



Proposed Ordinance: All-Electric Buildings for New Construction

Prepared by the San Francisco Department of Environment - June 30, 2020

Overview

In order to reduce health and safety risks endemic to natural gas and to help prevent irreversible damage from climate change, policymakers are proposing an ordinance that would prohibit the use of natural gas in newly constructed buildings in San Francisco. Natural gas, which is typically used to provide water and space heating, and for cooking and other uses, would be eliminated, in favor of all-electric new construction. This ordinance would apply to construction of all new buildings, both residential and non-residential, that apply for initial building permits after January 1, 2021. It does not impact existing buildings, additions, or alterations. The ordinance would allow for limited exceptions on a case-by-case basis when particular all-electric building systems are determined to be not feasible using currently available technology.

Rationale

The ordinance is designed to address the risks to health, safety, resilience, and equity posed by natural gas infrastructure, indoor combustion of natural gas, and climate change to San Francisco.

Health: Exposure to the pollutants produced from natural gas appliances can be detrimental to human health. Buildings that are constructed as all-electric eliminate both indoor and outdoor air pollution from burning natural gas. The combustion of natural gas emits a wide range of air pollutants, such as carbon monoxide (CO), nitrogen oxide (NOx), and particulate matter (PM) which have been linked to various acute and chronic health effects including asthma in children, respiratory illness, cardiovascular disease, and premature death.ⁱ

Safety: Reducing the reliance on the natural gas system improves resilience by reducing the fire risk and simplifying building systems and maintenance. Natural gas plumbing in buildings poses fire, explosion, and public safety risks. On average in the United States, a natural gas or oil pipeline catches fire every four days, results in an injury every five days, explodes every 11 days, and leads to a fatality every 26 days.ⁱⁱ For example, on February 6, 2019, a natural gas line explosion on Geary Street burned five buildings.ⁱⁱⁱ In 2010, the explosion of a natural gas pipeline in San Bruno resulted in eight fatalities and destroyed an entire neighborhood.^{iv}

Resilience: Natural Gas line ruptures caused half of the fires in San Francisco after the 1989 Loma Prieta earthquake, and even today, it is estimated that after a 7.9 earthquake it would take six months to restore natural gas services citywide, while electricity could be restored in less than a week.^v

Equity: For low-income communities and communities of color that spend a disproportionate amount of their income on energy, and who are more likely to suffer from asthma due to poor indoor air quality, zero emission homes are an important opportunity to deliver social equity benefits.

Climate Change: San Francisco has set greenhouse gas emissions reduction targets of 68% by 2030 and zero net emissions by 2050.^{vi} In conjunction with those goals, Mayor London Breed has committed to ensure new buildings in San Francisco will generate no operational emissions by no later than 2030. In 2018, the residential buildings sector, which accounted for 22% of the city's carbon footprint, had 88% of its emissions arise from the use of natural gas. At the same time, the commercial buildings sector, which accounted for an additional 22% of the city's carbon footprint, had 76% of its emissions arise from the use of natural gas.^{vii} Natural gas is a non-renewable combustible



fuel that is mostly comprised of methane, a greenhouse gas that is 86 times more potent than carbon dioxide.^{viii} The elimination of natural gas is a necessary component to achieve the City’s climate goals.^{ix}

Authority and Requirements

The authority for this ordinance will be established in San Francisco Building Code Section 106A.1.17. This ordinance requires the construction of all new buildings to be all-electric. Natural gas plumbing systems shall not be installed within any new building to serve any system or device for heating, cooling, water heating, cooking, or clothes drying. Furthermore, no permits that would alter, modify, or otherwise convert all-electric buildings into mixed-fuel buildings will be issued. Building Code Section 106A.1.17.1 is not an energy requirement; it is a provision enacted for protection of health and safety.

Applicability

The requirements of section 106A.1.17 of the San Francisco Building code shall apply to all applications for building permits for new construction in San Francisco submitted to San Francisco Department of Building Inspection (DBI) starting January 1, 2021. For projects that include areas specifically designated for occupancy by a commercial food service establishment, building permits may continue to be accepted until January 1, 2022 that provide gas plumbing exclusively for cooking equipment only.

Exceptions

The legislation allows for the DBI Director to modify requirements for an all-electric building in limited circumstances. Requirements can only be modified on a case by case basis, solely in the event a project sponsor demonstrates it is infeasible to build all-electric. The exception process requires a qualified professional to provide a third-party verification to confirm all-electric construction is infeasible for a specific area or system, and confirm the project is wired for future electrification. Any exception must be limited to the specific system or area of the project deemed to be infeasible using current available technology. When a new building receives an exception, the building is termed a “Mixed-Fuel Building”. Mixed Fuel Buildings are subject to additional energy efficiency requirements,^x electric-ready provisions, and required to provide equivalent protections in the design of the project for health and safety.

