

**Application for Locally Adopted Energy Standards  
by the City of Union City in Accordance With  
Section 10-106 of the California Code of Regulations,  
Title 24, Part 1**

December 21, 2009

From:

Avalon Schultz, Associate Planner  
Economic and Community Development Department  
City of Union City  
34009 Alvarado-Niles Rd.  
Union City, CA 94587  
510.675.5321  
Email: [AvalonE@ci.union-city.ca.us](mailto:AvalonE@ci.union-city.ca.us)

Report prepared by:

Michael Gabel  
Gabel Associates, LLC  
1818 Harmon Street, Suite #1  
Berkeley, CA 94703  
(510) 428-0803  
Email: [mike@gabelenergy.com](mailto:mike@gabelenergy.com)

**Table of Contents**

1.0 Executive Summary ..... 1

2.0 Impacts of the Ordinance ..... 3

3.0 Cost Effectiveness ..... 10

4.0 Text of the Union City Ordinance ..... 13

Appendix: Alameda County Small Commercial Green Building Checklist

## **1.0 Executive Summary**

The Union City Council approved the introduction of its Green Building Ordinance on August 25, 2009. The new ordinance is scheduled to take effect under the state's 2008 Building Energy Efficiency Standards after January 1, 2010. Gabel Associates has researched and reviewed the feasibility and energy cost-effectiveness of permit applicants exceeding the 2008 Standards in order to meet the minimum energy efficiency requirements of the proposed ordinance.

### *Overall Scope of the Ordinance*

<b>New ordinance or revision to previous ordinance?</b>	<b>New Ordinance</b>
<b>Projected Effective Date:</b>	<b>March 1, 2010</b>
<b>Green building or stand-alone energy ordinance?</b>	<b>Green Building Ordinance</b>
<b>Do minimum energy requirements increase after initial effective date?</b>	<b>No</b>
<b>Occupancies covered?</b>	<b>Residential and Commercial Buildings</b>
<b>Energy requirements apply to new construction, additions, alterations?</b>	<b>New Construction, Additions and Remodels</b>
<b>Special or unusual energy requirements?</b>	<b>Alameda County Small Commercial Green Building Checklist</b>
<b>Third party verification?</b>	<b>GreenPoint Verification for Residential Buildings</b>
<b>Implementation details in the ordinance or in a separate document?</b>	<b>No</b>

Key Features of the Ordinance By Occupancy Type

Occupancy Type	General Requirements	Minimum Energy Requirement
<b>Single Family and Multi-family Buildings:</b>	<b>2010 GreenPoint Rated</b>	
<b>All New Construction</b>	<b>50 points</b>	<b>15% Better-than-Title 24</b>
<b>Additions &amp; Alterations</b>	<b>No requirement</b>	<b>2008 Title 24 Standards</b>
<b>Nonresidential Buildings: New Construction, Additions and Alterations</b>	<b>Alameda County Small Commerical Green Building Checklist</b>	<b>10% Better-than-Title 24 or prescriptive options as applicable or 2008 Title 24</b>

In order to avoid a potential conflict with the federal NAECA standards in following a few of the prescriptive requirements in the Alameda County Small Commercial Green Building Checklist, the following language will be added to the Ordinance prior to its final adoption by the City Council:

*“Nothing in this ordinance shall require the Applicant to use covered products, as defined in the federal Energy Policy and Conservation Act (42 U.S.C. § 6201 et seq), that exceed any applicable federal energy conservation standards for such products.”*

## **2.0 Impacts of the New Ordinance**

The energy performance impacts of the Ordinance have been evaluated in Climate Zone 3 using several prototypical designs which collectively reflect a broad range of building types, including:

- Single family house: 2-story 1,582 sf
- Single family house: 2-story 2,025 sf
- Low-rise Multi-family building, 8 dwelling units: 2-story 8,442 sf
- High-rise Multi-family building, 40 dwelling units: 4-story 36,800 sf
- Nonresidential office building: 2-story, 21,160 sf
- Nonresidential office building: 5-story, 52,900 sf

The methodology used in the case studies is based on a design process for buildings that meet or exceed the energy standards, and includes the following:

- (a) Each prototype building design is tested for compliance with the 2008 Standards, and the mix of energy measures are adjusted using common construction options so the building first just meets the Standards. The set of energy measures chosen represent a reasonable combination which reflects how designers, builders and developers are likely to achieve a specified level of performance using a relatively low first incremental (additional) cost
- (b) Starting with that set of measures which is minimally compliant with the 2008 Standards, various energy measures are upgraded so that the building just meets the minimum energy performance required by the proposed Ordinance (e.g., 15% better than 2008 Title 24). The design choices by the consultant authoring this study are based on many years of experience with architects, builders, mechanical engineers; and general knowledge of the relative acceptance and preferences of many measures, as well as their incremental costs. This approach tends to reflect how building energy performance is typically evaluated for code compliance and how it's used to select design energy efficiency measures. Note that lowest simple payback with respect to building site energy is not always the primary focus of selecting measures; but rather the requisite reduction of Title 24 Time Dependent Valuation(TDV) energy at a reasonably low incremental cost consistent with other non-monetary but important design considerations.
- (c) A minimum and maximum range of incremental costs of added energy efficiency measures is established by a variety of research means. A construction cost estimator, Building Advisory LLC, was contracted to conduct research to obtain current measure cost information for many energy measures; and Gabel Associates performed its own additional research to establish first cost data. Site energy in kWh and therms, is calculated from the Title 24 simulation results to establish the annual energy savings, energy cost savings and CO<sub>2</sub>-equivalent reductions in greenhouse gases.

## 2.1 Single Family Homes

### CLIMATE ZONE 3

The following energy design descriptions of single family building prototypes just meet the 2008 Title 24 Building Energy Efficiency Standards in **Climate Zone 3**:

#### **CZ3: Single Family House 1,582 square feet, 2-story, 14.3% glazing/floor area ratio**

<b>Energy Efficiency Measures to Meet Title 24</b>
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30; no overhangs
Furnace: 80% AFUE; No Cooling
R-6 Attic Ducts
50 gallon Gas DHW: EF=0.58; no extra pipe insulation

#### **CZ3: Single Family House 2,025 square feet, 2-story, 20.2% glazing/floor area ratio**

<b>Energy Efficiency Measures to Meet Title 24</b>
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.40, SHGC=0.40; no overhangs
Furnace: 80% AFUE; No Cooling
R-6 Attic Ducts
50 gallon Gas DHW: EF=0.62; no extra pipe insulation

### **Energy Efficiency Measures Needed to Meet the Ordinance**

The following tables list the energy features and/or equipment included in the Title 24 base design, the efficient measure options, and an estimate of the incremental cost for each measure included **to improve the building performance to use 15% less TDV energy than the corresponding Title 24 base case design.**

**Incremental Cost Estimate to Exceed Title 24 by 15%**  
**Single Family Prototype: 1,582 SF, Option 1**

**Climate Zone 3**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
Furnace: 92% AFUE	Upgrade	\$ 500	\$ 1,200	\$ 850
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 300	\$ 600	\$ 450
House wrap: 1,116 sf @ \$0.08 to \$0.12/sf	Upgrade	\$ 90	\$ 135	\$ 113
R-49 roof insulation: 1,582 sf \$0.19 to \$0.22/sf	Upgrade	\$ 300	\$ 350	\$ 325
50 gallon DHW: EF=0.62 (from EF=0.58)	Upgrade	\$ 100	\$ 200	\$ 150
R-15 Wall Insulation: 1,116 sf @ \$0.06 to \$0.08/sf	-	\$ -	\$ -	\$ -
All DHW Pipe Insulation	-	\$ -	\$ -	\$ -
<b>Total Incremental Cost of Energy Efficiency Measures:</b>		<b>\$ 1,290</b>	<b>\$ 2,485</b>	<b>\$ 1,888</b>
<b>Total Incremental Cost per Square Foot:</b>		<b>\$ 0.82</b>	<b>\$ 1.57</b>	<b>\$ 1.19</b>

