances fitted with scrubbers or other equipment that capture and remove NO_x emissions.

In addition, Berkeley does not meet State and Federal ambient outdoor air quality standards (nonattainment) for ozone and is also in an area of nonattainment for State standards for particulate matter (PM_{2.5} and PM₁₀). Per the BAAQMD⁷, a local government has the authority to regulate air quality. By regulating NO_x emissions from equipment, Berkeley can reduce harm to public health within buildings, improve ambient air quality, and assist in the transition to BAAQMD's appliance rules which will impact the sale and installation of water heaters and furnaces starting in 2027.

ALTERNATIVES CONSIDERED

Council could consider instead adopting an alternative amendment known as a "Single Margin Energy Reach Code." The single margin approach would require the proposed building to meet a higher source energy compliance margin for all occupancies than currently required by the California Energy Code. Although "source energy" is not defined in the state Energy Code, a Code manual explains it generally measures the marginal greenhouse gas emissions of energy used to supply electricity (2022 Single

⁷ <https://www.baaqmd.gov/en/plans-and-climate/local-government-support>

Family Residential Compliance Manual at 1.6.4). The metric accounts for the system delivering energy to the building, as well as the time of day the energy is delivered.

By requiring that a proposed building achieve a certain compliance margin below the source energy requirement for a standard design building, such an ordinance would require that a building improve upon the state code's EDR1 metric. Each building type would have a respective single margin it would need to comply with. This approach gives builders flexibility in how to meet these standards, and allows and applies to both electric and mixed-use fuel designs. Methods to achieve a particular source energy compliance margin include electrifying appliances, or, if a building uses gas appliances, adding efficiency improvements such as insulation, and/or utilizing solar PV or a battery. However, overall the single margin approach is less effective at reducing greenhouse gas emissions than Zero NOx requirements, though it is a feasible option for greenhouse gas reduction, and requires more passive design such as increased insulation and/or more efficient windows in a building. The Single Margin Energy Reach Code approach has been adopted by other California cities including San Luis Obispo, Santa Cruz, San Jose, Palo Alto, East Palo Alto, Encinitas, and Brisbane.

This option was discussed at ECC, HLEEC, and at the roundtable with building professionals, and was not voiced as the preferred option by the majority of the participants in any meeting. A Single Margin Energy Reach Code would require additional work for all types of projects, leading to greater difficulty in understanding the requirements, higher impacts on building design teams, and a longer timeline for implementation, as California Energy Commission approval would be required after local adoption. It would also place greater demands on City plan check and field inspection staff.

CONTACT PERSON

David Lopez, Chief Building Official, Building and Safety Division, Planning and Development Department, 510-981-7441

Kurt Hurley, Green Building Program Manager, Building and Safety Division, Planning and Development Department, 510-981-7501

Sarah Moore, Manager, Office of Energy and Sustainable Development, Planning and Development Department, 510-981-7494

Attachments:

- 1: Code Amendment Ordinance
- 2: Resolution Adopting Findings of Local Conditions

ORDINANCE NO. –N.S.

AMENDING BERKELEY MUNICIPAL CODE SECTION 19.37.040 (BERKELEY GREEN CODE)

BE IT ORDAINED by the Council of the City of Berkeley as follows:

Section 1. That Berkeley Municipal Code Section 19.37.040 is hereby amended to read as follows:

Section 19.37.040

BERKELEY GREEN CODE

Sections:

19.37.040 Amendments to the California Green Building Standards Code.

19.37.040 Amendments to the California Green Building Standards Code with Mid-Cycle Supplement.

Chapter 2 Definitions of the California Green Building Standards Code with Mid-Cycle Supplement is adopted in its entirety subject to the modifications thereto which are set forth below:

Add new definitions to Section 202:

NITROGEN OXIDES (NO_x). The sum of nitrogen oxide (NO) and nitrogen dioxide (NO₂) collectively expressed as NO_x.

