

1 **[Requiring Rooftop Solar and Living Roofs on New Commercial and Residential Buildings]**

2 Ordinance amending the Planning Code Article 1.2 by establishing Section 149, amending the 2013 San  
3 Francisco Green Building Code, and establishing Environment Code Chapter 25 to require the installation  
4 of solar or living roofs in certain new construction in San Francisco; adopting environmental findings and  
5 findings required by California Health and Safety Code, California Public Resources Code, and Title 24  
6 of the California Code of Regulations; and directing the Clerk of the Board of Supervisors to forward this  
7 ordinance to the California Building Standards Commission upon final passage.

8 NOTE: **Unchanged Code text and uncodified text** [will be] in plain Arial font.

9 **Additions to Codes** are in *single-underline italics Times New Roman font*.

10 **Deletions to Codes** are in *strikethrough italics Times New Roman font*.

11 **Board amendment additions** are in double-underlined Arial font.

12 **Board amendment deletions** are in strikethrough Arial font.

13 **Asterisks (\* \* \* \*)** indicate the omission of unchanged Code subsections or parts of tables.

14  
15 Be it ordained by the People of the City and County of San Francisco:

16  
17 Section 1. Environmental Findings. [The Planning Department {HAS/HAS NOT} determined that the  
18 actions contemplated in this ordinance comply with the California Environmental Quality Act (California  
19 Public Resources Code Sections 21000 et seq.). Said determination is on file with the Clerk of the Board  
20 of Supervisors in File No. \_\_\_\_\_ and is incorporated herein by reference.]

21  
22 Section 2. General Findings.

23 A. The California Building Standards Code is contained in Title 24 of the California Code of  
24 Regulations, and consists of several parts that are based upon model codes with amendments  
25 made by various State agencies. The California Green Building Standards Code, also known  
26 as the CALGreen Code, is Part 11 of Title 24 of the California Code of Regulations, and San  
27 Francisco has enacted the San Francisco Green Building Code as amendments to the 2013  
28 California Green Building Standards Code.

29 B. Local jurisdictions are required to enforce the California Green Building Standards Code but  
30 they may also enact more stringent standards when reasonably necessary because of local  
31 conditions caused by climate, geology or topography.

32 C. The Building Inspection Commission, Planning Commission, and Commission on the  
33 Environment shall consider the applicable sections of this legislation at duly noticed public  
34 hearings.

1 Section 3. Findings regarding Local Conditions required by the California Health & Safety Code

2 A. California Health & Safety Code Section 17958.7 provides that before making any changes  
3 or modifications to the California Green Building Standards Code and any other applicable  
4 provisions published by the State Building Standards Commission, the governing body must  
5 make an express finding that each such change or modification is reasonably necessary  
6 because of specified local conditions, and the findings must be filed with the State Building  
7 Standards Commission before the local changes or modifications go into effect.

8 B. The Board of Supervisors expressly declares that the following amendments to the San  
9 Francisco Green Building Code are reasonably necessary because of local climatic,  
10 topological, and geological conditions as listed below.

- 11 1. As a coastal city located on the tip of a peninsula, San Francisco is vulnerable to sea level  
12 rise, and human activities releasing greenhouse gases into the atmosphere cause increases  
13 in worldwide average temperature, which contribute to melting of glaciers and thermal  
14 expansion of ocean water – resulting in rising sea levels.
- 15 2. San Francisco is already experiencing the repercussions of excessive CO<sub>2</sub> emissions as  
16 rising sea levels threaten the City’s shoreline and infrastructure, have caused significant  
17 erosion, increased impacts to infrastructure during extreme tides, and have caused the  
18 City to expend funds to modify the wastewater discharge system.
- 19 3. Some San Francisco populations are vulnerable to heat events.
- 20 4. Installing solar will help San Francisco meet its goals under Ordinance 81-08, to have a  
21 greenhouse gas-free electric system by 2030 and to reduce greenhouse gas emissions  
22 citywide to 40% below 1990 levels by 2025 and 80% by 2050.
- 23 5. Installing living roofs provide mitigation of urban heat islands, improve building  
24 insulation, and moderate temperature near ventilation intake vents, each contributing to  
25 reductions in building energy use and corresponding greenhouse gas emissions. Living  
26 roofs also reduce stormwater entering the sewer system, provide habitat supporting  
27 ecological systems, and enhance urban connections between humans and nature. Urban  
28 rooftop agriculture can reduce emissions from transporting food.
- 29 6. Living roofs and solar energy systems are compatible uses that can be combined on the  
30 same rooftop; the combination of the two systems can be complementary, improving the  
31 environmental benefits of each.
- 32 7. It is reasonably necessary to require building owners to take steps to reduce the energy  
33 consumed by inefficient building operations and produce renewable, low-carbon  
34 electricity; or capture solar heat; or develop living roofs in order to reduce the pollution  
35 and global warming effects of energy consumption.

