BOARD of SUPERVISORS

City Hall
1 Dr. Carlton B. Goodlett Place
Room 244
San Francisco, CA 94102-4689
Tel. No. 554-5184
Fax No. 554-5163
TDD/TTY No. 544-5227

November 19, 2013

SENT CERTIFIED MAIL (Return Receipt Requested)

California Energy Commission
Media and Public Communications Office
1516 Ninth Street, MS-29
Sacramento, CA 95814-5512

SUBJECT: Transmittal of San Francisco Building Code Amendment

To Whom It May Concern:

Pursuant to California Health & Safety Code Section 17958.7, enclosed please find a certified copy of the following legislation, which was finally passed by the Board of Supervisors of the City and County of San Francisco on November 5, 2013 and approved by the Mayor on November 14, 2013:

- **Ordinance No. 259-13 (File No. 130841)** – Ordinance enacting a 2013 San Francisco Green Building Code consisting of the 2013 California Green Building Standards Code, as amended by San Francisco; adopting environmental findings and findings required by the California Health and Safety Code, California Public Resources Code, and Title 24 of the California Code of Regulations; providing for an operative date of January 1, 2014; and directing the Clerk of the Board to forward the legislation to the State Building Standards Commission as required by State law.

If you have any questions or require additional information, please call (415) 554-4442 or email andrea.ausberry@sfgov.org.

Sincerely,

Angela Calvillo, Clerk of the Board

City and County of San Francisco

Certified Copy

Ordinance

City Hall
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4689

130841 **[Green Building Code - Enactment of New Code]**

Ordinance enacting a 2013 San Francisco Green Building Code consisting of the 2013 California Green Building Standards Code, as amended by San Francisco; adopting environmental findings and findings required by the California Health and Safety Code, California Public Resources Code, and Title 24 of the California Code of Regulations; providing for an operative date of January 1, 2014; and directing the Clerk of the Board to forward the legislation to the State Building Standards Commission, as required by State law. (Building Inspection Commission)

10/29/2013 Board of Supervisors - PASSED, ON FIRST READING

Ayes: 11 - Avalos, Breed, Campos, Chiu, Cohen, Farrell, Kim, Mar, Tang, Wiener and Yee

11/5/2013 Board of Supervisors - FINALLY PASSED

Ayes: 11 - Avalos, Breed, Campos, Chiu, Cohen, Farrell, Kim, Mar, Tang, Wiener and Yee

11/14/2013 Mayor - APPROVED

STATE OF CALIFORNIA
CITY AND COUNTY OF SAN FRANCISCO

CLERK'S CERTIFICATE

I do hereby certify that the foregoing Ordinance is a full, true, and correct copy of the original thereof on file in this office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the offical seal of the City and County of San Francisco.

November 19, 2013
Date

Angela Calvillo
Clerk of the Board

[Green Building Code - Enactment of New Code]

Ordinance enacting a 2013 San Francisco Green Building Code consisting of the 2013 California Green Building Standards Code, as amended by San Francisco; adopting environmental findings and findings required by the California Health and Safety Code, California Public Resources Code, and Title 24 of the California Code of Regulations; providing for an operative date of January 1, 2014; and directing the Clerk of the Board to forward the legislation to the State Building Standards Commission as required by State law.

NOTE: **Unchanged Code text and uncodified text** are in plain Arial font.
Additions to Codes are in *single-underline italics Times New Roman font*.
Deletions to Codes are in ~~*strikethrough italics Times New Roman font*~~.
Board amendment additions are in double-underlined Arial font.
Board amendment deletions are in ~~strikethrough Arial font~~.
Asterisks (* * * *) indicate the omission of unchanged Code subsections or parts of tables.

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

Section 1. Environmental Findings. The Planning Department has determined that the actions contemplated in this ordinance comply with the California Environmental Quality Act (California Public Resources Code Sections 21000 et seq.). Said determination is on file with the Clerk of the Board of Supervisors in File No. 130841 and is incorporated herein by reference.

Section 2. General Findings.

A. The State of California adopts a new California Building Standards Code every three years that goes into effect throughout the State 180 days after publication. The California Building Standards Code is contained in Title 24 of the California Code of

Regulations, and consists of several parts that are based upon model codes with amendments made by various State agencies. The California Green Building Standards Code, also known as the CALGreen Code, is Part 11 of Title 24 of the California Code of Regulations. The 2013 California Green Building Standards Code will go into effect throughout California on January 1, 2014.

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

C. When California first adopted green building standards in the 2010 Code adoption cycle, San Francisco already had existing green building requirements that were codified as Chapter 13C of the San Francisco Building Code. These local requirements were retained as amendments to the 2010 California Building Code. In this Code cycle, San Francisco's green building requirements will be repealed from the San Francisco Building Code and re-enacted into a new San Francisco Green Building Code as amendments to the 2013 California Green Building Standards Code.

D. On August 21, 2013, at a duly noticed public hearing, the Building Inspection Commission considered this legislation.

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

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

B. The City and County of San Francisco is unique among California communities with respect to local climatic, geological, topographical, and other conditions. A specific list of findings that support San Francisco's modifications to the 2013 California Green Building Standards Code and a section-by-section correlation of each modification with a specific numbered finding are contained in Exhibit A entitled "Standard Findings for San Francisco Amendments," on file with the Clerk of the Board of Supervisors in File No. 130841, which is hereby declared to be part of this ordinance as if set forth fully therein.

C. Pursuant to California Health and Safety Code Section 17958.7, the Board of Supervisors finds and determines that the local conditions described in Exhibit A constitute a general summary of the most significant local conditions giving rise to the need for modification of the 2013 California Green Building Standards Code provisions published by the State Building Standards Commission. The Board of Supervisors further finds and determines that the proposed modifications are reasonably necessary based upon the local conditions set forth in Exhibit A.

Section 4. Findings required by the California Public Resources Code and Title 24 of the California Code of Regulations.

A. Public Resources Code Section 25402.1(h)(2) and Section 10-106 of the California Code of Regulations, Title 24, Part 1, Locally Adopted Energy Standards, authorize a local jurisdiction to adopt and enforce more stringent local energy standards, provided that the local jurisdiction makes a determination that the local standards are cost effective and will save more energy than the current Statewide standards and provided further that the local jurisdiction files an application for approval with the California Energy Commission together with documentation supporting the cost-effectiveness determination. These local energy standards may take effect only after the California Energy Commission has reviewed and formally approved them.

B. Based upon the findings of a cost-effectiveness study performed on the more stringent local standards contained in the City's proposed 2013 San Francisco Green Building Code, the Board of Supervisors hereby determines that these local energy standards are cost effective and will save more energy than the standards contained in the 2013 California Green Building Standards (CALGreen) Code. A copy of the cost-effectiveness study is on file with the Clerk of the Board of Supervisors in File No. 130841.

Section 5. The 2013 San Francisco Green Building Code is hereby enacted. The Green Building Code being enacted consists of the 2013 California Green Building Standards Code as amended by the San Francisco amendments. A copy of the 2013 California Green Building Standards Code, together with the San Francisco amendments, is on file with the Clerk of the Board of Supervisors in File No. 130941 all of which is hereby declared to be part of this ordinance as if set forth fully therein. Additions to the 2013 California Green Building Standards Code are shown in bold underlined type; deletions are shown with strikethrough.