**Incremental Cost Estimate to Exceed Title 24 by 15%**  
**Single Family Prototype: 2,025 SF, Option 1**

**Climate Zone 3**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
Furnace: 92% AFUE	Upgrade	\$ 500	\$ 1,200	\$ 850
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 300	\$ 600	\$ 450
House wrap: 1,116 sf @ \$0.08 to \$0.12/sf	Upgrade	\$ 205	\$ 305	\$ 255
R-49 roof insulation: 1,443 sf \$0.19 to \$0.22/sf	-	\$ -	\$ -	\$ -
50 gallon DHW: EF=0.62 (from EF=0.58)	-	\$ -	\$ -	\$ -
R-15 Wall Insulation: 2,550 sf @ \$0.06 to \$0.08/sf	-	\$ -	\$ -	\$ -
All DHW Pipe Insulation	-	\$ -	\$ -	\$ -
<b>Total Incremental Cost of Energy Efficiency Measures:</b>		<b>\$ 1,005</b>	<b>\$ 2,105</b>	<b>\$ 1,555</b>
<b>Total Incremental Cost per Square Foot:</b>		<b>\$ 0.50</b>	<b>\$ 1.04</b>	<b>\$ 0.77</b>

## 2.2 Low-rise Multi-family Residential Building

The following is the energy design description of the low-rise multifamily building prototype which just meets the 2008 Title 24 Building Energy Efficiency Standards:

### CZ3: Low-rise Multi-family: 2-story 8,442 square feet, 8 units, 12.5% glazing

Energy Efficiency Measures to Meet Title 24
R-38 Roof w/ Radiant Barrier
R-13 Walls
Slab-on-grade 1st floor
Low E2 Vinyl Windows, U=0.39, SHGC=0.33; no overhangs
Furnace: 80% AFUE; No Cooling
R-6 Attic Ducts
50 gallon Gas DHW: EF=0.575; no extra pipe insulation

### Climate Zone 3 Energy Measures Needed to Meet the Ordinance

Incremental Cost Estimate to Exceed Title 24 by 15%

Multifamily Prototype: 8,442 SF, Option 1

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
Furnace: (8) @ 92% AFUE	Upgrade	\$ 4,000	\$ 9,600	\$ 6,800
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,000	\$ 4,000	\$ 3,000
House wrap: 9,266 sf @ \$0.08 to \$0.12/sf	Upgrade	\$ 745	\$ 1,115	\$ 930
R-49 roof insulation: 2,880 sf \$0.19 to \$0.22/sf	Upgrade	\$ 550	\$ 635	\$ 593
50 gallon DHW: EF=0.62 (from EF=0.58)	-	\$ -	\$ -	\$ -
R-15 Wall Insulation: 9,266 sf @ \$0.06 to \$0.08/sf	Upgrade	\$ 560	\$ 745	\$ 653
All DHW Pipe Insulation	-	\$ -	\$ -	\$ -
<b>Total Incremental Cost of Energy Efficiency Measures:</b>		<b>\$ 7,855</b>	<b>\$ 16,095</b>	<b>\$ 11,975</b>
<b>Total Incremental Cost per Square Foot:</b>		<b>\$ 0.93</b>	<b>\$ 1.91</b>	<b>\$ 1.42</b>

## 2.3 High-rise Multifamily Building

The following is the energy design description of the high-rise multifamily building prototype which just meets the 2008 Title 24 Building Energy Efficiency Standards:

### **CZ3: High-rise Residential: 4-story 36,800 sf, 40 units, Window Wall Ratio=35.2%**

<b>Energy Efficiency Measures to Meet Title 24</b>
R-30 Attic w/ Cool Roof Reflectance=0.30, Emittance=0.75
R-19 in Metal Frame Walls
R-0 (un-insulated) raised slab over parking garage
Low E2 Vinyl Windows, U=0.33, SHGC=0.30 (see Note 1)
Split heat pumps: HSPF=7.2, EER=10.2
Central domestic DHW boiler: 82.7% AFUE and recirculating system w/ timer-temperature controls & VSD hot water pump

*Note 1: Includes a small amount of fixed overhangs above first floor front fenestration*

### **Energy Measures Needed to Meet the County's Ordinance**

See Section 2.1 for the description of the approach used to establish which energy measures are used to meet the proposed Ordinance for this prototype building design.

#### **Incremental Cost Estimate to Exceed Title 24 by 15%** **High-rise Residential Prototype: 36,800 SF, Option 1**

**Climate Zone 3**

<b>Energy Efficiency Measures to Exceed Title 24 by 15%</b>	<b>Change Type</b>	<b>Incremental Cost Estimate</b>		
		<b>Min</b>	<b>Max</b>	<b>Avg</b>
R-30 Attic; Cool Roof Reflectance=0.30, Emittance=0.75	-	\$ -	\$ -	\$ -
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-3 (1" K-13 spray-on) Raised Slab over parking garage 9,200 sf @ \$1.20 to \$1.50/sf	Upgrade	\$ 11,040	\$ 13,800	\$ 12,420
Vinyl Windows, NFRC U=0.33, SHGC=0.23; 6,240 sf @ \$1.40 to \$1.60/sf	Upgrade	\$ 8,425	\$ 9,360	\$ 8,893
(80) Room Heat Pumps: HSPF=7.84, eer=11.2 (No Ducts) @ \$150 to \$250/unit	Upgrade	\$ 12,000	\$ 20,000	\$ 16,000
(2) 94% AFUE DHW boilers @ \$1500 to \$2500 each	Upgrade	\$ 3,000	\$ 5,000	\$ 4,000
<b>Total Incremental Cost of Energy Efficiency Measures:</b>		<b>\$ 34,465</b>	<b>\$ 48,160</b>	<b>\$ 41,313</b>
<b>Total Incremental Cost per Square Foot:</b>		<b>\$ 0.94</b>	<b>\$ 1.31</b>	<b>\$ 1.12</b>

## 2.4 Nonresidential Buildings

The following energy design descriptions of nonresidential building prototypes just meet the 2008 Title 24 Building Energy Efficiency Standards in Climate Zone 3:

### **CZ3: Nonresidential 2-story office building: 21,160 sf, Window Wall Ratio= 37.1%**

<b>Energy Efficiency Measures to Meet Title 24</b>
R-38 Attic w/ Cool Roof Reflectance=0.30, Emittance=0.75
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
NFRC-rated Low-E windows, U=0.50, SHGCc=0.38 w/ no exterior shading
Lighting LPD = 0.867 watts/sf: (248) 2-lamp 4' T8 fixtures @ 62w each and (104) 26w CFLs @ 26w each; no lighting controls beyond mandatory measures
(4) 10-ton Packaged DX units: EER=11.0, 4,000 cfm; and (4) 7.5-ton Packaged DX units: Carrier EER=11.0, 3,000 cfm; all standard efficiency fan motors
R-4.2 duct insulation, ducts in conditioned space
Standard 50 gallon gas water heater, EF=0.575

### **CZ3: Nonresidential 5-story office building: 52,900 sf, Window Wall Ratio= 29.1%**

<b>Energy Efficiency Measures to Meet Title 24</b>
R-30 Attic w/ No Cool Roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
NFRC-rated Low-E windows, U=0.50, SHGCc=0.38 w/ no exterior shading
Lighting LPD = 0.867 watts/sf: (248) 2-lamp 4' T8 fixtures @ 62w each and (104) 26w CFLs @ 26w each; no lighting controls beyond mandatory measures
(4) 25-ton Packaged VAV units: EER=10.4, 10,000 cfm; standard efficiency fan motors; 20% VAV boxes w/reheat
R-4.2 duct insulation, ducts in conditioned space
Standard gas water heater, EF=0.575

**CZ3: Nonresidential 2-story office building: 21,160 sf, Window Wall Ratio= 37.1%**  
**Incremental Cost Estimate to Exceed Title 24 by 10%**