1           8. Installing solar benefits the health, welfare and resiliency of San Francisco and its  
2           residents.

3           C. Requiring solar heating, solar photovoltaics, and living roofs at time of new construction is  
4           more cost-effective than installing the equipment after construction because workers are  
5           already on-site, permitting and administrative costs are lower, and it is more cost-effective to  
6           include such systems in existing construction financing .Based upon the findings of cost-  
7           effectiveness study performed on the more stringent local standards contained in the City’s  
8           proposed amendments to the 2013 San Francisco Green Building Code, the Board of  
9           Supervisors hereby determines that these local energy standards are cost effective and will  
10          save more energy than the standards contained in the 2013 California Green Building  
11          Standards (CALGreen) Code and the 2013 California Energy Standards (Title 24 Part 6). A  
12          copy of the cost-effectiveness study is on file with the Clerk of the Board of Supervisors in  
13          File No. \_\_\_\_\_.

14          Section 4. Severability. If any section, subsection, sentence, clause, or phrase of this ordinance is,  
15          for any reason, held to be unconstitutional, such decision shall not affect the validity of the  
16          remaining portions of this ordinance. The Board of Supervisors hereby declares that it would  
17          have passed this ordinance, and each section, subsection, sentence, clause, or phrase of this  
18          Ordinance, irrespective of the fact that any one or more sections, subsections, sentences, clauses,  
19          or phrases be declared unconstitutional.  
20  
21

1 **San Francisco Planning Code**

2 Article 1.2 of the San Francisco Planning Code is amended, as follows:

3 Section 149

4 (a) Purpose. The purpose of this section is to establish requirements for certain new building  
5 construction which will increase the utility of rooftops by ensuring development of renewable  
6 energy resources and living roofs.

7 (b) Definitions.

8 **BETTER ROOF PROJECT PLAN** is a plan for compliance with this Section, for  
9 installation of of solar photovoltaic systems, solar thermal systems, and/or living roof.

10 **COMPLIANCE SOFTWARE** is software that has been approved pursuant to Section  
11 10-109 of Part 1 of Title 24 of the California Code of Regulations, to demonstrate  
12 compliance with the performance approach of Part 6.

13 **NONRESIDENTIAL COMPLIANCE MANUAL** is the manual developed by the  
14 Commission, under Section  
15 25402.1(e) of the Public Resources Code, to aid designers, builders, and contractors in  
16 meeting the energy efficiency requirements for nonresidential, high-rise residential, and  
17 hotel/motel buildings.

18 **RESIDENTIAL COMPLIANCE MANUAL** is the manual developed by the  
19 Commission, under Section 25402.1 of the Public Resources Code, to aid designers,  
20 builders, and contractors in meeting Energy Efficiency Standards for low-rise residential  
21 buildings.

22 **LIVING ROOF.** Living roof is the area occupied by media for growing plants, as well as  
23 the set of related components installed exterior to the facility's roofing membrane. This  
24 includes both 'roof gardens' and 'landscaped roofs' as referred to in the California  
25 Building Code.

26 **ROOF** is the outside cover of a building or structure including the structural supports,  
27 decking, and top layer that is exposed to the outside with a slope less than 60 degrees  
28 from the horizontal.

29 **ROOF, LOW-SLOPED** is a roof that has a ratio of rise to run of 2:12 or less (9.5  
30 degrees from the horizontal).