NO_x EMITTING EQUIPMENT. Any equipment or appliance primarily used for space heating, space ventilation, water heating, cooking, clothes drying and lighting that emits more than 0.0 nanograms of nitrogen oxides expressed as NO_x per joule of heat and/or light output.

ZERO NO_x EMISSION BUILDING. A building is considered a zero NO_x emission building if it utilizes only zero NO_x equipment or appliances to provide space heating, space ventilation, water heating, cooking, clothes drying, and lighting for the life of the building including future alterations and additions.

ZERO NO_x EMITTING EQUIPMENT. Any equipment or appliance that emits no more than 0.0 nanograms of nitrogen oxides (NO_x) per joule of heat and/or light output. Equipment and appliances primarily used for space heating, space ventilation, water heating, cooking, clothes drying, and lighting.

Chapter 3 Green Building of the California Green Building Standards Code with Mid-Cycle Supplement is adopted in its entirety subject to the modifications thereto which are set forth below:

Add a new Subsection 301.1.2 to read:

301.1.2 Residential waste diversion. The requirements of Section 4.408 shall be required for:

1. Any additions or alterations, which increase the building's conditioned area, volume or size.
2. Any building alterations with a permit valuation over \$100,000.
3. Any interior or exterior demolitions valued over \$3,000.

Modify Subsection 301.3.2 to read:

301.3.2 Nonresidential waste diversion. The requirements of Section 5.408 shall be required for additions ~~and~~, alterations and demolitions whenever a permit is required for work.

Chapter 4 Residential Mandatory Measures of the California Green Buildings Standards Code with Mid-Cycle Supplement is adopted in its entirety subject to the modifications thereto which are set forth below:

Modify Subsection 4.106.4.1 to read:

4.106.4.1 New one- and two-family dwellings and townhouses with attached or detached private garages, carports, or any other on-site parking. For each dwelling unit, install a listed raceway to accommodate a dedicated 208/240-volt branch circuit. ~~The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or other enclosure in close proximity to the proposed location of an EV charger. Raceways are required to be continuous at enclosed, inaccessible or concealed areas and spaces. The service panel and/or subpanel shall provide capacity to install a 40-ampere 208/240-volt minimum dedicated branch circuit and space(s) reserved to permit installation of a branch circuit overcurrent protective device minimum 40-ampere 208/240-volt dedicated EV branch circuit in close proximity to the proposed location of an EV charger at the time of original construction in accordance with the California Electrical Code.~~

Exception: A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the proposed location of an EV charger at the time of original construction in accordance with the California Electrical Code.

4.106.4.1.1 Identification. The service panel or subpanel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging as “EV CAPABLE READY”. The raceway termination location shall be permanently and visibly marked as “EV CAPABLE READY”.

Modify Subsection 4.106.4.2.2. to read:

4.106.4.2.2 Multifamily dwellings, hotels and motels.

1. EV ready parking spaces with receptacles.

a. **Hotels and motels.** Forty (40) percent of the total number of parking spaces shall be equipped with low power Level 2 EV charging receptacles.

b. **Multifamily parking facilities.** Forty (40) percent of the total number of parking spaces shall be equipped with low power Level 2 EV charging receptacles. EV charging receptacles required by this section shall be located in at least one assigned parking space per dwelling unit where assigned parking is provided but need not exceed forty (40) percent of the total number of assigned parking spaces provided on the site.

~~Exception: Areas of parking facilities served by parking lifts, including but not limited to automated mechanical access open parking garages as defined in the California Building Code; or parking facilities otherwise incapable of supporting electric vehicle charging.~~ Areas of parking facilities served by parking lifts, provided the required percentage of EV Chargers spaces are installed elsewhere.

c. **Receptacle power source.** EV charging receptacles in multifamily parking facilities shall be provided with a dedicated branch circuit connected to the dwelling unit's electrical panel, unless determined as infeasible by the project builder or designer and subject to concurrence of the local enforcing agency.