Section 6. Continuance of Actions Under Prior Code. Nothing contained in this ordinance shall be construed as abating any action now pending under or by virtue of any ordinance of the City and County of San Francisco hereby repealed, nor shall this ordinance be construed as discontinuing, abating, modifying or altering any penalties accruing, or to accrue, or as waiving any right of the City under any such ordinance.

Section 7. Severability. If any section, subsection, sentence, clause, or phrase of this ordinance is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The Board of Supervisors hereby declares that it would have passed this ordinance, and each section, subsection, sentence, clause, or phrase of this Ordinance, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared unconstitutional.

Section 8. Effective and Operative Dates. This ordinance shall become effective 30 days after enactment. Enactment occurs when the Mayor signs the ordinance, the Mayor returns the ordinance unsigned or does not sign the ordinance within ten days of receiving it, or the Board of Supervisors overrides the Mayor's veto of the ordinance. This ordinance shall take effect and be in full force on and after either January 1, 2014 or its effective date if the effective date is later.

Section 9. Directions to Clerk. Upon final passage of this ordinance, the Clerk of the Board of Supervisors is hereby directed to transmit this ordinance with the Exhibit A attachment and the San Francisco modifications to the 2013 California Green Building Standards Code to the State Building Standards Commission pursuant to the applicable provisions of State law.

APPROVED AS TO FORM:
DENNIS J. HERRERA, City Attorney

By: Judith A. Boyajian
JUDITH A. BOYAJIAN
Deputy City Attorney

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City and County of San Francisco
Tails
Ordinance

City Hall
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4689

File Number: 130841 **Date Passed:** November 05, 2013

Ordinance enacting a 2013 San Francisco Green Building Code consisting of the 2013 California Green Building Standards Code, as amended by San Francisco; adopting environmental findings and findings required by the California Health and Safety Code, California Public Resources Code, and Title 24 of the California Code of Regulations; providing for an operative date of January 1, 2014; and directing the Clerk of the Board to forward the legislation to the State Building Standards Commission, as required by State law.

October 21, 2013 Land Use and Economic Development Committee - RECOMMENDED

October 29, 2013 Board of Supervisors - PASSED, ON FIRST READING

Ayes: 11 - Avalos, Breed, Campos, Chiu, Cohen, Farrell, Kim, Mar, Tang, Wiener and Yee

November 05, 2013 Board of Supervisors - FINALLY PASSED

Ayes: 11 - Avalos, Breed, Campos, Chiu, Cohen, Farrell, Kim, Mar, Tang, Wiener and Yee

File No. 130841

I hereby certify that the foregoing Ordinance was FINALLY PASSED on 11/5/2013 by the Board of Supervisors of the City and County of San Francisco.

Angela Calvillo
Clerk of the Board

Edwin M. Lee
Mayor

11/14/2013
Date Approved

EXHIBIT A

STANDARD FINDINGS FOR SAN FRANCISCO BUILDING STANDARDS CODE AMENDMENTS:

1. Certain buildings/occupancies in San Francisco are at increased risk for earthquake-induced failure and consequent fire due to local hazardous microzones, slide areas, and local liquefaction hazards. (Geology)

2. Certain buildings/occupancies in San Francisco are at increased risk of fire due to high density of buildings on very small lots, with many buildings built up to the property lines. (Topography)

3. Topography of San Francisco has let to development of a high density of buildings on small lots, necessitating special provisions for exiting, fire separation, or fire-resistive construction. (Topography)

4. Many buildings are built on steep hills and narrow streets, requiring special safety consideration. (Topography)

5. Additional fire, structural and other protection is required due to high building density and crowded occupancy. (Topography)

6. San Francisco has narrow, crowded sidewalks due to building and population density and unusual topography. (Topography)

7. All rain water in San Francisco drains to the building drains and sewer; unusual geology, occasional extremely high local rainfall amounts, and the configuration of the City as a peninsula restrict the installation of separate storm water and sewer systems. (Topography, Climate, Geology)

8. Moist, corrosive atmosphere of salt-laden fog in San Francisco necessitates additional requirements. (Climate)

9. Not a building standard; no local findings required.

10. Soil conditions in this region induce adverse reactions with some materials, leading to premature failures and subsequent unsanitary conditions. (Climate)

11. The region is subject to fluctuating rainfall due to changes in climatic conditions. (Climate)

12. San Francisco is a peninsula surrounded on three sides by water at sea level;

mitigation of climate change impacts, including sea level rise, is critical to the long term protection of the local built environment and local infrastructure. (Topography)

13. Climate and potential climate change impacts San Francisco's water resources, including reservoirs and distribution facilities. (Climate)

14. Organic material in San Francisco's waste breaks down into methane gas which is a significant contributor to climate change. (Climate)

15. San Francisco is topographically constrained and its built environment occupies most available land, requiring minimization of debris and solid waste. (Topography)

16. Prevailing winds, coastal mountain ranges, and periodic seasonal high temperatures contribute to photochemical reactions that produce smog and ozone; limiting the emission of smog's chemical precursors - volatile organic chemicals and oxides of nitrogen - is necessary to health and safety. (Climate, Topography)

17. The aquifers underlying San Francisco are small relative to local population, necessitating ongoing water imports and special provisions to ensure efficient use of water in local buildings. (Geology)

2013 San Francisco Green Building Code Findings

Section #	Finding #	Section #	Finding #	Section #	Finding #

CHAPTER 1

Section #	Finding #	Section #	Finding#	Section #	Finding #
101.1	9	101.4	9	101.10	9
101.2	9	101.6.1	9	101.11	9
101.3	9	101.6.3	9		
101.3.1	9	101.7	9		

CHAPTER 2

Section #	Finding #	Section #	Finding #	Section #	Finding #
202	9				

CHAPTER 3

Section #	Finding #	Section #	Finding #	Section #	Finding #
301.1	9	304.1.1	9	306.1	9
302.1	9	305.1	9	306.1.1	9
303.1.1.1	9	305.1.1	9		
304.1	9	305.1.2	9		

CHAPTER 4

Section #	Finding #	Section #	Finding #	Section #	Finding #
4.101.1	9	4.103.2.3	14,15	TABLE 4.104.A	12,14,15
4.103.1	9	4.103.2.4	7,11	4.105	9
4.103.1.1	5,7,11,12,13, 14,15,16,17	4.103.2.4.1	7,11	4.105.1	12,14,15
4.103.1.2	7,11	4.103.3	9	4.105.1.1	12,14,15
4.103.2	9	4.103.3.1	5,7,11,12,13, 14,15,16,17	4.105.1.2	12,14,15
4.103.2.1	5,7,11,12,13, 14,15,16,17	4.103.3.2	4,5,17	4.201.1	9
4.103.2.2	11,13,17	4.104.1	12,14,15		

CHAPTER 5

Section #	Finding #	Section #	Finding #	Section #	Finding #
5.101	9	5.103.1.9	5,8,14,15,16	5.103.4.1	5,7,11,12,13, 14,15,16,17
5.103.1	9	5.103.1.10	9	5.103.4.2	5,8,14,15,16
5.103.1.1	5, 7,11,12,13, 14,15,16,17	5.103.2	9	5.104.1	14,15
5.103.1.2	11,13,17	5.103.2.2	14,15	Table 5.104.A	14,15
5.103.1.3	14,15	5.103.2.3	12	5.105.1	14,15
5.103.1.4	12	5.103.2.5	9	5.105.1.1	14,15