31 **ROOF, STEEP-SLOPED** is a roof that has a ratio of rise to run of greater than 2:12 (9.5  
32 degrees from the horizontal).

33 **SITE SOLAR ENERGY** is thermal, chemical, or electrical energy derived from direct  
34 conversion of incident solar radiation at the building site.

1 **SOLAR SAVINGS FRACTION (SSF)** is the fraction of domestic hot water demand  
2 provided by a solar water heating system.

3 **SOLAR READY ZONE** is a section of the roof designated and reserved for the future  
4 installation of a solar electric or solar thermal system which is required in new  
5 construction by California Title 24 Part 6 Energy Standards, Section 110.10.

6 **SOLAR READY AREA** is the minimum area of Solar Zone required by California Title  
7 24 Part 6 Energy Standards Section 110.10, without applying any exception allowed  
8 therein.

9 (c) Better Roof Project Guidelines.

10 The Planning Department, in consultation with Environment, shall prepare and maintain  
11 Better Roof Project Guidelines detailing method(s) to calculate the area of each subject  
12 building that is subject to Better Roof requirements, along with supporting or explanatory  
13 information as appropriate. In order to assure ability to comply by the effective date of  
14 this Section, the Director may issue a bulletin or other interim guidance as needed.

15 (d) Applicability.

16 Requirements described within this Section apply to:

- 17 a. **Single Family Residences.** Newly constructed single family residences.  
18 b. **Low-rise Multi-family Buildings.** Newly constructed multi-family buildings with 3  
19 or fewer habitable floors,  
20 c. **Hotel/Motel Occupancies and High-rise Multi-family Buildings.** Newly  
21 constructed hotel/motel facilities and high-rise multi-family buildings with ten  
22 habitable stories or fewer,  
23 d. **All Other Nonresidential Buildings.** All other newly constructed nonresidential  
24 buildings with ten habitable stories or fewer.

25 (e) Solar Ready Zone. Per the California Energy Standards, the Solar Ready Zone “is an allocated  
26 space that is unshaded, un-penetrated, and free of obstructions. It serves as a suitable place that  
27 solar panels can be installed at a future date.”

28  
29 “For single family residences the solar zone shall be located on the roof or overhang of the  
30 building.

31  
32 “For low-rise multifamily buildings the solar zone can be located at any of the following  
33 locations:

- Roof of building
- Overhang of the building
- Roof and overhang of another structure located within 250 feet (75 meters) of the primary building
- Covered parking installed with the building project
- Other structures include, but are not limited to, trellises, arbors, patio covers, carports, gazebos, and similar accessory structures.

“The solar zone design must comply with the access, pathway, smoke ventilation, and spacing requirements as specified in Title 24, Part 9”, as well as any applicable local requirements.

(f) Requirements.

**Minimum Better Roof Area.**

At a minimum, the project shall allocate an area for Better Roof uses equal to the minimum Solar Zone Area specified in California Energy Standards. To calculate minimum Solar Ready Area:

- (1) The exceptions in Section 110.10 of the California Energy Standards may not be applied.
- (2) Utilize the methods in the California Energy Commission’s Residential Compliance Manual and Nonresidential Compliance Manual, as applicable. (E.g. Residential projects designed with 3 or fewer occupied floors use CEC-CF1R-SRA-01-E. All non-residential projects and residential projects designed for 4 or more occupied floors use CEC-NRCC-SRC-02.E, or subsequent versions.)

Applicant shall develop a Better Roof Project Plan such that the combination of the following is equivalent to the Minimum Better Roof Area

- (1) Area of solar photovoltaic collectors, where such collectors meet the functional requirements of the California New Solar Homes Partnership or non-residential equivalent.
- (2) Area of solar thermal collectors, where such collectors meet CEC performance criteria
- (3) Area of living roof, where four (4) square feet of living roof are equivalent to (1) one square foot of solar collector.

**Shading.**

1 (1) New Project. The subject building: (Title 24 Section 110.10(b)(3))

2 a. Shall not locate obstructions within the solar zone, including but not limited  
3 to vents, chimneys, architectural features, and roof mounted equipment.