~~Exception: Areas of parking facilities served by parking lifts, including but not limited to automated mechanical access open parking garages as defined in the California Building Code; or parking facilities otherwise incapable of supporting electric vehicle charging.~~ Areas of parking facilities served by parking lifts, provided the required percentage of EV Chargers spaces are installed elsewhere.

d. **Receptacle configurations.** 208/240V EV charging receptacles shall comply with one of the following configurations:

1. For 20-ampere receptacles, NEMA 6-20R.
2. For 30-ampere receptacles, NEMA 14-30R.
3. For 50-ampere receptacles, NEMA 14-50R.

Add a new section 4.106.5 to read:

4.106.5 ZERO NO_x EMISSION BUILDINGS

Add a new subsection 4.106.5.1 to read:

4.106.5.1 Newly Constructed Buildings. All newly constructed buildings and accessory structures shall be Zero NO_x Emission Buildings.

Add a new Subsection 4.405.1 to read:

4.405.1 Reduction in cement use. As allowed by the enforcing agency, cement used in concrete mix design shall be reduced not less than 25 percent. Products commonly used to replace cement in concrete mix designs include, but are not limited to:

1. Fly ash.
2. Slag.
3. Silica fume.
4. Rice hull ash.

Exception: Minimum cement reductions in concrete mix designs approved by the Engineer of Record may be lower where high early strength is needed for concrete products or to meet an accelerated project schedule.

Modify Subsection 4.408.1 to read:

4.408.1 Construction waste management. Recycle and/or salvage for reuse 100% of excavated soil and land-clearing debris, 100% of concrete, 100% of asphalt, and a minimum of 65 percent of the other nonhazardous construction and demolition waste in accordance with either Section 4.408.2, 4.408.3 or 4.408.4, or meet a more stringent local construction and demolition waste management ordinance.

Exceptions:

- ~~1. Excavated soil and land-clearing debris.~~
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist or are not located reasonably close to the jobsite.
3. The enforcing agency may make exceptions to the requirements of this section when isolated jobsites are located in areas beyond the haul boundaries of the diversion facility.

Chapter 5 Nonresidential Mandatory Measures of the California Green Buildings Standards Code with Mid-Cycle Supplement is adopted in its entirety subject to the modifications thereto which are set forth below:

Modify Subsection 5.106.5.3.1 to read:

5.106.5.3.1 EV Capable Spaces. [N] Twenty (20) percent of the total number of parking spaces shall be EV capable spaces. Calculation for EV capable spaces shall be rounded up to the nearest whole number. shall be provided in accordance with Table 5.106.5.3.1 and The spaces shall comply with the following requirements:

1. Raceways complying with the California Electrical Code and no less than 1-inch (25 mm) diameter shall be provided and shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the EV capable space and into a suitable listed cabinet, box, enclosure or equivalent. A common raceway may be used to serve multiple EV capable spaces.
2. A service panel or subpanel(s) shall be provided with panel space and electrical load capacity for a dedicated 208/240 volt, 40-ampere minimum branch circuit for each EV capable space, with delivery of 30-ampere minimum to an installed EVSE at each EVCS.
3. The electrical system and any on-site distribution transformers shall have sufficient capacity to supply full rated amperage at each EV capable space.
4. The service panel or subpanel circuit directory shall identify the reserved overcurrent protective device space(s) as "EV CAPABLE". The raceway termination location shall be permanently and visibly marked as "EV CAPABLE."

Note: A parking space served by electric vehicle supply equipment or designed as a future EV charging space shall count as at least one standard automobile parking space only for the purpose of complying with any applicable minimum parking space requirements established by an enforcement agency. See Vehicle Code Section 22511.2 for further details.

Modify Subsection 5.106.5.3.2 to read:

5.106.5.3.2 Electric vehicle charging stations (EVCS). Ten (10) percent of the total number of parking spaces shall be EV capable spaces shall be provided with electric vehicle supply equipment (EVSE) to create EVCS in the number indicated in Table 5.106.5.3.1 separate and in addition to the requirements of Section 5.106.5.3.1. Calculation of required EVCS shall be rounded up to the nearest whole number. The EVCS required by Table 5.106.5.3.1 by this section shall be provided with Level 2 EVSE or DCFC as permitted in Section 5.106.5.3.2.1. At least one minimum 6.6 kVA Level 2 EVSE shall be provided.