5.103.1.5	12	5.103.3	9	5.105.1.2	14,15
5.103.1.6	7,11	5.103.3.1	5,7,11,12,13, 14,15,16,17	5.201.1	9
5.103.1.7	9	5.103.3.2	5,8,14,15,16		
5.103.1.8	5,8,14,15,16	5.103.4	9		

CHAPTER 6
NO S.F. AMENDMENTS

CHAPTER 7

Section #	Finding #	Section #	Finding #	Section #	Finding #
701	9	702.3	5	7.703.1	9
702.2	9				

PROPOSED SAN FRANCISCO GREEN BUILDING CODE AMENDMENTS 2013 Edition

Chapter 1
GENERAL

SECTION 101 – GENERAL

Revise this section as follows:

101.1 Title. These regulations shall be known as the ~~California~~ **San Francisco** Green Building ~~Standards~~ Code and may be cited as such and will be referred to herein as "this code". ~~It is intended that it shall also be known as the CALGreen Code.~~ The ~~California~~ **San Francisco** Green Building ~~Standards~~ Code consists **of the combination of** ~~is~~ Part 11 ~~of twelve parts~~ of the official compilation and publication of the adoption, amendment and repeal of building regulations to the California Code of Regulations, Title 24, **and Chapter 13C of San Francisco Building Inspection Commission Amendments to** ~~as~~ the California Building Standards Code.

Revise this section as follows:

101.2 Purpose. The purpose of this ~~code~~ **chapter** is to ~~improve public~~ **promote the** health, safety and ~~general~~ welfare **of San Francisco residents, workers, and visitors** by **minimizing waste of energy, water, and other resources in the construction and operation of buildings in the City and County of San Francisco and by providing a healthy indoor environment. The green building practices required by this chapter will also further the goal of reducing the greenhouse gas emissions in the City and County of San Francisco to 25 percent below 1990 levels by the year 2017, as stated in Board of Supervisors Resolution No. 158-02 and San Francisco Environment Code Chapter 9.** ~~enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact, or positive environmental impact~~ and ~~encouraging sustainable construction practices in the following categories:~~

~~1. Planning and design.~~
~~2. Energy efficiency.~~
~~3. Water efficiency and conservation.~~
~~4. Material conservation and resource efficiency.~~
~~5. Environmental quality.~~

Revise this section as follows:

101.3 Scope. The provisions of this code shall apply to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure, unless otherwise indicated in this code, **as well as alterations to existing buildings** throughout the ~~State of California.~~ **the City and County of San Francisco**.

~~It is not the intent that~~ **While** this code ~~substitute or be identified as meeting~~ **references green building programs,** the **City and County of San Francisco does not confer** certification ~~requirements of~~ **under** any green building program.

Revise this section as follows:

101.3.1 ~~State-regulated~~ **Regulated** buildings, structures and applications. Provisions of this code shall apply to the following buildings, structures, and applications regulated by state agencies as specified in Sections 103 through 106 of California Green Building Standards Code Title 24 Part 11, ~~except where~~ modified by local ordinance **with supplemental requirements applicable to occupancy types A, B, I, M, and R as defined by California Building Code Title 24 Section 302 (2013) as amended** pursuant to Section 101.7. When adopted by a state agency, the provisions of this code shall be enforced by the appropriate enforcing agency, but only to the extent of authority granted to such agency by statute.

Revise this section as follows:

101.4 Appendices. ~~Provisions contained in the appendices of this code are not mandatory unless specifically adopted by a State agency or adopted by a city, county, or city and county in compliance with Health and Safety Code Sections 18930 and 18941.5, respectively, for Building Standards Law; Health and Safety Code Section 17950 for State Housing Law; and Health and Safety Code Section 13869.7 for Fire Protection Districts. See Section 101.7 of this code.~~ **[Reserved]**

Revise this section as follows:

101.6.1 Differences. In the event of any differences between these building standards and the standard reference documents, the text of ~~these building standards~~ **this Chapter** shall govern. ~~In the event a local amendment to this code results in differences between these building standards and the amendment, the text of the amendment shall govern.~~

Revise this section as follows:

101.6.3 Conflicts. When the requirements of this code conflict with the requirements of any other part of the California Building Standards Code, Title 24, ~~the most restrictive requirement shall prevail.~~ **any provision contained elsewhere in the San Francisco Municipal Code, or any regulation or requirement adopted by the Public Utilities Commission or other City agency under its Charter authority, the most restrictive requirement shall prevail.**

Revise this section as follows:

101.7 City~~, county, or city~~ and county amendments, additions ~~or~~ and deletions. ~~This code is intended to set mandatory minimum Green Building Standards and includes optional tiers that may, at the discretion of any city, county or city and county, be applied.~~ **This code includes the amendments, deletions, and additions to California green building requirements which maintain stricter local green building standards.**

Revise this section as follows:

101.10 ~~Mandatory requirements. This code contains both mandatory and voluntary green building measures. Mandatory and voluntary measures are identified in the appropriate application checklist contained in this code.~~ **Equivalency. Wherever reference is made to the LEED® or GreenPoint Rated systems, a comparable equivalent rating system may be used if approved by the Director. The applicable LEED®, GreenPoint Rated or equivalent versions of performance standards for applications subject to this chapter are:**

LEED® for Green Interior Design and Construction v2009
LEED® for Building Design and Construction v2009
LEED® for Homes v2008
GreenPoint Rated (GPR) Single Family New Home Construction – v6
GreenPoint Rated (GPR) Multifamily New Home Construction – v6
GreenPoint Rated (GPR) Existing Multifamily – v6

Wherever specific LEED® prerequisites or credits are cited, such references are to LEED® BD&C 2009. More recent LEED® and GreenPoint Rated versions may be used, provided the credits and points achieved are as or at least as stringent as LEED® BD&C 2009 or GPR v6.

Wherever the LEED® or GreenPoint Rated systems include a minimum energy or other performance requirement, the permit applicant may choose to meet the minimum performance requirements with an alternative equivalent method approved by the Director.

Compliance with any of these requirements may be verified and/or certified by any means, including third-party review, as approved by the Director.

Revise this section as follows:

101.11 Effective use of this code. The following steps may be used to establish which provisions of this code are applicable to a specific occupancy:

1. Establish the type of occupancy.
~~2. Verify which state agency has authority for the established occupancy by reviewing the authorities list in Sections103 through 106.~~
2.~~3. Once the appropriate agency has been identified, find~~ **Find** the section which covers the established occupancy.
3.~~4. The Matrix Adoption Tables at the beginning of Chapters 4 and 5 i~~ **Identify** ~~the mandatory green building measures necessary to meet~~ the minimum requirements of this code for the established occupancy **in Sections 4 and 5**.
~~5. Voluntary tier measures are contained in Appendix Chapters A4 and A5. A Checklist containing each green building measure, both required and voluntary is provided at the end of each appendix chapter. Each measure listed in the application checklist has a section number which correlates to a section where more information about the specific measure is available.~~
~~6. The Application Checklist identifies which measures are required by this code and allows users to check off which voluntary items have been selected to meet voluntary tier levels if desired or mandated by a city, county, or city and county.~~
4. Administrative Bulletin 93, provided by the Department of Building Inspection, summarizes how the requirements of San Francisco Green Building Code and relevant local requirements may be met. Appendices to Administrative Bulletin 93 include tabular summaries of required measures, and provide submittal forms.