**Nonresidential Prototype: 21,160 SF, Option 1**

**Climate Zone 3**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Attic w/ Cool Roof Reflectance=0.30, Emittance=0.75	-	\$ -	\$ -	\$ -
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Glazing: U=0.50, SHGCc=0.31; 5,160 sf @ \$2.00 to \$3.00/sf	Upgrade	\$ 10,320	\$ 15,480	\$ 12,900
Lighting: (248) 2-lamp 4' T8 fixtures, 50w ea. @\$25.00 to \$30.00 per fixture	Upgrade	\$ 5,800	\$ 6,960	\$ 6,380
(4) 10-ton Packaged DX units: EER=11.0, 4,000 cfm; and (4) 7.5-ton Packaged DX units: Carrier EER=11.0, 3,000 cfm; all standard efficiency fan motors	-	\$ -	\$ -	\$ -
R-4.2 duct insulation, ducts in conditioned space	-	\$ -	\$ -	\$ -
Standard 50 gallon gas water heater, EF=0.575	-	\$ -	\$ -	\$ -
<b>Total Incremental Cost of Energy Efficiency Measures:</b>		<b>\$ 16,120</b>	<b>\$ 22,440</b>	<b>\$ 19,280</b>
<b>Total Incremental Cost per Square Foot:</b>		<b>\$ 0.76</b>	<b>\$ 1.06</b>	<b>\$ 0.91</b>

**CZ3: Nonresidential 5-story office building: 52,900 sf, Window Wall Ratio= 29.1%**  
**Incremental Cost Estimate to Exceed Title 24 by 15%**

**Nonresidential Prototype: 52,900 SF, Option 1**

**Climate Zone 3**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 cool roof: 10,580 sf @ \$0.30 to \$0.40/sf	Upgrade	\$ 3,175	\$ 4,230	\$ 3,703
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
NFRC-rated Low-E windows, U=0.50, SHGCc=0.38 w/ no exterior shading	-	\$ -	\$ -	\$ -
Lighting: (720) 2-lamp 4' T8 fixtures, 50w ea. @\$25.00 to \$30.00 per fixture	Upgrade	\$ 18,000	\$ 21,600	\$ 19,800
(240) of T8 fixtures (33%) on 120 multi-level occupant sensors in small offices @ \$65.00 to \$85.00 each	Upgrade	\$ 7,800	\$ 10,200	\$ 9,000
(40) additional CFL fixtures w/ 18 lamps @\$175 - \$250 each	Upgrade	\$ 7,000	\$ 10,000	\$ 8,500
(4) 25-ton Packaged VAV units: EER=10.4, 10,000 cfm; (8) Premium efficiency fan motors; 20% VAV boxes w/reheat	Upgrade	\$ 750	\$ 1,250	\$ 1,000
R-4.2 duct insulation, ducts in conditioned space	-	\$ -	\$ -	\$ -
Standard gas water heater, EF=0.575	-	\$ -	\$ -	\$ -
<b>Total Incremental Cost of Energy Efficiency Measures:</b>		<b>\$ 33,550</b>	<b>\$ 43,050</b>	<b>\$ 38,300</b>
<b>Total Incremental Cost per Square Foot:</b>		<b>\$ 0.63</b>	<b>\$ 0.81</b>	<b>\$ 0.72</b>

### **3.0 Cost Effectiveness**

The summary of results in this section are based upon the following assumptions:

- Annual site electricity (kWh) and natural gas (therms) saved are calculated using a beta version of the state-approved energy compliance software for the 2008 Low-rise Residential Building Energy Efficiency Standards, Micropas 8; and a beta version of the 2008 state-approved energy compliance software, EnergyPro v5, for the high-rise residential and nonresidential occupancies.
- Average utility rates of \$0.173/kWh for electricity and \$1.15/therm for natural gas in current constant dollars
- No change (i.e., no inflation or deflation) of utility rates in constant dollars
- No increase in summer temperatures from global climate change

The Simple Payback data includes a cost-effectiveness analysis of the Ordinance with respect to each case study building design and assumes:

- No external cost of global climate change -- and corresponding value of additional investment in energy efficiency and CO2 reduction – is included
- The cost of money (e.g, opportunity cost) invested in the incremental cost of energy efficiency measures is not included.

### 3.1 New Single Family Houses

#### Climate Zone 3: 15% Better Than Title 24

##### *Single Family*

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
1,582 sf (Option 1)	63	67	\$1,888	\$88	21.5

*Annual Reduction in CO2-equivalent: 808 lb./building-year  
0.51 lb./sq.ft.-year*

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
2,025 sf (Option 1)	81	88	\$1,555	\$115	13.5

*Annual Reduction in CO2-equivalent: 1,061 lb./building-year  
0.52 lb./sq.ft.-year*

### 3.2 Low-rise Multi-family Building

#### Climate Zone 3: 15% Better Than Title 24

##### *Low-rise Apartments*

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
8,442 sf (Option 1)	363	318	\$11,975	\$428	27.9

*Annual Reduction in CO2-equivalent: 3,865 lb./building-year  
0.46 lb./sq.ft.-year*

### 3.3 High-rise Multi-family Building

#### Climate Zone 3: 15% Better Than Title 24

##### *High-rise Apartments*

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
36,800 sf (Option 1)	10032	179	\$40,513	\$1,941	20.9

*Annual Reduction in CO2-equivalent: 6,598 lb./building-year  
0.18 lb./sq.ft.-year*

### 3.4 Nonresidential Buildings

#### Climate Zone 3: 10% Better Than Title 24

##### **2-Story Office Building**

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
21,160 sf (Option 1)	13107	-71	\$19,280	\$2,005	9.6

*Annual Reduction in CO2-equivalent: 5,072 lb./building-year  
0.24 lb./sq.ft.-year*

#### Climate Zone 3: 10% Better Than Title 24

##### **5-Story Office Building**

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
52,900 sf (Option 1)	30228	-70	\$38,300	\$4,745	8.1

*Annual Reduction in CO2-equivalent: 12,788 lb./building-year  
0.24 lb./sq.ft.-year*

### Conclusions

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings under the Union City Green Building Ordinance and the 2008 Title 24 Building Energy Efficiency Standards appears cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental first cost and payback. As with simply meeting the requirements of the Title 24 energy standards, a permit applicant complying with the energy requirements of the Union City Green Building Ordinance should carefully analyze building energy performance to reduce incremental first cost and the payback for the required additional energy efficiency measures.

#### **4.0 Text of the Union City Green Building Ordinance**

As noted in the Executive Summary, the following Ordinance will be amended before final adoption by the City Council to include the following language:

*“Nothing in this ordinance shall require the Applicant to use covered products, as defined in the federal Energy Policy and Conservation Act (42 U.S.C. § 6201 et seq), that exceed any applicable federal energy conservation standards for such products.”*

**CITY COUNCIL ORDINANCE NUMBER # -09**

**ORDINANCE OF THE CITY COUNCIL OF THE CITY OF UNION CITY  
AMENDING CHAPTER 15.76, GREEN BUILDING AND LANDSCAPING PRACTICES,  
OF THE MUNICIPAL CODE TO ESTABLISH MANDATORY GREEN BUILDING  
REQUIREMENTS FOR PRIVATE DEVELOPMENT PROJECTS AND TO MODIFY  
THE CURRENT GREEN BUILDING AND LANDSCAPING REQUIREMENTS FOR  
PUBLICLY FUNDED PROJECTS**

**THE CITY COUNCIL OF THE CITY OF UNION CITY DOES ORDAIN AS  
FOLLOWS:**

**SECTION 1.** Pursuant to Section 18.64 of the City of Union City Municipal Code, the City Council of the City of Union City does hereby find the following textual changes to the Zoning Ordinance to be necessary and desirable to achieve the purposes of Title 18, *Zoning*, of the Municipal Code of the City of Union City and to promote the public health, safety, morals, comfort, convenience, and general welfare of the residents of the City of Union City,

**SECTION 2.** Chapter 15.76 of the Municipal Code is amended as shown in Exhibit A, attached hereto and made a part hereof by this reference, a copy of which is available in the office of the City Clerk,

**SECTION 3.** The proposed amendment to the City's Municipal Code is exempt from further environmental review in accordance with the California Environmental Quality Act (CEQA) Guidelines Section 15308, Actions by Regulatory Agencies for Protection of the Environment.

**SECTION 4.** The proposed standards are cost effective and will require the diminution of energy consumption levels permitted by the 2008 Statewide energy efficiency standards, based upon the findings of the January 21, 2009 study entitled "Energy Cost Effectiveness Case Studies Using the 2008 Title 24 Building Energy Efficiency Standards," adopted by the Stopwaste.Org org Board on April 22, 2009 and made a part hereof by this reference, a copy of which is available in the Economic & Community Development Department.