One EV charger with multiple connectors capable of charging multiple EVs simultaneously shall be permitted if the electrical load capacity required by Section 5.106.5.3.1 for each EV capable space is accumulatively supplied to the EV charger.

Delete Table 5.106.5.3.1.

Modify Subsection 5.106.5.3.6 to read:

5.106.5.3.6 Electric vehicle charging stations (EVCS)—power allocation method. The power allocation method may be used as an alternative to the requirements in ~~Section 5.106.5.3.1, and Section 5.106.5.3.2 and associated Table 5.106.5.3.1.~~ Use Table 5.106.5.3.6 the product of the factor 0.66 kVA/ parking space times the total number of parking spaces to determine the total power in kVA required ~~based on the total number of actual parking spaces for EVSE charging infrastructure.~~

Power allocation method shall include the following:

- 1) Use any kVA combination of ~~EV capable spaces,~~ low power Level 2, Level 2 or DCFC EVSEs.
- 2) At least one Level 2 EVSE shall be provided.
- 3) Any remainder power allocation kVA from Section 5.106.3.6 Item (1) shall be converted to one additional low power Level 2 EVSE.

Delete Table 5.106.5.3.6.

Add a new section 5.106.13 to read:

5.106.13 ZERO NO_x EMISSION BUILDINGS

Add a new subsection 5.106.13.1 to read:

5.106.13.1 New construction. [N] All newly constructed buildings shall be Zero NO_x Emission Buildings.

Exception 1: F1 and F2 Occupancy Classifications as defined by California Building Code Section 306; and H1, H2, H3, H4, and H5 Occupancy Classifications as defined by California Building Code Section 307 for processes other than service water heating, space heating, space ventilation, cooking, clothes drying, and lighting as they relate to human occupancy.

Exception 2: Cooking equipment serving nonresidential occupancies.

Add a new Subsection 5.405.1 to read:

5.405.1 Reduction in cement use. As allowed by the enforcing agency, cement used in concrete mix design shall be reduced not less than 25 percent. Products commonly used to replace cement in concrete mix designs include, but are not limited to:

1. Fly ash.
2. Slag.
3. Silica fume.
4. Rice hull ash.

Exception: Minimum cement reductions in concrete mix designs approved by the Engineer of Record may be lower where high early strength is needed for concrete products or to meet an accelerated project schedule.

Modify Subsection 5.408.3 to read:

5.408.3 Concrete, asphalt, excavated soil and land clearing debris. 100 percent of concrete, asphalt, trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

Exception: Reuse, either on-or off-site, of vegetation or soil contaminated by disease or pest infestation.

Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material. (www.cdfa.ca.gov/exec/county/county_contacts.html).
2. For a map of known pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. (www.cdfa.ca.gov).

Section 2. Copies of this Ordinance shall be posted for two days prior to adoption in the display case located near the walkway in front of Council Chambers, 2134 Martin Luther King Jr. Way. Within 15 days of adoption, copies of this Ordinance shall be filed at each branch of the Berkeley Public Library and the title shall be published in a newspaper of general circulation.

* * * * *

RESOLUTION NO. ##,###-N.S.