4 b. Any obstruction, located on the roof or any other part of the building that  
5 projects above a solar zone shall be located at least twice the distance,  
6 measured in the horizontal plane, of the height difference between the  
7 highest point of the obstruction and the horizontal projection of the nearest  
8 point of the solar zone, measured in the vertical plane.

9 **EXCEPTION:** Such objects may be located on the roof or any other part  
10 of the building, provided the object is oriented north of all points on the  
11 solar zone.

12 (i) **Existing Buildings**

13 (ii) **Allowable Future Development**

14  
15 (g) Exceptions. Exceptions to these requirements may be granted at the discretion of the Director  
16 in cases of infeasibility or conflict with area plans. However, in such cases, Title 24 Part 6  
17 Section 110.10 may remain applicable, as determined by the Director of the Department of  
18 Building Inspection.

19 (h) Reporting. Collaborate with the commissions on Environment, Building, and Public Utilities,  
20 prepare and publish an annual report on the renewable energy and living roof resources  
21 developed in compliance with this chapter, and their impacts.

# San Francisco Green Building Code

The San Francisco Green Building Code is amended as follows:

Chapter 2. Definitions

[Definitions in black are copied without modification from CA Title 24 Part 6 (2013) Energy Standards.]

***BETTER ROOF PROJECT PLAN*** is a plan for compliance with Planning Code Section Article 1.2, 149, for installation of solar photovoltaic systems, solar thermal systems, and/or living roof.

**COMPLIANCE SOFTWARE** is software that has been approved pursuant to Section 10-109 of Part 1 of Title 24 of the California Code of Regulations, to demonstrate compliance with the performance approach of Part 6.

**NONRESIDENTIAL COMPLIANCE MANUAL** is the manual developed by the Commission, under Section 25402.1(e) of the Public Resources Code, to aid designers, builders, and contractors in meeting the energy efficiency requirements for nonresidential, high-rise residential, and hotel/motel buildings.

**RESIDENTIAL COMPLIANCE MANUAL** is the manual developed by the Commission, under Section 25402.1 of the Public Resources Code, to aid designers, builders, and contractors in meeting Energy Efficiency Standards for low-rise residential buildings.

***LIVING ROOF***. *Living roof is the area occupied by media for growing plants, as well as the set of related components installed exterior to the facility's roofing membrane. This includes both 'roof gardens' and 'landscaped roofs' as referred to in the California Building Code.*

**ROOF** is the outside cover of a building or structure including the structural supports, decking, and top layer that is exposed to the outside with a slope less than 60 degrees from the horizontal.

**ROOF, LOW-SLOPED** is a roof that has a ratio of rise to run of 2:12 or less (9.5 degrees from the horizontal).

**ROOF, STEEP-SLOPED** is a roof that has a ratio of rise to run of greater than 2:12 (9.5 degrees from the horizontal).

**SITE SOLAR ENERGY** is thermal, chemical, or electrical energy derived from direct conversion of incident solar radiation at the building site.

**SOLAR SAVINGS FRACTION (SSF)** is the fraction of domestic hot water demand provided by a solar water heating system.

**SOLAR *READY* ZONE** is a section of the roof designated and reserved for the future installation of a solar electric or solar thermal system.



Chapter 4, Division 4.2, Energy ~~Efficiency~~

**4.201.1 Energy Performance. [Reserved] Effective January 1, 2016, new construction projects shall:**

(a) Calculate the required Solar Ready Zone for the project per California Title 24 Part 6 Section 110.10 (a) through (e), as applicable, and the Residential Compliance Manual Section 7.

(b) Prepare a Better Roof Project Plan compliant with Planning Code Section 149, as determined by the San Francisco Planning Department.

(c) Install the combination of solar photovoltaic system, solar thermal system, and/or living roof systems specified in the Better Roof Project Plan equal in area to the Solar Ready Zone, and in accord with applicable California Fire Code, Electrical Code, and Building Code requirements.