**SECTION 5.** The proposed Municipal Code Amendment is reasonably necessary because of local climatic, geological, or topographical conditions in accordance with Health and Safety Code Sections 17958.5 and 17958.7:

- A. The City is located in Climate Zone 3, which is characterized by periods of extremely hot, dry weather during the summer and fall months. In addition, during the winter, the City frequently experiences cold days with temperature inversions that trap certain air pollutants near the ground and exacerbate conditions leading to respiratory disease and other health risks. Average temperatures in Union City range from a low of 41.7 degrees in December to a high of 78.6 degrees in August. Topography ranges from approximately one foot above sea level at the Bay edge to over 1,500 feet above sea level in the eastern hills portion of the City. Union City has a relatively high potential for

air quality impacts during the summer and fall. When high pressure dominates, low mixing depths and bay and ocean wind patterns can concentrate and carry pollutants from other cities to Union City, adding to the locally emitted pollutant mix. In winter and spring the air pollution potential in Union City is moderate. These local features contribute to the Bay Area's status as a "nonattainment area" under the federal Clean Air Act for ozone and particulate matter.

- B. In June 2006 ICLEI – Local Governments for Sustainability in partnership with the Alameda County Waste Management Authority & Recycling Board (StopWaste.Org) and the Alameda County Conference of Mayors launched the Alameda County Climate Protection Project. Union City committed to the project and embarked on an ongoing, coordinated effort to reduce the emissions that cause global warming, improve air quality, reduce waste, cut energy use and save money. The City of Union City is committed to reducing community-wide greenhouse gas emissions by 30% below our 2005 levels by 2020. While climate change is a global problem influenced by an array of interrelated factors, climate change is also a local problem with serious impacts foreseen for California, the Bay Area and Union City. Local impacts include:
- i. *Sea level rise:* According to the Union of Concerned Scientists, the sea level in the State of California is expected to rise up to 12 inches of the next hundred years. The Pew Center on Climate Change has reported that this would result in the erosion of beaches, bay shores and river deltas, marshes and wetlands and increased salinity of estuaries, marshes, rivers and aquifers. This increased salinity has the potential to damage or destroy crops in low-lying farmlands. Infrastructure at or near sea level, such as harbors, bridges, roads and even the San Francisco International and Oakland International Airports are at risk of damage and destruction. The San Francisco Bay Area Conservation Commission has modeled the impact of a sea level rise of 3 feet (approx 1 meter) on the San Francisco Bay Area. Areas such as the Oakland Airport would be under water as well parts of Alameda, San Leandro, Hayward, Union City, Fremont and Newark, including sections of Interstate 880. Under this scenario, large portions of the 511 Area west of Union City Boulevard could be under water.
  - ii. *Impacts on water:* Water quality and quantity are at risk as a result of changing temperatures. With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate at which the snowpack melts in the spring. Not only does such snow melt increase the threat for spring flooding, it will decrease the Sierras' capacity as a natural water tower, resulting in decreased water availability for agricultural irrigation, hydroelectric generation and the general needs of a growing population. The Sierra snowpack is the origin of the Mokelumne River, the primary source of water for the jurisdictions within Alameda County.
  - iii. *Natural disasters:* Climate models predict a 4°F temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells,

as well as a 20-30% increase in precipitation in the spring and fall. More frequent and heavier precipitation cause flooding and mudslides, which would incur considerable costs in damages to property, infrastructure and even human life. In addition, the increase of wildfires due to continued dry periods and high temperatures is another expected impact of continued climate change. In these conditions, fires burn hotter and spread faster.

- iv. *Public health impact:* Warming temperatures and increased precipitation can also encourage mosquito-breeding, thus engendering diseases that come with mosquitoes, such as the West Nile Virus, a disease of growing concern in Union City and the surrounding region. Heat waves are also expected to have a major impact on public health and be a determinant factor of mortality. Increased temperatures also pose a risk to human health when coupled with high concentrations of ground-level ozone and other air pollutants, which may lead to increased rates of asthma and other pulmonary diseases. The incidence of bad air days in California's urban areas has increased, mostly in hot summer days. In the summer of 2006, the Bay Area Air Quality Management District (BAAQMD) registered 11 Spare the Air days for the region and exceeded the California 1-hour standard for ozone (set at 90 ppb) 18 times.
- v. *Impacts on plants and vegetation:* Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. The increased flow and salinity of water resources could also seriously affect the food web and mating conditions for fish that are of both of economic and recreational interest to residents. In addition, the natural cycle of plant's flowering and pollination, as well as the temperature conditions necessary for a thriving locally adapted agriculture could be affected, with perennial crops such as grapes taking years to recover.

C. Union City's local climatic, topographic, and geological conditions exacerbate the impacts of global climate change in several ways to make the adoption of green building requirements reasonable and necessary:

- i. Increasing summer temperatures increase the need for air conditioning, thereby increasing average load demand and peak load demand for energy within Union City. This heightened demand increases the risk of power outages and power shortages, with associated adverse public safety and economic impacts. Increased energy demand and usage also increases local and regional air pollution impacts. Decreasing energy consumption through energy efficiency and other green building techniques reduces each of these impacts.
- ii. Increasing summer and year-round temperatures also adversely affect the city's water supply, which is already subject to periodic drought conditions and potential water cutback. Decreasing water usage through conservation, sustainable landscaping (such as Bay-Friendly Landscaping), use of drought-tolerant and native plants, and other green building techniques reduces these adverse impacts.

- D. The City finds that the design, construction, and maintenance of buildings and landscapes within the city can have a significant impact on the city's environmental sustainability, resource usage and efficiency, waste management, and the health and productivity of residents, workers, and visitors to the city.
- E. Green buildings play a significant role in reducing the amount of waste sent to landfills. Construction and demolition debris comprise up to 30% of all materials disposed of in California's landfills, and over 21% of materials disposed of in Alameda County. Many of these materials have green house gas implications once landfilled – from both the process of organic materials breaking down in the landfill and producing methane and other green house gasses, and the energy needed to produce more building materials from raw materials.
- F. This green building ordinance furthers Union City's efforts to enhance the community's social, economic, and environmental well-being and to mitigate the effects of global warming on the city's weather, water supply, physical infrastructure, ecological diversity, human health and economy.

**SECTION 6.** Within fifteen (15) days from and after adoption, this Ordinance shall be published once in the Tri-City Voice, a newspaper of general circulation printed and published in Alameda County and circulated in the City of Union City, in accordance with California Government Code Section 36933. This Ordinance shall take effect and be enforced thirty (30) days after its adoption.

## EXHIBIT A

**Note: All of the existing text within Chapter 15.76 has been replaced with the following wording.**

### CHAPTER 15.76 GREEN BUILDING AND LANDSCAPING PRACTICES

#### 15.76.010 Purpose.

The purpose of this chapter is to create a more environmentally and economically sustainable community by incorporating green measures into the design, construction, demolition, renovation, operation, and maintenance of buildings and landscaping within the city. This chapter establishes requirements for green building and landscaping practices to be used in City-sponsored, public partnership, and privately funded development projects. The green building and landscaping practices referenced in this chapter are designed to reduce landfill waste, conserve natural resources, increase energy efficiency, lower costs associated with operations and maintenance, improve indoor air quality, and minimize impacts on the natural environment.

#### 15.76.020 Definitions.

For the purposes of this chapter, the following definitions shall apply:

A. “Applicant” means any person, firm, partnership, association, joint venture, corporation, or any entity or combination of entities who applies to the City for permits to undertake any construction or renovation for a building and/or landscaping project.

B. “Bay-Friendly Landscape guidelines” means the most recent version of guidelines developed by StopWaste.Org for use in the design, construction, and maintenance of landscapes.

C. “Bay-Friendly Landscape scorecard” means the most recent version of the scorecard developed by StopWaste.Org for the Bay-Friendly Landscape program.

D. “Bay-Friendly Landscaping” means a whole systems approach to the design, construction, and maintenance of the landscape in order to support the integrity of the San Francisco Bay watershed.