ADOPTING FINDINGS AS TO LOCAL CLIMATIC, GEOLOGICAL, AND TOPOGRAPHICAL CONDITIONS, RENDERING REASONABLY NECESSARY ENUMERATED LOCAL GREEN BUILDING STANDARDS THAT ARE MORE STRINGENT THAN THOSE MANDATED BY THE CALIFORNIA GREEN BUILDING STANDARDS CODE

WHEREAS, the City is proposing to adopt enumerated changes and modifications to the 2022 California Green Building Standards Code with Mid-Cycle Supplements, California Code of Regulations, Title 24, as set forth below; and

WHEREAS, Health & Safety Code §17958 allows the City to make modifications or changes to the California Building Standards Code and other regulations adopted pursuant to Health & Safety Code §17921(a) which result in more stringent local requirements; and

WHEREAS, Health & Safety Code §17958, §17958.5 and §17958.7 require that such changes be supported by findings made by the governing body that such more stringent local requirements are necessary because of "local climatic, geological, or topographical conditions"; and

WHEREAS, Health & Safety Code § 39002 recognizes local authority to set stricter air quality standards for nonvehicular sources than those set forth by state or federal law or by the California Air Resources Board; and

WHEREAS, the Bay Area Air Quality Management District approved rules on June 21, 2023 that outlaw the sale of NOx-emitting water heaters and furnaces in 2027 and 2029, respectively, for installation in Bay Area buildings including in Berkeley; and

WHEREAS, preparing structures in the City for the upcoming implementation of the Bay Area Air Quality Management District's rules will protect community health and promote efficiency and cost savings that will benefit the City's residents; and

WHEREAS, the Federal Clean Air Act requires the Federal Environmental Protection Agency to establish federal air quality standards to protect public health and public welfare and regulate emissions of hazardous air pollutants; and

WHEREAS, Nitrogen Dioxide and ozone are two of the six criteria pollutants explicitly addressed in the Federal Clean Air Act; and

WHEREAS, pursuant to the California Clean Air Act Law, the California Air Resources Board regulates mobile sources of pollution while local and regional authorities are

responsible for controlling air pollution discharged, released, or otherwise produced from other sources; and

WHEREAS, much of the Greater Bay Area, including the City, remains a nonattainment area that does not meet federal air quality standards for ozone and other harmful air pollutants established to protect public health; and

WHEREAS, Nitrogen Oxide and Nitrogen Dioxide (collectively NOx) emissions from building appliances contribute significantly to the formation of ozone and other harmful air pollutants that are present in the Greater Bay Area at levels that violate federal standards; and

WHEREAS, such findings must be made available as a public record and a copy thereof with each such modification or change shall be filed with the California Building Standards Commission; and

WHEREAS, on November 3, 2022, the Berkeley City Council adopted Resolution No. 70,585-N.S. and additionally on May 7, 2024 the Berkeley Council adopted Resolution no. 71,320-N.S. making findings in support of previous local code amendments.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Berkeley that it finds that each of the proposed changes or modifications to the California Green Building Standards Code which are enumerated below are reasonably necessary because of local conditions in the area encompassed by the City of Berkeley, as set forth below:

A. LOCAL CONDITIONS

1. Climatic Conditions

a. Discussion

The City of Berkeley is located at the geographic center of the Bay Area. The western limits are defined by the Bay at near sea level and the eastern limits by the abruptly rising Berkeley Hills to 1,200 feet. The eastern limit faces open parklands and open space (covered with vegetative fuel loading) to the east and is exposed to a unique danger from wild land fires during periods of hot, dry weather in the summer months. Many of the Berkeley homes in this area have wood shake and shingle roofs and are surrounded by brush type vegetation. The situation is made even worse by the negative effects of high wind conditions during the fire season. During May to October, critical climatic fire conditions occur where the temperature is greater than 80°F, the wind speed is greater than 15 mph, fuel moisture is less than or equal to 10.0 percent, wind direction is from north to the east-southeast and the ignition component is 65 or greater. These conditions occur more frequently during the fire season but this does not preclude the possibility that a serious fire could occur during other months of the year. The critical climate fire conditions create a situation conducive to rapidly moving, high intensity fires. Fires starting in the wild land areas along the easterly border are likely to move rapidly westward into Berkeley's urban areas.