Chapter 2
DEFINITIONS

SECTION 202 – DEFINITIONS

Add and amend the following definitions:

GREENPOINT RATED, GREENPOINTS and GREENPOINTS CHECKLIST. The residential green building rating system and checklist and certification methodology of the non-profit organization Build It Green.

HIGH-RISE RESIDENTIAL BUILDING. For the purposes of **this code**~~CalGreen~~, a building that is of Occupancy Group R and is four stories or greater.

HISTORICAL RESOURCE. A property that meets the terms of the definitions in Section 21084.1 of the CEQA Statute (The California Environmental Quality Act [Public Resources Code Section 21084.1]) and Section 15064.5 of the CEQA Guidelines, as determined by the San Francisco Planning Department.

LARGE COMMERCIAL BUILDING. A commercial building or addition of Group B, M, A, or I occupancy that is 25,000 gross square feet or more.

LEED® and LEED® Checklist The Leadership in Energy and Environment Design rating system, certification methodology, and checklist of the United States Green Building Council (USGBC).

LOW-RISE RESIDENTIAL BUILDING. For the purposes of **this code**~~CalGreen~~, a building that is of Occupancy Group R and is three stories or less **or that is a one or two family dwelling or townhouse**.

MAJOR ALTERATIONS. Alterations where interior finishes are removed and significant upgrades to structural and mechanical, electrical and/or plumbing systems are proposed where areas of such construction are 25,000 gross square feet or more in Group B, M or R occupancies of existing buildings.

MID-SIZE COMMERCIAL BUILDING. A commercial building of Group B or M occupancy that is 5,000 or more and less than 25,000 gross square feet, and is not a high-rise building.

NEWLY CONSTRUCTED (or NEW CONSTRUCTION). A newly constructed building (or new construction) **is a building that has never before been used or occupied for any purpose and** does not include additions, alterations or repairs.

NEW LARGE COMMERCIAL INTERIORS. First-time tenant improvements where areas of such construction are over 25,000 gross square feet or more in Group B or M occupancy areas of existing buildings.

Chapter 3
GREEN BUILDING

SECTION 301 –GENERAL

Revise this section as follows:

301.1 Scope. Buildings **in the City and County of San Francisco** shall be designed to include the green building measures specified as mandatory ~~in the application checklists contained in this code. Voluntary green building measures are also included in~~ under the ~~application checklists and may be included~~ **California Green Building Standards Code (CalGreen).** ~~in the design and construction of structures covered by this code but are not required unless adopted by a city, county or city and county as specified in Section 101.7~~

Additional green building requirements established by the City and County of San Francisco are mandatory for:

(1) Newly constructed Group R occupancy buildings,
(2) Newly constructed buildings of Group B, M, A, and I occupancies that are 25,000 gross square feet or more,
(3) New first-time build-outs of commercial interiors that are 25,000 gross square feet or more in buildings of Group B or M occupancies, and
(4) Major alterations that are 25,000 gross square feet or more in existing buildings of Group B, M or R occupancies, where interior finishes are removed and significant upgrades to structural and mechanical, electrical and/or plumbing systems are proposed.

Exempt from additional local requirements of this chapter, unless otherwise noted, are:

(1) Any new building in which laboratory use of any occupancy classification is the primary use, and
(2) Any building undergoing renovation in which the area of renovation will be primarily for laboratory use of any occupancy classification.

SECTION 302 – MIXED OCCUPANCY BUILDINGS

Revise this section as follows:

302.1 Mixed occupancy buildings. In mixed occupancy buildings, each portion of a building shall comply with the specific ~~green building~~ **California Title 24 Part 11 requi**red measures applicable to each specific occupancy. **However, to fulfill any additional local green building requirements, the project sponsor may apply a single required green building standard to the entire building.**

SECTION 303 – PHASED PROJECTS

Add the following section:

303.1.1.1 Maintenance of required features. Any structure subject to this chapter shall maintain the green building features required herein, or equivalent, regardless of subsequent alterations, additions, or changes of use, unless subject to subsequent or more stringent requirements.

Modify the following section:

SECTION 304 – VOULUNTARY TIERS

This section not applicable in San Francisco.

~~304.1 Purpose. Voluntary tiers are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment and promote a more sustainable design.~~

~~304.1.1 Tiers. The provisions of Divisions A4.6 and A5.6 outline means, in the form of voluntary tiers, of achieving enhanced construction levels by incorporating additional measures for residential and nonresidential new construction. Voluntary tiers may be adopted by local governments and, when adopted, enforced by local enforcing agencies. Buildings complying with tiers specified for each occupancy contain additional prerequisite and elective green building measures necessary to meet the threshold of each tier. See section 101.7 of this code for procedures and requirements related to local amendments, additions or deletions, including changes to energy standards.~~

~~[BSC] Where there are practical difficulties involved in complying with the threshold levels of a tier, the enforcing agency may grant modifications for individual cases. The enforcing agency shall first find that a special individual reason makes the strict letter of the tier impractical and that modification is in conformance with the intent and purpose of the measure. The details of any action granting modification shall be recorded and entered in the files of the enforcing agency.~~

Modify the following section:

SECTION 305 [OSHPD 1] – CALGREEN TIER 1 AND CALGREEN TIER 2

This section not applicable in San Francisco.

~~305.1 CALGreen Tier 1 and CALGreen Tier 2 buildings contain voluntary green building measures necessary to meet the threshold of each level.~~

~~305.1.1 CALGREEN Tier 1. To achieve CALGreen Tier I, buildings must comply with the latest edition of "Savings By Design, Healthcare Modeling Procedures" found online at http://www/energysoft.com/ep/2007SBDHProcedures.pdf~~

~~305.1.2 CALGREEN Tier 2. To achieve CALGreen Tier 2, buildings must exceed the latest edition of "Savings By Design, Healthcare Modeling Procedures" by a minimum of 15%.~~

Modify the following section:

SECTION 306 – VOLUNTARY MEASURES

This section not applicable in San Francisco.

~~306.1 Purpose. Voluntary measures are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment, promote a more sustainable design, and high performance educational facilities.~~

~~306.1.1 The provisions of Appendix A5 outline means of achieving enhanced construction levels by incorporating additional measures.~~

Chapter 4
RESIDENTIAL REQUIREMENTS

Division 4.1
PLANNING AND DESIGN

SECTION 4.101 –GENERAL

Modify the following section:

4.101.1 Scope. The provisions of this division outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore, enhance the environmental quality of the site, ~~and~~ respect the integrity of adjacent properties**, and promote the health, safety and welfare of San Francisco residents.**

Add the following section:

SECTION 4.103 – REQUIREMENTS FOR GROUP R OCCUPANCY BUILDINGS

4.103.1 New low-rise residential buildings.

4.103.1.1 Rating requirements
New low-rise residential buildings must be GreenPoint Rated and applicants must submit documentation demonstrating that a minimum of 75 GreenPoints from the GreenPoints Single Family New Construction Checklist or the GreenPoints Multifamily New Construction Checklist will be achieved. Alternatively, this rating requirement may be met by obtaining LEED Silver certification.