E. “Board of Appeals” means a body comprised of one or more hearing officers appointed by the City Council who are qualified by experience and training to pass upon matters pertaining to building construction and are not employees of the jurisdiction.

F. “Build It Green” is a non-profit membership organization that developed the GreenPoint Rating Systems for Residential and Mixed-Use projects in order to promote sustainable buildings.

G. “Building Official” means the Chief Building Official of the City of Union City.

H. “City-sponsored project” means any new construction, renovation, or landscaping project funded by the City or Redevelopment Agency and conducted on City- or Redevelopment Agency-owned property.

I. “Construction” means the building of any facility or structure or any portion thereof including any tenant improvements to an existing facility or structure.

J. “Covered project” shall have the meaning set forth in this chapter.

K. “Green building” means a whole systems approach to the design, construction, operation and maintenance of buildings and structures that helps mitigate the environmental, economic, and social impacts of construction, demolition, and renovation. Green building practices recognize the relationship between natural and built environments and seek to minimize the use of energy, water, and other natural resources and provide a healthy, productive indoor environment.

L. “Green Building in Alameda County” is a program developed by Stopwaste.Org that serves Alameda County Waste Management Authority’s seventeen member agencies, design and building industry professionals, and residents of Alameda County.

M. “GreenPoint Rated” is a third party rating system for homes based on a set of green building measures incorporated from Build It Green’s Green Building Guidelines and used to evaluate a home’s environmental performance.

N. “GreenPoint Rated Checklist” means the most recent version of the checklists developed by Build It Green for the GreenPoint Rated system.

O. “Historical” means any building or site deemed of importance to the history, architecture or culture of an area by an appropriate local, state or federal governmental jurisdiction, including historical buildings or properties on, or determined eligible for, national, state or local historical registers or inventories, such as the National Register of Historic Places, California Register of Historical Resources, State Historical Landmarks, State Points of Historical Interest, and City or county registers, inventories or surveys of historical or architecturally significant sites, places, or landmarks.

P. “LEED™” means the Leadership in Energy and Environmental Design rating system used by the United States Green Building Council.

Q. “LEED™ checklist” means the most recent version of the checklists used by the United States Green Building Council for the LEED™ rating system.

R. “LEED™ Accredited Professional” means an individual who has passed the LEED™ accreditation exam administered by the U.S. Green Building Council.

S. “Mixed-use” means a building with residential and non-residential uses.

T. “Multifamily dwelling” means a building or portion thereof designed or used as a residence for two or more families living independently of each other and doing their own cooking in the building. This definition includes two-family houses, three-family houses, four-family houses, apartment houses and apartment hotels but does not include automobile courts, trailer parks and tourist camps.

U. “Public partnership project” means any new construction or renovation project constructed on City- or Redevelopment Agency-owned land, and/or that includes funding by the City or the Redevelopment Agency, and/or is built under a Development Agreement or Disposition and Development agreement with the Redevelopment Agency.

V. “Public works projects” means construction projects such as pump stations, flood control improvements, roads, bridges, as well as traffic lights, sidewalks, bike paths, bus stops, street median projects, and associated infrastructure on City-owned and maintained property but does not include landscaping projects greater than 5,000 sq. ft.

W. “Remodel” means any change or modification to an existing building or structure, including, but not limited to, tenant improvements.

X. “Secondary dwelling” means an additional dwelling unit on a single-family lot which has kitchen, sleeping and full bathroom facilities, and a separate external access.

Y. “Single-family dwelling” means a detached building designed for or occupied by one family

Z. “Small Commercial Green Building Checklist” is a green building checklist for non-residential new construction, additions, and remodels developed by Green Building in Alameda County.

AA. “Stopwaste.Org” is the Alameda County Waste Management Authority and the Alameda County Source Reduction and Recycling Board operating as one public agency. The Alameda County Waste Management Authority is a public joint-powers agency comprised of the County of Alameda, each of the fourteen cities within the county, and two sanitary districts that provide refuse collection services. Stopwaste.Org offers many programs in the areas of public education, green building, recycled product procurement, waste reduction, and market development.

#### **15.76.030 Applicability.**

A. The following shall be considered Covered Projects for the purposes of this chapter:

1. City-sponsored and public partnership projects. City-sponsored and public partnership building projects initiated on or after the final adoption of the ordinance codified in this chapter, except as otherwise provided herein, whose estimated cost of construction is equal to or greater than three million dollars (to be adjusted annually according to the Building Cost Index published in Engineering News-Record Magazine using 2006 as a base year) and City-sponsored and public partnership landscape projects greater than five thousand square feet.

2. Privately funded projects. Privately funded construction projects, except as otherwise provided herein, for which an application for a building permit is received after January 10, 2010, or after the date the California Energy Commission and California Building Standards Commission approve the green building standards required by this Chapter, whichever date is later, consisting of:

- a. Residential: New construction, additions, or remodels greater than 500 square feet.
- b. Non-Residential: New construction, additions, or remodels

B. The Building Official shall make the final determination as to whether any initiated project qualifies as a Covered Project.

#### **15.76.040 Exemptions.**

The provisions of this Chapter apply to Covered Projects, with the following exemptions

A. City-sponsored and public partnership projects:

1. Historical buildings, as defined by this chapter;

2. Permits issued exclusively for foundation repair, re-roofing, repair of fire damage, work required by termite reports, upgrades for accessibility, or other items of building or structural maintenance, as determined by the Building Official;

3. Public works projects, as defined by this chapter;

4. Projects where it can be demonstrated that complete compliance is not possible due to unusual building circumstances, subject to approval by the City Council;

5. Projects where it can be demonstrated that compliance with this Chapter is not financially feasible by either the City or the Redevelopment Agency, and that the proposed building will provide an overriding benefit to the community, subject to approval by the City Council.

B. Privately funded projects:

1. Historical buildings, as defined by this Chapter;

2. Permits issued exclusively for foundation repair, re-roofing, repair of fire damage, work required by termite reports, upgrades for accessibility, or other items of building or structural maintenance, as determined by the Building Official;

3. Projects that received Site Development Review or Administrative Site Development Review Approval prior to the effective date of the Ordinance.

#### **15.76.050 Standards for compliance.**

A. City-sponsored and public partnership projects:

1. City-sponsored and public partnership buildings that are Covered Projects shall meet a minimum LEED™ Silver rating and be so certified by the US Green Building Council. These projects shall also have a LEED-Accredited Professional as a principal member of the design team.. The LEED™ rating option to be used shall be the one most appropriate for the project, subject to review and approval by the Building Official.

2. City-sponsored and public partnership landscapes that are Covered Projects shall meet the most recent minimum Bay Friendly Landscape Scorecard points recommended by StopWaste.Org.

3. The Director of Public Works Department or his/her designee shall regularly review the project specifications used in bidding public works projects to include the best green building/environmental practices applicable.

4. City-sponsored and public partnership projects that are not considered Covered Projects are encouraged to:

a. Incorporate as many green building measures as feasible from the green building rating system most appropriate for the project, if applicable.

b. Meet as many Bay-Friendly Landscape Scorecard points as feasible, taking into account available resources and design objectives, if applicable.

c. Provide documentation demonstrating level of compliance.

B. Privately funded Covered Projects:

## 1. Residential:

a. Multifamily Residential and Mixed-Use Buildings. Applicants for new multifamily residential and mixed-use Covered Projects shall submit the GreenPoint Rated checklist with their building permit application. Prior to final approval, applicants for new multifamily residential and mixed-use Covered Projects shall submit documentation demonstrating the building(s) has/have been certified through Build it Green. New landscapes shall incorporate Bay-Friendly Landscaping measures.

b. New Single-Family Dwellings and Secondary Dwellings. Applicants for new single-family and secondary dwelling Covered Projects shall submit a GreenPoint Rated checklist with their building permit application. Prior to final approval, applicants shall submit documentation demonstrating the building(s) has/have been certified through Build It Green. New landscapes shall incorporate Bay-Friendly Landscaping measures.

c. Residential Additions, or Remodels Over 500 Square Feet. Prior to building permit submittal, applicants for residential Covered Projects, consisting of remodels and/or additions greater than 500 square feet to existing single-family or multifamily dwellings, shall consult with City staff to consider the incorporation of green building measures into the project and submit a completed GreenPoint Rated Checklist with the building permit application. New landscapes shall incorporate Bay-Friendly Landscaping measures.