In September 1923, critical climatic fire conditions were in effect and Berkeley sustained one of the most devastating fires in California's history. A fire swept over the range of the hills to the northeast of Berkeley and within two hours was attacking houses within the City limits. A total of 130 acres of built-up territory burned. 584 Berkeley buildings were wholly destroyed and about 30 others seriously damaged. By far the greater portion were single-family dwellings, but among the number were 63 apartments, 13 fraternity, sorority and students' house clubs and 6 hotels and boarding houses.

In December of 1980, during critical climatic fire conditions, a small fire started at Berkeley's northeast limits and within minutes five homes were totally destroyed by fire.

On October 20, 1991, a disastrous firestorm swept down from the Oakland hills. Within the first few hours, thousands of people were evacuated. Ultimately over 3,000 dwelling units were destroyed, of which more than 70 were in Berkeley. This fire matched the pattern established by the fires of 1923 and 1980. Additionally, the conditions that led to it were the same as the conditions that led to a 1970 fire that destroyed 70 homes in Oakland.

Berkeley frequently experiences cold winter days with accompanying temperature inversions which trap wood smoke near the ground and increase air pollution. These stagnant air days are marked by increased acute respiratory disease, including asthma, and a small but consistent increase in deaths from heart and lung disease. During these periods the usual onshore flow of clean marine air ceases and wood smoke air pollution becomes an area-wide phenomena. Studies by the Bay Area Air Quality Management District suggest that between 20 and 50% of air polluting small particles come from residential wood burning.

In addition, local surface winds frequently transport moisture laden air from the surface of the Bay waters into the City. Larger scale prevailing weather patterns and winds created by the jet stream from the west also transport highly humid air and storms across the Pacific Ocean through the strait between the San Francisco peninsula and the Marin Headlands straddled by Golden Gate Bridge and into the City. The moderating effect of the Bay waters on local temperatures tends to reduce local temperature extremes, even during periods of high inland temperatures. The combination of moist air from adjacent waters and the associated mild temperatures means that it is common for local weather conditions to hover near the dew point. This can result in the formation of fog associated with local and regional marine weather layers, which commonly cover the City for hours or even days at a time with an average morning relative humidity of 82 percent.

Much of Northern California is considered to possess a predominantly Mediterranean climate. At times Berkeley does experience periods of high temperature and/or low humidity particularly between mid-July and mid-October, when the danger of hillside fires is greatest. Throughout the rest of the year, the marine weather environment is characterized by higher humidity and lower overall prevailing temperatures, resulting in a higher overall moisture content in building construction materials and slower drying of building materials and assemblies once wet or humidified.

Scientific evidence has established that combustion, procurement and transportation produce significant greenhouse gas emissions that contribute to global warming and climate change. Human activities releasing greenhouse gases into the atmosphere cause increases in worldwide average temperature, which contribute to melting of glaciers and thermal expansion of ocean water, drought conditions, increase in vegetative fuel, and length of fire seasons. Alameda County, in which Berkeley is located, has significant levels of some greenhouse gases like ozone, which is also an air pollutant that impacts public health¹. Ozone is formed when NO_x and VOCs chemically react in the sun. As a coastal city located on the San Francisco Bay, Berkeley is experiencing the repercussions of climate change due excessive greenhouse gas emissions. Rising sea levels have caused significant coastal erosion and have increased impacts to infrastructure during extreme tides.

Scientific evidence also suggests storms are growing with higher intensity due to climate change and will be followed by an increased frequency of dry periods. By 2100, average temperatures in the San Francisco Bay Area are expected to increase up to 11°, bringing 6-10 additional heat waves to Berkeley each year. According to historical records, Bay Area sea level has risen 8 inches over the last century and the pace of sea level rise has increased since 2011. While regional variability exists, the median increase for the San Francisco Bay is expected to reach almost 1 ft by 2050² under a low risk model, while 2.7 ft is projected under an extreme risk scenario. Such climate change events are expected to increase the risk of flooding in low-lying areas of Berkeley, while hillside communities face increased risk of wildfires.