Impact

The San Francisco housing pipeline consists of development projects that would add residential units or commercial space. The housing pipeline includes only applications which have been formally submitted to the Planning Department or DBI. This new ordinance would only apply to projects that have not formally submitted building permit applications to DBI, including applications for site permits prior to January 1, 2021. Based on the housing pipeline data from 2019 Q2 (Table 1) – the new ordinance would apply to approximately 65% of the housing units in the pipeline and 75% of the commercial space.^{xi}

Table 1. Estimated Applicability of All Electric New Construction Requirement (Based on 2019 Q2 Pipeline Report)

Status of application	Would new ordinance apply?	Housing Units	Affordable Units	Square Footage of Commercial
Application Filed and Approve by Planning Department	Yes	54,203	10,868	31,942,514



Building Permit Application Filed with Department of Building Inspection	No	8,543	1,370	762,477
Lapsed Building Permit Application is "re-instated" by Department of Building Inspection	No	101	8	8,021
Building Permit Application Approved by Department of Building Inspection	No	1,886	75	97,849
Approved Building Permit Application Issued by Department of Building Inspection	No	7,477	1,540	2,633,351
Project is Under Construction	No	10,325	2,863	6,619,567
	Total	82,535	16,724	42,063,779

Cost Impacts

In many scenarios, notably most new home construction, electrification of space and water heating reduces the homeowner’s costs over the lifetime of the building, when compared with fossil fuel use. Three statewide cost-effectiveness studies were completed examining all-electric requirements for the 2019/2020 Building Energy Efficiency Standards.^{xii} While the studies provided a comprehensive analysis of building prototypes representative of new construction, some supplementary analysis was required by the San Francisco Department of Environment around existing PV requirements. The results are summarized in Table 2 below.

Table 1. Incremental costs and benefits normalized by building floor area (e.g., cost per square foot) for all-electric

Use	All Electric	
	Change in Construction Cost (\$/Sq Ft)	Lifetime Savings (\$/Sq Ft)
Single family	-\$5.01	\$3.62
Multifamily 3 floors or less	-\$1.18	\$4.64
Multifamily 4 - 8 floors	-\$0.13	\$0.68
Retail	-\$0.98	\$6.37
Office	-\$1.54	\$1.09

Negative numbers for the construction cost indicate a construction cost below baseline (prescriptively compliant mixed fuel). Positive values for lifetime savings indicate a financial benefit.



SF Environment

Our home. Our city. Our planet.

A Department of the City and County of San Francisco

Sources

i See for example:

UCLA Fielding School of Public Health (2020) Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California. coeh.ph.ucla.edu/effects-residential-gas-appliances-indoor-and-outdoor-air-quality-and-public-health-california

Lin, Brunekreef, Gehring (2013) Meta-analysis of the effects of indoor nitrogen dioxide and gas cooking on asthma and wheeze in children. academic.oup.com/ije/article/42/6/1724/737113, and

Nicole (2014) Cooking Up Indoor Air Pollution ehp.niehs.nih.gov/doi/pdf/10.1289/ehp.122-A27

ii Kelso (2018) “Pipeline Incidents Continue to Impact Residents” www.fractracker.org/2018/12/pipeline-incidents-impact-residents/

iii ABC 7 News (2019) NTSB releases preliminary report on gas line explosion in San Francisco. abc7news.com/ntsb-releases-preliminary-report-on-gas-line-explosion-in-san-francisco/5160531/

iv Wikipedia (2019) en.wikipedia.org/wiki/San_Bruno_pipeline_explosion

v San Francisco Lifelines Council (2014) “Lifelines Interdependency Study” sfgov.org/orr/sites/default/files/documents/Lifelines%20Council%20Interdependency%20Study.pdf

vi San Francisco Environment Code Chapter 9 (2008) <http://bit.ly/SFGHGLIMITS>

vii San Francisco Climate Dashboard (2020) sfenvironment.org/sf-climate-dashboard

viii San Francisco Department of Environment (2017) Methane Math: How cities can rethink emissions from natural gas” sfenvironment.org/sites/default/files/fliers/files/methane-math_natural-gas-report_final.pdf

ix San Francisco Department of Environment (2019) Focus 2030: A Pathway to Net Zero Emissions. sfenvironment.org/sites/default/files/fliers/files/sfe_focus_2030_report_july2019.pdf

x San Francisco Board of Supervisors File 190974 (2020) sfgov.legistar.com/LegislationDetail.aspx?ID=4148399&GUID=9BB45FCD-B034-41A1-9C8F-5E7BA14B278A

xi San Francisco Planning Department (2019) Pipeline Report. sfplanning.org/project/pipeline-report

xii See:

2019 Residential New Construction Cost-effective Study (released 8-1-2019)
localenergycodes.com/download/800/file_path/fieldList/2019%20Res%20NC%20Reach%20Codes and

2019 Nonresidential New Construction Cost-effective Study (released 8-1-2019)
localenergycodes.com/download/801/file_path/fieldList/2019%20NR%20NC%20Cost%20Effectiveness%20Study-2019-07-25.pdf and

2020 Residential Mid-Rise New Construction Cost-effective Study (not yet released)