## 2. Non-Residential:

a. New Construction, Additions, or Remodels Over 1,000 Square Feet. Applicants for non-residential Covered Projects shall submit the Green Building in Alameda County Small Commercial Green Building Checklist with their building permit application. Plans submitted for building permits shall clearly show where each applicable measure has been incorporated into the project. The plan review shall verify the incorporation of applicable checklist items into the plans. The building inspection process shall verify the inclusion of these items in the construction. Final approval shall not be granted until the incorporation of applicable checklist items is verified. New landscapes shall incorporate Bay-Friendly Landscaping measures.

b. New Construction, Additions, or Remodels Less Than 1,000 Square Feet. Prior to building permit submittal, applicants for non-residential Covered Projects, consisting of remodels and/or additions less than 1,000 square feet, shall consult with City staff to consider the incorporation of green building measures into the project and submit a completed Small Commercial Green Building Checklist with the building permit application.

3. Public Landscaping Installed by Private Development. Landscaping within private development projects to be dedicated to the City for long-term maintenance by the City shall meet the most recent minimum Bay Friendly Landscape Scorecard points and provide documentation demonstrating level of compliance prior to acceptance.

C. Determination of Compliance. The Building Official shall make the final determination as to whether a project has complied with the requirements of this chapter.

D. Alternative Green Building Requirements. A comparable equivalent rating system may be used if the Building Official finds the proposed alternate method is satisfactory and complies with the intent of this Chapter. The applicable systems are those in effect at the time a building permit application is filed.

**15.76.060 Appeal.**

Any person affected by a decision of the Building Official regarding compliance with this Chapter may appeal the decision to the Board of Appeals by filing a notice of appeal with the City Clerk. The Board of Appeals shall be comprised of one or more hearing officers appointed by the City Council. The City Clerk shall give written notice of the time and place of the hearing to the applicant. The decision of the appointed hearing officer(s) is final as to any related Appeals Board and City Council actions.

**Appendix:**

**Alameda County Small Commercial  
Green Building Ordinance Checklist**

# Small Commercial Green Building Checklist



This Commercial Checklist is intended to address new construction and renovations/expansions up to 10,000 square feet or \$3 million. Projects are recommended to meet all applicable measures on the checklist. For measures that are not applicable or are not in the project's scope of work, select "N/A" and make a note of why the measure does not apply to the project. For appendices, electronic copies of this checklist, and other green building resources, visit [www.buildgreennow.org](http://www.buildgreennow.org).

**Project:** \_\_\_\_\_  
**Address:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## Site

*Access to alternative transportation sources reduces the number of single passenger vehicle trips, reduces traffic congestion, and saves fuel and associated greenhouse gas emissions. Allowing space for bike parking increases participation in alternative transportation services. Cool sites and roofs reduce the amount of heat stored and re-radiated during summer days in urban environments that contribute to higher energy use and pollution.*

Yes	No	N/A	Measure & Requirement	Documentation	Notes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>1. Alternative Transportation Access</b> Project is located within 1/4 mile of two or more bus lines AND/OR within 1/2 mile of a light rail or commuter rail transit stop (BART, Amtrak, etc.). Project also includes bicycle racks or storage areas for use by building occupants (workers) in a secure and covered area. If the project is in a high use public area, provide bicycle racks and/or storage options for visitors to the building as well. Provide bike racks or storage area capable of securing at least 1 bike for every 2,000 sf of building space.	1. Provide a simple map showing distances to public transit stops from the main entry of the buildings. Use the "Nearby Routes & Services" calculator on the <a href="http://www.511.org">www.511.org</a> website or other transit agency website to calculate distances from the project address. 2. Provide a site plan that shows bike rack/storage locations. Highlight or circle the bike racks/storage areas and provide a total number of bikes able to be parked at the site. Bike racks dedicated to building occupants (workers) should be in a covered and secure location.	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>2. Reduced Parking</b> Project does not exceed minimum local parking requirements OR the project does not provide any new parking.	1. Provide proof of the minimum local parking requirements for the site OR provide proof that no parking will be added. Minimum parking requirements usually come from the City. 2. If parking is added, provide a site plan with parking areas highlighted. Total and highlight the number of existing and new parking spaces.	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>3. Reduced Heat Island Effect</b> Combine cool roof and/or cool site techniques for 75% of site area being impacted by construction (including roof and all landscaping/hardscapes on site). Cool roofs are reflective surfaces applied to the roof. To find cool roof products, go to <a href="http://www.coolroofs.org">www.coolroofs.org</a> and use the "Rated Products Directory". Cool site techniques include pervious surfaces (including open grid pavement and vegetation) and light colored concrete.	1. Site plan with the following areas calculated and clearly visible (if applicable): total site area, building/roof area, photovoltaic array area, landscape area, area of hardscapes under shade (from trees or awnings, etc.), and hardscape area. 2. Calculate the percent of the total site area that includes cool roof and/or cool site techniques. Photovoltaic panels can be exempt from the calculation if mounted on the roof or if they shade hard surfaces (subtract the photovoltaic array area from the total site area). For low-sloped roofs (<2:12), eligible cool roof materials must have a Solar Reflective Index (SRI) of 78 or higher. If SRI is not available for the cool roof product, then products with an initial solar reflectance of 0.70 or higher AND an initial thermal emittance of 0.75 or higher are acceptable. Steep sloped roofs (>2:12) do not need to comply and should have their square footage removed from calculation. 3. Provide manufacturer literature stating the cool roof SRI.	

# Small Commercial Green Building Checklist



Yes No N/A **Measure & Requirement** **Documentation** **Notes**

## Water

*Water-efficient fixtures reduce water use and sewer costs and reduce demand on water supplies and treatment facilities. For sites that have landscapes, see the Bay-Friendly for Permitted Landscapes checklist at [www.buildgreennow.org](http://www.buildgreennow.org).*

Yes No N/A

### 4. Water Efficient Plumbing Fixtures

<p>The following performance thresholds are required for all new fixtures:</p> <ol style="list-style-type: none"> <li>1. Toilets: High Efficiency Toilets (HETs) with flush rate <math>\leq</math> 1.28 gallons per flush (gpf).</li> <li>2. Urinals: Waterless or low-flow with flush rate <math>\leq</math> 0.5 gpf.</li> <li>3. Faucets: flow rates <math>\leq</math> 1.5 gallons per minute (gpm) for all faucets except kitchen sinks.</li> <li>4. Pre-rinse Spray Valves: flow rates <math>\leq</math> 2.0 gpm.</li> </ol>	<ol style="list-style-type: none"> <li>1. Floor plan(s) with fixture schedule(s) showing location of all new toilets, urinals, faucets and kitchen pre-rinse spray valves in the project. Include flow rates in the fixture schedule.</li> <li>2. Specification sections showing that low-flow fixtures are specified for all new fixtures (if specifications are created for the project).</li> <li>3. Manufacturer literature (cut sheets) showing flush rate of toilets and urinals to be installed, and flow rates for faucets and spray valves.</li> </ol>	
--	---	--

## Energy

*Exceeding energy efficiency minimums results in reduced greenhouse gas emissions, lower utility costs and increased comfort. Another benefit is higher quality construction, thanks to better air sealing, increased insulation, and high efficiency equipment.*

### 5. Improved Energy Efficiency

There are 2 paths for achieving this measure:

Path 1. Performance: For buildings that require Title 24 energy modeling, complete Path 1. Check "N/A" in the Path 2 box.

Path 2. Prescriptive: For projects that do not require energy modeling, complete Path 2. Check "N/A" in the Path 1 box.