4.103.1.2 Stormwater management
Projects subject to this section shall meet the San Francisco Public Utilities Commission stormwater management requirements.

4.103.2 New high-rise residential buildings

4.103.2.1 Rating requirement

Permit applicants must submit documentation to achieve LEED® "Silver" certification. Alternatively, this rating requirement may be met by obtaining the GreenPoint Rated designation and submitting documentation demonstrating that a minimum of 75 GreenPoints from the GreenPoint Rated Multifamily New Construction checklist will be achieved.

4.103.2.2 Indoor water use reduction. Permit applicants must submit documentation verifying that a minimum 30 percent reduction in the use of indoor potable water is achieved, as calculated to meet LEED® credit WE3.2. Projects applying GreenPoint Rated or other equivalent rating systems may alternately use the CALGreen Performance Method (Title 24 Part 11 Section 4.301.1.2) to demonstrate 30% reduction.

4.103.2.3 Construction debris management. Permit applicants must submit documentation verifying the diversion of a minimum 75 percent of the projects construction and demolition debris, as calculated to meet LEED® credit MR2.2. The waste management plan necessary to meet this requirement shall be updated as necessary and shall be accessible during construction for examination by the Department of Building Inspection. Permit applicants must also meet the requirements of San Francisco Environment Code Chapter 14 and San Francisco Building Code Chapter 13B (Construction and Demolition Debris Recovery Program.)

4.103.2.4 Stormwater management. Projects subject to this section shall meet the San Francisco Public Utilities Commission stormwater management requirements.

4.103.2.4.1 Construction activity stormwater pollution prevention. All projects, whether greater or lesser than one acre, must develop and implement construction activity pollution prevention and site run-off controls adopted by the San Francisco Public Utilities Commission, as well as LEED® prerequisite SSp1, as applicable.

4.103.3 MAJOR ALTERATIONS TO EXISTING GROUP R OCCUPANCY BUILDINGS

4.103.3.1 RATING REQUIREMENT
Permit applicants must submit documentation to achieve a LEED® Gold rating. Alternatively, this rating requirement may be met by obtaining the GreenPoint Rated designation and submitting documentation demonstrating that a minimum of 75 GreenPoints from the GreenPoint Rated Multifamily checklist will be achieved. Major alterations applying to less than 80% of the building's gross floor area may alternately obtain the GreenPoint Rated Elements designation and submit documentation demonstrating that 49 points from the GreenPoint Rated Multifamily checklist have been achieved.

4.103.3.2 LOW-EMITTING MATERIALS
Alterations utilizing LEED® must submit documentation to verify the use of low-emitting materials meeting the LEED® credits EQ 4.1 (adhesives and sealants), EQ 4.2 (paints and coatings), and EQ 4.3 (carpet systems) where applicable.

Alterations utilizing GreenPoint Rated must submit documentation to verify the use of low-emitting materials meeting the GreenPoint Rated Multifamily New Homes measures for low-emitting coatings, adhesives and sealants, and carpet systems.

Add the following section:

SECTION 4.104 – HISTORIC PRESERVATION

4.104.1 On-site retention of historical features. For alterations of buildings determined to be historical resources, after demonstrating compliance with all applicable codes, including the 2013 California Building Energy Efficiency Standards (Title 24, Part 6) and the 2013 California Historical Building Code (Title 24, Part 8), the minimum points or credits required under this chapter shall be reduced for retention and in-situ reuse or restoration of certain character defining features, as follows:

TABLE 4.104.A

SIGNIFICANT HISTORICAL ARCHITECTURAL FEATURES	PERCENT RETAINED*	ADJUSTMENT TO MINIMUM LEED POINT REQUIREMENT	ADJUSTMENT TO MINIMUM GREENPOINTS REQUIREMENT
Windows @ principal façade(s)	At least 50%	2	7
Windows @ principal façade(s)	At least 75%	3	11
Windows @ principal façade(s)	100%	4	15
Other windows	At least 50%	1	3
Other windows	100%	2	6
Exterior doors @ principal façade(s)	100%	1	3
Siding or wall finish @ principal façade(s)	80%	1	4
Trim & casing @ wall openings on principal façade(s)	100%	1	3
Roof cornices or decorative eaves visible from right-of-way	100%	1	3
Sub-cornices, belt courses, water tables, and running trim visible from right-of-way	80%	1	3
Character-defining elements of significant interior spaces	At least 50%	2	7
Character-defining elements of significant interior spaces	100%	4	15
Other exterior ornamentation (e.g. cartouches, corbels, quoins, etc.) visible from right-of-way	80%	1	3

*** Retention includes the rehabilitation and repair of character-defining features that conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.**

Add the following section:

SECTION 4.105 – DEMOLIITION OF EXISTING STRUCTURES

4.105.1 Adjustments to Rating Requirements for Building Demolition and Density. Applications subject to the San Francisco Green Building Code, whereby construction of a new building is proposed within five years of the demolition of a building on the site, where such demolition occurred after the effective date of the Green Building Ordinance - November 3, 2008 - the sustainability requirements for new buildings pursuant to the San Francisco Green Building Code shall be increased as follows:

4.105.1.1 LEED® Projects. For projects attaining a LEED® certification:

(1) Where the building demolished was an historical resource, the required points shall be increased by 10 points.

(2) Where the building demolished was not an historical resource, the required points shall be increased by 6 additional points.

(3) Where the building demolished was not an historical resource and the number of dwellings in the residential portion of the replacement structure are tripled, the required points shall be increased by 5 additional points.

4.105.1.2 GreenPoint Rated Projects. For projects attaining GreenPoint Rated:

(1) Where the building demolished was an historical resource, the required points shall be increased by 25 additional points.

(2) Where the building demolished was not an historical resource, the required points shall be increased by 20 additional points.

(3) Where the building demolished was not an historical resource and the number of dwellings in the residential portion of the replacement structure are tripled, the required points shall be increased by 17 additional points.

Division 4.2
ENERGY EFFICIENCY

SECTION4.201– GENERAL

Add the following section:

4.201.1 Energy Performance. [Reserved]

Chapter 5
NONRESIDENTIAL REQUIREMENTS

Division 5.1
PLANNING AND DESIGN

SECTION 5.101 –GENERAL

Modify the section as follows:

5.101 Scope. The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore, and enhance the environmental quality of the site, ~~and~~ respect the integrity of adjacent properties**, and promote the health, safety and welfare of San Francisco residents.**

Add the following section:

SECTION 5.103 – REQUIREMENTS FOR GROUP A, B, I, and M BUILDINGS

5.103.1 New large commercial buildings

5.103.1.1 Rating Requirement. Permit applicants must submit documentation to achieve LEED® "Gold" certification.

5.103.1.2 Indoor water use reduction . Permit applicants must submit documentation verifying that a minimum 30 percent reduction in the use of indoor potable water is achieved, as calculated to meet LEED® credit WE3.2.

5.103.1.3 Construction debris management. Permit applicants must submit documentation verifying the diversion of a minimum 75 percent of the projects construction and demolition debris, as calculated to meet LEED® credit MR2.2. Permit applicants must also meet the requirements of San Francisco Environment Code Chapter 14 and San Francisco Building Code Chapter 13B (Construction and Demolition Debris Recovery Program.) The waste management plan necessary to meet this requirement shall be updated as necessary and shall be accessible during construction for examination by the Department of Building Inspection.