b. Summary

Local climatic conditions of periods of limited rainfall, high temperature and/or low humidity particularly between mid-July and mid-October, and high winds along with existing building construction create periodic extremely hazardous fire conditions that adversely affect the acceleration intensity and size of fires in the City. The same climatic conditions may result in the concurrent occurrence of one or more fires, which may spread in the more populated areas of the City without adequate fire department personnel to protect against and control such a situation. Throughout the rest of the year, the marine weather environment is characterized by higher humidity and lower overall prevailing temperatures, resulting in a higher overall moisture content in building construction materials and slower drying of building materials and assemblies once wet or humidified. Berkeley is susceptible to the impacts of climate change, including sea level rise, increased average temperatures, and reduced air quality.

2. Geological Conditions

a. Discussion

¹ [California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants | Green Book | US EPA](#)

² Griggs, G., Cayan, D., Tebaldi, C., Fricker, H., & Árvai, J. (2017). Rising Seas in California. California Ocean Science Trust, (April), 71. Retrieved from <http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf>

The City of Berkeley is in a region of high seismic activity and is traversed by the Hayward fault. It has the San Andreas earthquake fault to the west and the Calaveras earthquake fault to the east. All three faults are known to be active as evidenced by the damaging earthquakes they have produced in the last 100 years and can, therefore, be expected to do the same in the future. Of primary concern to Berkeley is the Hayward Fault, which has been estimated to be capable of earthquakes exceeding a magnitude of 7.0 on the Richter scale. It extends through many residential areas and passes through a small business district and the University of California. A large number of underground utilities cross the fault, including major water supply and natural gas lines. Intensified damage during an earthquake may be expected in liquefaction zones along the Bay west of Interstate 80 and in known slide areas, as well as hillside areas (occupied mainly by dwellings) located within or near the fault zone; some areas are steep and have been subjected to slides.

The waterfront areas and areas in the Berkeley flatlands immediately adjacent to creeks and water streams present a major potential for soil liquefaction hazard. The Eastshore Freeway may liquefy and fail under heavy shaking or it may be inundated by a tsunami. The north hill area is most susceptible to landslides because of the presence of soft and unconsolidated sediments, extensive water content in the ground and the steepness of slopes.

Great potential damage can be related to the likely collapse of freeway overpasses. In the event of a major earthquake, Berkeley's firefighting capability could be significantly affected by loss of its main water supply. There is also the strong possibility of inundation due to failure of water reservoirs in the hill area. Summit Reservoir at the Kensington border in Berkeley and Berryman Reservoir North have recently been replaced by steel tanks. Berryman Reservoir South has received a seismic upgrade. Additional potential situations following an earthquake include broken natural gas mains and ensuing fire in the streets, building fires, as the result of broken service connections, the need for rescues for collapsed structures, and the rendering of first aid and other medical attention to a large number of people.

b. Summary

Local geological conditions include high seismic activity and large concentrations of residential type buildings as well as a major freeway. Since the City of Berkeley is located in a densely populated area having buildings and structures constructed over and near a vast array of fault systems capable of producing major earthquakes, the modifications cited herein are intended to better limit property damage as a result of a seismic activity and to establish criteria for repair of damaged properties following a local emergency.

3. Topographical Conditions

a. Discussion

The City of Berkeley has many homes built throughout the urban portion of the Berkeley Hills that are reached by narrow and often winding paved streets which hamper access for fire apparatus and escape routes for residents. In addition, many of the hillside homes are on the extreme eastern edge of the City and require longer response times for the total required firefighting force. Panoramic Way and other hill areas with narrow and winding streets may face the problem of isolation from the rest of the City.

In the areas north and south of the University of California, there are large concentrations of apartments, rooming houses, and fraternity and sorority houses. A number of apartments in these areas are of wood frame construction and are up to five stories in height from grade level. The fire potential is moderately high due to building congestion, heights, and wood shingle roof coverings and siding. Fires can be expected to involve large groups of buildings in these areas. It is noted that Berkeley most probably has more physically impaired people per capita than any other community in the United States. It is estimated that 14% of the approximate population of 124,321 per the 2021 Census in Berkeley are physically impaired. Emergency egress and rescue for these people are more difficult during a fire or other life safety emergency.