Chapter 5, Division 5.2, Energy ~~Efficiency~~

~~**5.103.1.5 Renewable energy.** Effective January 1, 2012, permit applicants must submit documentation verifying either:~~

~~—(1) Acquisition of renewable on-site energy or purchase of green energy credits in accord with LEED EA2 or EA6, OR~~

~~—(2) Achieve a 10% compliance margin over Title 24 Part 6 2013 California Energy Standards.~~

~~**5.103.2.3 Renewable energy.** Effective January 1, 2012, permit applicants must submit documentation verifying that either:~~

~~—(1) Acquisition of renewable on-site energy or purchase of green energy credits in accord with LEED EA2 or EA6, OR~~

~~—(2) In addition to meeting 5.103.2.5 Energy Performance requirement, achieve an additional 10% compliance margin over Title 24 Part 6 (2013) California Energy Standards.~~

**5.201.1.1 Energy performance. [Reserved] Effective January 1, 2016, new construction projects shall:**

(a) Calculate the required Solar Ready Zone for the project per California Title 24 Part 6 Section 110.10 (a) through (e), as applicable, and the Residential Compliance Manual Section 7.

(b) Prepare a Better Roof Project Plan compliant with Planning Code Section 149, as determined by the San Francisco Planning Department.

1 (c) Install the combination of solar photovoltaic system, solar thermal system, and/or  
2 living roof systems specified in the Better Roof Project Plan equal in area to the Solar  
3 Ready Zone, and in accord with applicable California Fire Code, Electrical Code, and  
4 Building Code requirements.

5  
6 Notwithstanding Section 301 of this Chapter, a Better Roof compliance plan determined  
7 by the San Francisco Planning Department may be applicable to a new building of any  
8 occupancy.

## 11 San Francisco Environment Code

12 Chapter 7 of the San Francisco Environment Code is amended, as follows:

13 Section 706(a)

14 (4) **Renewable Energy.** The LEED Project Administrator shall confer with SFPUC on  
15 renewable energy opportunities for municipal construction projects, including photovoltaics, solar  
16 hot water and wind power. Space allocation and infrastructure for future renewable energy  
17 installations shall be included in municipal construction projects, as advised by SFPUC, including  
18 but not limited to structural capacity, wiring conduits, supply and return piping, and control  
19 wiring. The LEED Project Administrator shall submit documentation verifying that ~~either:~~

20 (A) *The project meets LEED prerequisite EA 1 Energy Performance requirement*  
21 *and demonstrates compliance with Title 24 Part 6 California Energy Standards in effect at*  
22 *the time of permit application, AND*

23 (B) *The project includes a combination of photovoltaic, solar thermal, and/or living*  
24 *roof area meeting Planning Code Article 1.2 Section 149 and San Francisco Green*  
25 *Building Code Chapter 5 Division 5.2, or demonstrates applicability of exceptions therein.*

26 ~~At least 1 percent of the building's energy costs are offset by on-site renewable energy~~  
27 ~~generation, achieving LEED credit EA 2, including any combination of: photovoltaic,~~  
28 ~~solar thermal, wind, biofuel-based electrical systems, geothermal heating, geothermal~~  
29 ~~electric, wave, tidal, or low impact hydroelectric systems, or as specified in Section~~  
30 ~~25741 of the California Public Resources Code; or,~~

31 ~~(B) In addition to meeting LEED prerequisite EA 1 Energy Performance~~  
32 ~~requirement, achieve an additional 10 percent compliance margin over Title 24, Part 6,~~  
33 ~~2008 California Energy Standards, for a total compliance margin of at least 25 percent.~~

1 Chapter 25 of the San Francisco Environment Code is established, as follows:

2 Section 2500. Findings and Purpose.

3 Purpose. The purpose of this Chapter is to aid in establishment and support improvement of  
4 requirements for the new building construction which will increase the utility of rooftops by  
5 ensuring development of renewable energy resources and living roofs.

6 [Include selected findings from ordinance.]

7  
8 Section 2501. Definitions

9  
10 Sec. 2502. Duties of the Department of the Environment

- 11 1) Define and maintain technical details for system performance and components, where not  
12 otherwise specified in California or San Francisco codes.  
13 2) Recommend revisions to San Francisco's Better Roof requirements based on project data and  
14 other new information, in order to support the City's goals for greenhouse gas emissions  
15 reduction, environmental justice, provision of renewable energy, development of Zero Net  
16 Energy Buildings, biodiversity, and pollution prevention.