5.103.1.4 Commissioning . Permit applicants must submit documentation verifying that the facility has been or will meet the criteria necessary to meet LEED® credit EA 3.0 (Enhanced Commissioning), in addition to LEED® prerequisite EAp1 (Fundamental Commissioning of Building Energy Systems.)

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.

5.103.1.6 Stormwater Management. Projects subject to this section shall meet the San Francisco Public Utilities Commission stormwater management requirements. All new building projects must develop and implement an Erosion and Sediment Control Plan or Stormwater Pollution Prevention Plan and implement site run-off controls adopted by the San Francisco Public Utilities Commission as applicable.

5.103.1.7 ENERGY PERFORMANCE [Reserved]

5.103.1.8 Temporary ventilation and IAQ Management During construction Permit applicants must submit documentation verifying that an Indoor Air Quality Management Plan is prepared and implemented which meets LEED® credit EQ 3.1. and Title 24 Part 11 5.504.1.3.

5.103.1.9 Low Emitting Materials. Permit applicants must submit documentation verifying that low-emitting materials are used, subject to on-site verification, meeting LEED® credits EQ 4.1, EQ 4.2, EQ 4.3, and EQ 4.4 wherever applicable.

Exceptions: 100% reused or 100% post consumer recycled hard surface flooring may be exempted from this requirement. Projects exercising this exemption must otherwise be eligible for LEED® credit EQ 4.3.

Interior composite wood and agrifiber products shall meet LEED® credit EQ 4.4 by containing no added urea formaldehyde resins. Interior and exterior hardwood plywood, particleboard, and medium density fiberboard composite wood products shall additionally meet California Air Resources Board Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections.

5.103.1.10 CALGreen Mandatory Measures. The following measures are mandatory in California for new non-residential buildings. Optionally, relevant LEED® credits can be used as alternative compliance paths, as noted below:

Title 24 Part 11 Section(s)	Topic/Requirement	Alternate Compliance Option:
5.106.4	Bicycle Parking	N/A
5.106.5	Fuel efficient vehicle and carpool parking	Meet LEED® SSc4.3 and/or SSc4.4, and demonstrate that 8% of parking is designated for fuel efficient vehicle and carpool parking.
5.106.8	Light pollution reduction	Meet LEED® credit SS 8
5.106.10	Drainage management plan	N/A
5.303.1	Water submeters	N/A
5.303.3.3.2	Multiple showerheads in one shower stall must not exceed maximum flow rate for	N/A

	single showerhead	
5.503.1	Fireplaces in non-residential occupancy must meet residential efficiency and emissions requirements,	N/A
5.407.2.2 5.504.5.3	Indoor chemical and pollutant source control	Meet LEED® credit EQ 5
5.507.4 5.507.4.1 5.507.4.2	Acoustical control and noise transmission	N/A
5.508.1.2	Halons not allowed in HVAC, refrigeration and fire suppression equipment.	Meet LEED® credit EA 4, and additionally document that all HVAC&R systems do not contain CFCs or halons.

5.103.2 New mid-size commercial buildings

5.103.2.2 Construction debris management. Permit applicants must submit documentation verifying the diversion of a minimum 75 percent of the projects construction and demolition debris, as calculated either to meet LEED® credit MR2.2 or equivalent. Permit applicants must also meet the requirements of San Francisco Environment Code Chapter 14 and San Francisco Building Code Chapter 13B (Construction and Demolition Debris Recovery Program.) The waste management plan necessary to meet this requirement shall be updated as necessary and shall be accessible during construction for examination by the Department of Building Inspection.

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,

5.103.2.5 Energy Performance [Reserved]

5.103.3 Major alterations to existing non residential buildings.

5.103.3.1 Rating Requirement. Permit applicants must submit documentation to achieve LEED® "Gold" certification.

5.103.3.2 Low Emitting Materials. Permit applicants must submit documentation to verify the use of low-emitting materials meeting LEED® EQ4.1, EQ4.2, EQ 4.3 and EQ4.4 wherever applicable.

5.103.4 New large commercial interiors

5.103.4.1 Rating Requirement. Permit applicants must submit documentation to achieve LEED®

LEED® "Gold" certification.

5.103.4.2 Low Emitting Materials. Permit applicants must submit documentation verifying that low-emitting materials are used, subject to in-site verification, meeting LEED® credits EQ4.1, EQ4.2, EQ4.3 and EQ 4.4 wherever applicable.

Add the following section:

SECTION 5.104– HISTORIC PRESERVATION

5.104.1 On-site retention of historical features. For alterations of buildings determined to be historical resources, after demonstrating compliance with all applicable codes, including the 2013 California Building energy Efficiency Standards (Title 24, Part 6) and the 2013 California Historical Building Code (Title 24, Part 8), the minimum points or credits required under this chapter shall be reduced for retention and in-situ reuse or restoration of certain character defining features, as follows:

TABLE 5.104.A

SIGNIFICANT HISTORICAL ARCHITECTURAL FEATURES	PERCENT RETAINED*	ADJUSTMENT TO MINIMUM LEED POINT REQUIREMENT	ADJUSTMENT TO MINIMUM GREENPOINTS REQUIREMENT
Windows @ principal façade(s)	At least 50%	2	7
Windows @ principal façade(s)	At least 75%	3	11
Windows @ principal façade(s)	100%	4	15
Other windows	At least 50%	1	3
Other windows	100%	2	6
Exterior doors @ principal façade(s)	100%	1	3
Siding or wall finish @ principal façade(s)	80%	1	4
Trim & casing @ wall openings on principal façade(s)	100%	1	3
Roof cornices or decorative eaves visible from right-of-way	100%	1	3
Sub-cornices, belt courses, water tables, and running trim visible from right-of-way	80%	1	3
Character-defining elements of significant interior spaces	At least 50%	2	7
Character-defining elements of significant interior spaces	100%	4	15

Other exterior ornamentation (e.g. cartouches, corbels, quoins, etc.) visible from right-of-way	80%	1	3

* Retention includes the rehabilitation and repair of character-defining features that conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.

Add the following section:

SECTION 5.105 – DEMOLITION OF EXISTING STRUCTURES

5.105.1 Adjustments to Rating Requirements. Applications subject to the San Francisco Green Building Code, whereby construction of a new building is proposed within five years of the demolition of a building on the site, where such demolition occurred after November 3, 2008, the sustainability requirements for new buildings pursuant to the San Francisco Green Building Code shall be increased as follows:

5.105.1.1 LEED® Projects. For projects attaining a LEED® certification:

(1) **Where the building demolished was an historical resource, the required points shall be increased by 10 points, which is 10% of the total available in the LEED® rating system, absent demolition.**

(2) **Where the building demolished was not an historical resource, the required points shall be increased by 6 additional points, which is 10% of the maximum total required points under this chapter, absent demolition.**

(3) **Where the building demolished was not an historical resource and the number of dwellings in the residential portion of the replacement structure are tripled, the required points shall be increased by 5 additional points, which is 8% of the maximum total required points under this chapter, absent demolition.**

5.105.1.2 GreenPoint Rated Projects. For projects attaining GreenPoint Rated:

(1) **Where the building demolished was an historical resource, the required points shall be increased by 25 additional points.**

(2) **Where the building demolished was not an historical resource, the required points shall be increased by 20 additional points.**

(3) **Where the building demolished was not an historical resource and the number of dwellings in the residential portion of the replacement structure are tripled, the required points shall be increased by 17 additional points.**

Division 5.2
ENERGY EFFICIENCY

SECTION 5.201 –GENERAL

Add the following section:

5.201.1.1 Energy performance. [Reserved]

Chapter 7
INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

SECTION 701–GENERAL

Add the following section:

701.1 These requirements apply to installers and Special inspectors with regards to the requirements of this chapter.

SECTION 702 – QUALIFICATIONS

Modify the following section:

702.2 Special inspection. …

2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, ~~and~~ home energy auditors**, and ICC Certified CALGreen Inspectors**.