The Eastshore Freeway, running along the western edge of Berkeley, is one of the most heavily used and congested freeway sections in the state. Noted impacts have included increased rates of asthma, particularly among children. The proximity of Berkeley to this freeway and its location downwind from prevailing patterns negatively affects air quality, thus increasing the impact of wood smoke and NO_x emissions in Berkeley. NO_x emissions are released to the air from the exhaust of motor vehicles, as well as from combusting fuel gas for appliances. Accordingly, Berkeley's proximity to congested freeways contributes to the ambient NO_x levels in the air. Exposure to NO_x can irritate the eyes, nose, throat, and lungs, damage the respiratory system, and aggravate respiratory diseases, particularly asthma. NO_x also reacts with sunlight and other chemicals in the air to form both particulate matter and ozone, both of which are harmful when inhaled.

Berkeley's local climatic and topographical conditions exacerbate the health impacts of pollutants in the air, including NO_x. Part of the Pacific Coast Range, the Berkeley Hills, define the eastern boundary of the City and form a natural obstruction to the movement of humidified, cooler air out of the San Francisco Bay basin and the City of Berkeley into the dryer adjacent inland valleys and the interior of the State. Although these hills do not form an absolute air barrier, they do play a significant role in the creation of local microclimates. This effect is evidenced by the disparity in temperatures and relative humidity commonly experienced during periods of warm weather between communities adjacent to the San Francisco Bay / Pacific Ocean and communities in the Bay Area inland valleys only a few miles inland. This effect also contributes to trapping pollutants, including NO_x, in the colder and denser air, rather than allowing them to dissipate.

The City of Berkeley is part of a densely populated metropolitan area with limited space for landfills. It is important to preserve the limited landfill space for materials which cannot

be diverted and to keep land-clearing debris out of landfills, where decomposition of such organic material would result in methane.

b. Summary

Local topographical conditions include hillside housing with many narrow and winding streets with slide potential for blockage in the abruptly rising Berkeley hills. These conditions create an extremely serious problem for the Fire Department when a major fire or earthquake occurs. Many situations will result in limiting or total blockage of fire department emergency vehicular traffic, overtaxed fire department personnel and a total lack of resources for the suppression of fire in buildings and structures in the City of Berkeley. In addition, under these local conditions, the presence of wood smoke can cause increased disease, including asthma, and increased deaths from heart and lung disease. The built environment also provides little space for landfills.

B. REASONABLE NECESSITY

The proposed amendments to the California Green Building Standards Code are reasonably necessary due to the local conditions set forth above because they reduce the risks to life, public safety, health, welfare and property which result from the City's changing climate, atmospheric composition, its and location astride an active earthquake fault. They are further justified for the reasons set forth below.

In further amending the California Green Building Standards Code adopted as the Berkeley Green Code with local amendments, the City proposes to make certain substantive modifications whose effect is to impose more stringent requirements locally than are mandated by the California Building Standards Code. These are:

- (1) Provisions for Zero NO_x Emission Buildings to reduce indoor air pollution. (Berkeley Green Code Chapter 19.37 Section 19.37.040).

These more stringent local requirements are reasonably necessary to address risks created by local conditions set forth above for the following reasons:

- The provisions for Zero NO_x Emission Buildings made by Chapter 19.37 Section 19.37.040 will reduce known adverse human health impacts related to exposure to binary compounds of nitrogen and oxygen and will do so by requiring that all new buildings contain Zero NO_x appliances and mechanically ventilated kitchens.
- The provisions for Zero NO_x Zero Emission Buildings made by Chapter 19.37 will have the effect of reducing the emission of ozone, a greenhouse gas that contributes to climate change, because NO_x reacts in sunlight with other volatile organic compounds to create ozone, a powerful GHG with a Global Warming Potential (GWP) of 520.