Yes No N/A

#### Path 1: Building Energy Modeling

<p>Beat California minimum energy efficiency standards (Title 24, Part 6) by 10% or more.</p>	<ol style="list-style-type: none"> <li>1. Submit Title 24 report for whole building or by component. Percent better than code is determined by energy cost from ECON-1 report.</li> </ol>	
---	---	--

#### Path 2: For projects that DO NOT require building energy modeling: Complete A&B below.

##### A. Select at least 2 of the following prescriptive energy efficiency measures

<input type="checkbox"/>	<p>i. Reduce Lighting Power Density (LPD) in the facility to 90% of code.</p>	<ol style="list-style-type: none"> <li>1. Provide lighting design plans and/or specifications.</li> <li>2. Calculate the total LPD and include on plans or in other format. The LPD can be calculated from lighting design plans or from Title 24 submissions. Must be a maximum of 90% of Title 24 LPD. Do not include occupancy sensor or other switches/control strategies in this calculation.</li> </ol>	
<input type="checkbox"/>	<p>ii. Verify outside air economizer operation.</p>	<ol style="list-style-type: none"> <li>1. Evaluate economizer operation upon startup. Confirm operation of actuator from minimum position to 100% open.</li> <li>2. Verify economizer operates per control sequence (outside air, room set point) to meet space requirements.</li> </ol>	
<input type="checkbox"/>	<p>iii. High performance windows - for all windows replaced.</p>	<ol style="list-style-type: none"> <li>1. Provide plans and/or specifications with window schedule. All new windows must be NFRC rated and have a U-factor no higher than 0.40. Solar Heat Gain Coefficient (SHGC) is dependent on glazing percentage, for buildings with less than 20% glazing, SHGC should be no higher than 0.45. For buildings with more than 20% glazing, SHGC should be no higher than 0.35.</li> <li>2. Provide manufacturer cut sheets or other documentation of NFRC label for windows chosen.</li> </ol>	
<input type="checkbox"/>	<p>iv. All new or replaced windows have low-conductivity frames. Metal frames do not qualify, except those with thermal breaks.</p>	<ol style="list-style-type: none"> <li>1. Provide window schedule or specifications showing all new or replaced windows frames are vinyl, fiberglass, thermally-broken metal, or other non-metal.</li> <li>2. Provide manufacturer cut sheet illustrating frame type.</li> </ol>	

# Small Commercial Green Building Checklist



Yes	No	N/A	Measure & Requirement	Documentation	Notes
<input type="checkbox"/>			v. High Efficiency HVAC Equipment. All new HVAC equipment must comply with the Consortium for Energy Efficiency (CEE) Tier 1 commercial HVAC standards. See <a href="http://www.buildgreennow.org">www.buildgreennow.org</a> for a link to the CEE standards or download them at <a href="http://www.cee1.org/com/com-main.php3">www.cee1.org/com/com-main.php3</a> .	<ol style="list-style-type: none"> <li>1. Provide plans and specifications showing equipment schedule and performance specifications.</li> <li>2. Provide manufacturer literature confirming compliance with CEE Tier 1 standards.</li> </ol>	
<input type="checkbox"/>			vi. Provide on-site renewable energy generation (solar, wind, etc) system capable of producing at least 5% of the building's total electrical load OR at least 10% of the building's hot water demand.	<ol style="list-style-type: none"> <li>1. Provide estimated output and percent of building load to be offset with renewable energy system. Calculations to be provided by a licensed solar installer, electrical contractor, or from the CEC rebate application.</li> <li>2. Provide manufacturer cut sheets for solar panels. If photovoltaics are installed, provide cut sheet for inverter(s).</li> </ol>	
<p><b>B. Select at least 3 of the following prescriptive energy efficiency measures</b></p>					
<input type="checkbox"/>			i. Automatic daylight sensors are installed in at least 75% of spaces with exterior non-north facing windows. Automatic sensors must turn lights on, off, or dim depending on amount of daylight. (B.i and B.iii cannot both be attained on the same project).	<ol style="list-style-type: none"> <li>1. Highlight areas to be daylit on plans (those areas or rooms within 15 feet of skylights or exterior, non-north windows).</li> <li>2. Highlight locations of daylight sensors.</li> <li>3. Provide calculation showing that 75% or more of the space in daylit areas (by square feet or rooms) are under daylighting control.</li> </ol>	
<input type="checkbox"/>			ii. Locate occupancy sensors in 40% of intermittent or non regularly occupied spaces (hallways, bathrooms, closets, private offices). Exclude areas containing mechanical equipment or electrical panels which require light for maintenance activities.	<ol style="list-style-type: none"> <li>1. Provide lighting plans with intermittent/non-regularly occupied spaces highlighted.</li> <li>2. Highlight occupancy sensors on plans that serve these spaces.</li> <li>3. Provide calculation showing that 40% or more of the spaces are controlled by occupancy sensors.</li> </ol>	
<input type="checkbox"/>			iii. Multi-level switching in all "daylit" areas (B.i and B.iii cannot both be attained on the same project).	<ol style="list-style-type: none"> <li>1. Provide lighting plans with daylit areas highlighted (those areas within 15 feet of skylights or exterior, non-north windows).</li> <li>2. Confirm electrical design allows for multi-level switching.</li> </ol>	
<input type="checkbox"/>			iv. All new exit signs in the project are to be LED or nuclear. Recommend replacing all existing exit signs as well, even if not in project scope.	<ol style="list-style-type: none"> <li>1. Provide lighting plans specifying correct signage product.</li> </ol>	
<input type="checkbox"/>			v. Install ENERGY STAR rated office equipment and appliances. For eligible equipment, at least 75% of all new office equipment and 90% of all new appliances must be ENERGY STAR rated. See <a href="http://www.energystar.gov">www.energystar.gov</a> for product lists.	<ol style="list-style-type: none"> <li>1. Submit list of all planned new office equipment and appliances.</li> <li>2. Calculate the percent of planned office equipment and appliances that are to be ENERGY STAR. If ENERGY STAR products are not available for a particular appliance or piece of equipment, note that on the list and do not include those in the percentage calculation.</li> </ol>	
<input type="checkbox"/>			vi. High efficiency heating: If new furnaces are specified, they will have a minimum energy efficiency of 92 AFUE.	<ol style="list-style-type: none"> <li>1. Submit plans or specifications highlighting efficiency of forced air furnace(s).</li> <li>2. Submit manufacturer cut sheet for furnace(s) and highlight efficiency.</li> </ol>	
<input type="checkbox"/>			vii. High efficiency water heating: Specify gas water heaters above 0.65 EF or preferably a condensing hot water heater at 0.86. Avoid electric hot water heaters. Specify boilers with efficiency of 90% or more. (This excludes all tankless water heaters and any small kitchen or bathroom water heaters under 5 gallons.)	<ol style="list-style-type: none"> <li>1. Submit plans or specifications highlighting efficiency of water heater(s) or boiler(s).</li> <li>2. Submit manufacturer cut sheet for water heaters/boilers and highlight efficiency.</li> </ol>	

# Small Commercial Green Building Checklist



Yes	No	N/A	Measure & Requirement	Documentation	Notes
<input type="checkbox"/>			viii. Tight ducts: Duct testing and sealing for all ductwork.	<ol style="list-style-type: none"> <li>1. Submit evidence that duct sealing and testing will be performed. This could be in the specifications; be a HERS duct testing contract or report; or other documentation that ducts will be sealed and tested.</li> <li>2. Provide final duct testing report.</li> </ol>	
<input type="checkbox"/>			ix. Develop and implement an Operations & Maintenance (O&M) Plan for the building. Download a guide to green O&M at <a href="http://www.StopWaste.Org/EPP">www.StopWaste.Org/EPP</a> .	<ol style="list-style-type: none"> <li>1. Develop an O&amp;M plan for the project. The plan should address all that apply: building lighting, heating, cooling, plumbing, solar, rainwater catchment, irrigation/landscaping practices and other systems as well as more general building policies (such as green cleaning, environmental purchasing, etc). The plan should describe accessibility of units, proper maintenance techniques, descriptions of proper use, model numbers &amp; cut sheets, manufacturer contact information for replacement/repair/questions. The plan should include switching/controls diagrams, lighting plans, heating, cooling, plumbing, solar, rainwater, irrigation/landscaping practices.</li> <li>2. Submit signed O&amp;M plan from the owner saying that the O&amp;M plan will be followed once occupied.</li> </ol>	