Add the section as follows:

702.3 Special inspection. The Director of the Department of Building Inspection may require special inspection to verify compliance with this code or other laws that are enforced by the agency. The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Director of the Department of Building Inspection, for inspection of the particular type of construction or operation requiring special inspection. In addition, the special inspector shall have a certification from a recognized state, national, or international association, as determined by the Director of the Department of Building Inspection. The area of certification shall be closely related to the primary job function, as determined by the local agency.

SECTION 7.703 – VERIFICATIONS

Modify the section as follows:

7.703.1 Documentation. Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the ~~enforeing agency~~ **Director of the Department of Building Inspection** which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in ~~the appropriate section or identified in the application checklist~~ **Administrative Bulletin 93**.

City and County of San Francisco

2013 San Francisco Green Building Code

Analysis of Cost Effectiveness of Energy Requirements

Version 1 | October 17, 2013

Job number 214757

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Suite 700
San Francisco 94105
United States of America

Prepared for:

SF Environment
Our home. Our city. Our planet.

ARUP

ARUP

Job title	2013 San Francisco Green Building Code	**Job number** 214757
Document title	Analysis of Cost Effectiveness of Energy Requirements	**File reference**

Contents

1 Summary

This report presents the results of an energy savings and cost-effectiveness analysis conducted for the City and County of San Francisco, examining the cost-effectiveness of energy efficiency requirements of the San Francisco Green Building Code (2013). The San Francisco Green Building Code (2013) consists of California Green Building Standards Code Title 24 Part 11 (2013), known as CalGreen, and stricter local requirements established for San Francisco in 2008 and updated in 2010.

This report summarizes the cost-effectiveness of energy efficiency requirements for new low-rise residential buildings in San Francisco (or any community located in "Climate Zone 3" as defined by the California Energy Commission.) It is limited to new low-rise residential because the proposed San Francisco Green Building Code (2013) would continue to require such projects to achieve 75 points in GreenPoint Rated and all GreenPoint Rated prerequisites – including a significant cost-effective compliance margin over California's Title 24 Part 6 Energy Standards consistent with this analysis. Build It Green has confirmed that the prescriptive package of cost-effective measures in this report will be accepted as one cost-effective way to meet the minimum requirements of GreenPoint Rated. In practice, projects would continue to have the option of meeting this requirement through a performance-based energy model prepared in California Energy Commission approved energy modeling software, which allows tradeoffs among measures, provided that the resulting designed will consume at least 10% less energy than a similar building which minimally complies with the code.

This report is a part of the application from City of San Francisco to the California Energy Commission (CEC). It is intended to meet the requirements specified in Section 10-106 of the Title 24, Part 6: Locally Adopted Energy Standards, as follows:

> (a) Requirements. Local governmental agencies may adopt and enforce energy standards for newly constructed buildings, additions, alterations, and repairs to existing buildings provided the Energy Commission finds that the standards will require buildings to be designed to consume no more energy than permitted by Title 24, Part 6.
>
> (b) Documentation Application. Local governmental agencies wishing to enforce locally adopted energy standards shall submit an application with the following materials to the Executive Director:
>
> 1. The proposed energy standards.
>
> 2. The local governmental agency's findings and supporting analyses on the energy savings and cost effectiveness of the proposed energy standards.
>
> 3. A statement or finding by the local governmental agency that the local energy standards will require buildings to be designed to consume no more energy than permitted by Part 6.
>
> 4. Any findings, determinations, declarations or reports, including any negative declaration or environmental impact report, required pursuant to the California Environmental Quality Act, Pub. Resources Code Section 21000 et seq.

This report is also the first part of a broader analysis of the potential for cost effective energy efficiency in new construction in general under the 2013 Energy Standards. SF Environment and the Department of Building Inspection will share results of the broader analysis as they become available, as well as technical analysis of LEED v4, which will be optional until at least July 1, 2015. SF Environment prioritized analysis of energy efficiency opportunities in low-rise residential for two reasons:

1. Energy modeling software approved by the California Energy Commission was not available until September, while it was necessary to finalize the draft code by July 2013 in order for the San Francisco Green Building Code to be effective January 1, 2014. The 2013 California Energy Standards are more than 20% stricter than the prior 2010 Energy Standards – so every

project built to the 2013 Energy Standards will be held to a higher efficiency requirement than projects subject to San Francisco's 2010 green building requirements.

2. The San Francisco Green Building Code as proposed would continue to require LEED for Building Design & Construction (BD&C) v2009 rating system (or LEED Core & Shell, etc.) for any applicable non-residential new construction project.[1] In all cases, all projects applying for building permit on or after January 1, 2014 must meet the 2013 California Title 24 Energy Standards. However, for purposes of additionally meeting San Francisco's green building requirements (which extend to many considerations in addition to energy efficiency), LEED BD&C v2009 continues to allow energy efficiency calculations based on ASHRAE 90.1 (2007) or CA Title 24 (2005).[2] As a result, California's Title 24 (2013) Energy Standards are significantly stricter than the minimum requirements of LEED v2009. However, GreenPoint Rated New Home and LEED for Homes are the two rating systems applicable to new residential buildings of 3 floors or less, and both require energy efficiency beyond code compliance.

2 Costs and Savings Analysis

2.1 Base Building Models

Arup is performing a comparative analysis of energy savings and costs using four representative building energy models. Four key building types – single family residential, multifamily, large high-rise office, and low-rise retail – were chosen as representative of anticipated new construction in San Francisco. The baseline models have critical attributes consistent with Title 24 2013, which will become effective on January 1, 2014. Key building characteristics are described in Table 2 in Appendix 0.

2.2 Methods and Assumptions

Energy savings data was developed from energy modeling using an adapted version of EnergyPlus customized for the *Technical Feasibility of Zero Net Energy Buildings in California* Study (ZNE Tool), and cross-verified against results from Codes and Standards Enhancement (CASE) research done for Title 24 2013 development. Energy savings were estimated for a set of sample measures for each model in terms of the CEC approved 2013 Time Dependent Value energy (TDV). Energy and cost savings were scaled to a per-square-foot basis.

Incremental cost data was developed from existing CASE research, from RS Means, and from other sources where CASE data was not available. Cost data was scaled to a per-square-foot basis. Measures such as LED lighting, with long useful lives, were compared against the initial purchase price and eventual replacement cost of comparable equipment (such as a compact fluorescent lamp).

3 Results

3.1 Single Family and Multi-Family Residence

Table 1 shows the feasible energy savings measures beyond code that could be implemented in a low-rise residential building in San Francisco (CZ3). The analysis looked at both single family and multi-

[1] In the case of new high-rise residential, the San Francisco Green Building Code as proposed would continue to allow LEED BD&C v2009 or GreenPoint Rated as compliance options. For the reasons stated, projects that opt for LEED BD&C v2009 would not have mandatory energy efficiency requirements beyond Title 24 (2013) at this time.
[2] LEED v4 references ASHRAE 90.1 (2010), a substantially higher energy efficiency standard.

family prototypes. Percent savings are based off of a housing unit baseline energy consumption of 185,346 TDV kbtu. The group of measures is cost effective.

Table 1: Low-Rise Residence Energy Results

Prescriptive Measure List Description	Lifecycle Savings			First Costs	Lifecycle Benefit : Cost Ratio
	TDV kbtu	TDV Percent %	TDV $/sq ft.	$/sq. ft.	
Wall Insulation R-19 w/R-4ci, 2x6	2,321	1.3%	$0.19	$0.41	0.5
Showerheads 2.0 to 1.8 GPM	1,483	0.8%	$0.12	$0.02	5.1
Kitchen Sinks 1.5 to 1.4 GPM	556	0.3%	$0.05	$0.02	1.9
All Building LED High-Efficacy Lighting	4,887	2.6%	$0.40	$0.05	8.0
Natural Ventilation	3,707	2.0%	$0.30	$0.00	Large
Ducts in conditioned space*	1,199	0.6%	$0.10	$0.40	0.2
Reduced infiltration: 5 ACH50 to 3 ACH50*	4,032	2.2%	$0.33	$0.52	0.6
DHW Heat Recovery**	5,321	2.9%	$0.87	$0.22	4.1
Total Savings	23,506	13%	$2.36	$1.43	1.7

* Single Family Residential focused measures
** Multi-Family Residential focused measures

The package of measures in Table 1 represents one cost-effective path to attaining a substantial compliance margin over 2013 Title 24 Part 6 Energy Standards. Plumbing fitting flow rates, whole building LED high efficacy lighting, and natural ventilation are each anticipated to be afforded prescriptive credit toward the compliance margin due to limitations of commonly available compliance software.[3] In practice, projects may meet the requirement via other design solutions, which could for example include improved efficiency of mechanical equipment, on-site renewable energy generation,[4] or envelope improvements to Passive House standards.

3.2 High-Rise Office

High-Rise Office analysis is underway. Preliminary results indicate an energy efficiency compliance margin in excess of 10% is cost-effective. High rise residential will also be considered in this analysis.

3.3 Small Retail

Small retail analysis is underway. Preliminary results indicate an energy efficiency compliance margin in excess of 10% is cost-effective.

[3] Prescriptive compliance credit would solely be applicable to the required compliance margin, not to minimum compliance with Title 24 2013 Energy Standards.
[4] Photovoltaics and solar hot water heating have been recognized methods to meet San Francisco's supplemental energy performance requirements under the Green Building Ordinance since 2008.

A1 References

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National Renewable Energy Laboratory (NREL). National Residential Efficiency Measures Database. Accessed October 2013. http://www.nrel.gov/ap/retrofits/measures.cfm

RS Means Online. Accessed October 2013. www.meanscostworks.com

Measure Description	Data Source	URL
Wall Insulation: R-19 w/R-4ci, 2x6	Residential Increased Wall Insulation: 2013 California Building Energy Efficiency Standards California Utilities Statewide Codes and Standards Team. October 2011.	http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Envelope/2013_CASE_R_Increased_Wall_Insulation_Oct_2011.pdf
Showerhead: 2.0 to 1.8 GPM	Multi-Head Showers and Lower-Flow Shower Heads: 2013 California Building Energy Efficiency Standards California Utilities Statewide Codes and Standards Team. October 2011.	http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Water_Heating/2013_CASE_R_Shower_Heads_Sept_2011.pdf
Kitchen faucet: 1.5 to 1.4 GPM	Original calculation.	
Ducts in conditioned space	Davis Energy Group research: SFD-Residential EEM Cost_v2.xlsx	
Improve indoor lighting from 50 lm/W to 100 lm/W	Measure Information Template – Residential Lighting, California Building Energy Efficiency Standards California Utilities Statewide Codes and Standards Team. March 2011.	http://www.h-m-g.com/T24/Lighting/draft%20presentations%202011.03.11/Residential%20Lighting%20%20Draft%20CASE%20Report.pdf
Natural Ventilation	Remove cooling load.	
Reduced infiltration: 1.8 SLA / 3.15 ACH50	National Renewable Energy Laboratory (NREL). National Residential Efficiency Measures Database. Accessed October 2013.	http://www.nrel.gov/ap/retrofits/measures.cfm
Drain water heat recovery added	Are potential savings going down the drain? – Clean Energy Resource Team. July 2013.	http://s3.amazonaws.com/zanran_storage/www.duluthenergydesign.com/ContentPages/2489554523.pdf http://www.cleanenergyresourceteams.org/blog/are-potential-savings-going-down-drain

A2 Baseline Building Models

Table 2: Representative Baseline Buildings for Energy Reach Code Analysis

	Single-Family Residence	Multifamily	High-Rise Office	Small Retail
Area (sq. ft.)	2,116	84,360	498,600	22,500
Dimensions	46 ft x 46 ft	152 ft x 56 ft	240 ft x 160 ft	300 ft x 75 ft
Number of Levels	1	10	10 + 2 basement	1
Walls	2'x4', 16" o.c., R-15 w/R-4 rigid c.i. U = 0.065	R-13.0 + R-7.5 c.i. U = 0.064	R-13.0 + R-3.8 c.i. U = 0.084	R-13.0 + R-3.8 c.i. U = 0.084
Window to Wall Ratio (%)	25%	14.9%	40% above-grade	10.5% over all 26% south-facing
Window	U = 0.32 SHGC = 0.25	U = 0.65 SHGC = 0.25	U = 0.65 SHGC = 0.25	U = 0.65 SHGC = 0.25
Skylight	None	None	None	None
Roof	R-30 U = 0.031	R-20.0 c.i. U = 0.048	R-20.0 c.i. U = 0.048	R-20.0 c.i. U = 0.048
Heating System	Gas Furnace	WSHP with CAV	Boiler Hot Water VAV	Gas Furnace
Cooling System	DX PTAC	WHSP with CAV	Water-Cooled Chiller Chilled Water VAV	Packaged SZ CAV DX RTU
Interior Lighting Power Density (LPD)	NA High-efficacy lighting mandatory in many spaces Dimming or vacancy sensor mandatory in many spaces	Apartment: 0.35 W/sf Corridors: 0.55 W/sf Weighted: 0.38 W/sf	1.0 W/sf	High Retail: 2.28 W/sf Mid Retail: 1.7 W/sf Low Retail: 1.3 W/sf Weighted: 1.64 W/sf
Interior Plug Load Density (EPD)	NA	Weighted: 0.80 w/sf	Office: 0.75 W/sf Weighted: 0.727 W/sf	1.0 W/sf
Exterior Lighting Power Density (LPD)	None	13.58 kW installed	60.216 kW installed	9.153 kW installed
Base Total EUI (kbtu / sq. ft.)	24.9	30.4	26.8	45.0