## Materials

*Construction materials constitute about 22% of the disposed waste stream statewide. Many of these materials can be reduced, reused or recycled. Recycling reduces the amount of material entering landfills and can save money for building owners through reduced disposal and operating fees. Buying environmentally preferable new products can reduce the impact on raw materials extraction and disposal at end of life.*

Yes No N/A

### 6. Construction Waste Management

			<p>During construction, divert 100% of concrete and asphalt concrete and divert at least 65% of remaining job site construction waste from landfill via recycling or reuse.</p>	<ol style="list-style-type: none"> <li>1. Prior to construction, complete a construction waste management plan. The City should provide a sample template, or one can be downloaded at <a href="http://www.buildgreennow.org">www.buildgreennow.org</a>.</li> <li>2. After construction, provide final waste management plan and verification (service provider weight tags and/or receipts) that 100% of concrete and asphalt concrete were diverted and at least 65% of remaining job site construction waste diverted from landfill via recycling or reuse. If material was taken to a transfer station, a facility average recycling rate must be applied to the amount of material sent to that facility.</li> </ol>	
--	--	--	---	---	--

### 7. Environmentally Preferable Materials

Achieve at least 5 Environmentally Preferable Materials from i-xiv below.  
 Materials or finishes listed below meet at least one of the following environmentally preferable criteria: Plywood/MDF/wood is FSC certified; salvaged/reclaimed materials (including onsite materials); flyash in concrete; rapidly renewable materials (bamboo, etc); recycled content materials (at least 40% combined pre and post consumer); exposed concrete (for flooring only); or low-emitting (Volatile Organic Compounds (VOCs) and other chemicals. See [www.buildgreennow.org](http://www.buildgreennow.org) for links and resources on Environmentally Preferable Materials.

			<p>i. Cabinets &amp; Shelving (includes boxes, face frames and doors).  <i>At least 50% of cabinets and shelving (by volume or linear feet) meet environmentally preferable criteria.</i></p>	<ol style="list-style-type: none"> <li>1. Provide finish schedule or specifications with applicable material(s) highlighted.</li> <li>2. Provide manufacturer literature to support environmental claims of material (recycled content %, FSC certification, etc.).</li> <li>3. Provide calculation of applicable material percentage.</li> </ol>	
			<p>ii. Interior Trim (includes all trim for floors, doors, walls, ceilings, windows, wainscot).  <i>At least 50% of all interior trim (by volume or linear feet) meet environmentally preferable criteria.</i></p>	<ol style="list-style-type: none"> <li>1. Provide finish schedule or specifications with applicable material(s) highlighted.</li> <li>2. Provide manufacturer literature to support environmental claims of material.</li> <li>3. Provide calculation of applicable material percentage.</li> </ol>	

# Small Commercial Green Building Checklist



Yes	No	N/A	Measure & Requirement	Documentation	Notes
<input type="checkbox"/>			iii. Doors and Door Cores <i>At least 50% of all doors (by count) meet environmentally preferable criteria.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			iv. Countertops and Substrates. <i>At least 50% of all countertops and substrates (by volume or linear feet) meet environmentally preferable criteria.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			v. Furniture (Includes systems and stand-alone furniture). <i>At least 75% of all furniture (by number of pieces or by cost) meet environmentally preferable criteria.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of furniture. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			vi. Ceiling Tiles. <i>At least 75% of all ceiling tile (by square feet) meet environmentally preferable criteria.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			vii. Insulation. <i>At least 75% of all insulation (by volume, square feet, or cost) meet environmentally preferable criteria.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			viii. Flooring. <i>At least 50% (by square feet) of all flooring (exposed or stained concrete) or floor coverings (carpet, resilient flooring, tile, hardwood, etc.) meet environmentally preferable criteria.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			ix. Flyash in Concrete <i>Achieve 15% flyash as percentage of portland cement for all new concrete poured.</i>	1. Provide proposed mix designs showing flyash as percentage of portland cement. 2. Provide calculation showing planned 15% flyash for total new poured concrete (ensure that flyash is percentage of portland cement).	
<input type="checkbox"/>			x. Exterior Paint. <i>At least 50% of all exterior paint (by square footage or volume) is recycled content (40%+).</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature showing recycled content. 3. Provide calculation of applicable material percentage.	
<input type="checkbox"/>			xi. Low-Emitting Interior Paint. <i>All interior paints are low emitting: <math>\leq 50</math> grams/liter for flat paints, <math>\leq 150</math> g/L for non-flat paints and other coatings.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide documentation that all paints and coatings are low-emitting. Provide MSDS sheets.	
<input type="checkbox"/>			xii. Low-Emitting Adhesives & Sealants. <i>All adhesives and sealants are low-emitting according to the South Coast Air Quality Management District Rule 1168 (see <a href="http://www.aqmd.gov/rules/req/req11/r1168.pdf">www.aqmd.gov/rules/req/req11/r1168.pdf</a> for VOC limits).</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide documentation that all adhesives and sealants are low-emitting. Provide MSDS sheets.	

# Small Commercial Green Building Checklist



Yes	No	N/A	Measure & Requirement	Documentation	Notes
<input type="checkbox"/>			xiii. Low-Emitting Carpeting. <i>All carpeting, carpet pads, and adhesives are certified Green Label Plus per the Carpet and Rug Institute (CRI). See <a href="http://www.carpet-rug.org">www.carpet-rug.org</a> for label requirements and product lists.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide CRI Green Label Plus documentation.	
<input type="checkbox"/>			xiv. Low-Emitting Composite Wood. <i>All interior composite wood (MDF, plywood, particleboard, etc.) contain no added urea formaldehyde.</i>	1. Provide finish schedule or specifications with applicable material(s) highlighted. 2. Provide manufacturer literature to support environmental claims of material. 3. Provide MSDS sheets of composite wood.	

  

## 8. Collection of Recyclables

Encourage ongoing recycling by providing at least as much bin volume for recycling as for waste. Additionally, recycle at least 5 of the following material streams: glass, plastic, cardboard, aluminum, food scraps, hazardous waste (fluorescent lamps, batteries, oil, etc.), and e-waste (computer equipment).	1. Provide plans showing recycling receptacles are provided in all applicable areas: offices, private rooms, meeting rooms, kitchens, etc. 2. Provide calculation of adequate recycling volume. 3. Provide evidence of recycling for at least 5 of the material streams. Submit recycling hauler information for recyclables and food scraps. Provide a short narrative on how the facility will collect and recycle hazardous and e-waste.	
---	---	--

## Indoor Environment & Air

Effective daylighting and natural ventilation may improve indoor environmental quality. Natural ventilation can reduce heating and cooling requirements and may justify smaller, simpler HVAC systems, which can reduce the project's first costs. Ventilation (natural or mechanical) improves indoor air quality. Daylighting can offset some of the electric lighting load.

Yes No N/A

  

## 9. Daylight, Views & Natural Ventilation

Provide access to views to the outdoors (any window or skylight can provide a view) from 80% of regularly occupied areas. Operable windows are recommended for all projects; required if 2 or more walls have windows or access to outdoor air and there is not a security compromise by having operable windows.	1. Provide site plans with view areas highlighted (those areas within sightline of skylights or exterior windows). 2. Calculate percent of regularly occupied areas with/without access to views. 3. Provide window schedule showing operable and non-operable windows.	
---	---	--

  

## 10. Fresh Air Monitors for Densely Occupied Spaces

For systems with moveable outside air dampers: For all densely occupied spaces, such as multi-purpose rooms or conference rooms, provide CO2 monitors with alarms (example: small visual indicator such as a light to alert building occupants or building operator), and the ability to manually adjust air flow.	1. Provide mechanical plans with CO2 monitors highlighted. 2. Confirm alarm function (user adjustable) of Building Automation System. Verify control sequence resulting from "alarm" in Sequence of Operations. 3. Provide Title 24 "Acceptance" forms. 4. Written confirmation that testing, adjusting and balancing (TAB) contractor will adjust and balance the moveable outside air damper to provide cooling as required for air conditioning the space. When CO2 monitor located within referenced AC unit's conditioned space sends an alarm signal the economizer damper actuator shall open outside air damper to provide 30% more air than the minimum damper setting.	
--	---	--