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

January 31, 2011

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1.0 Executive Summary for the Tiburon Green Building Ordinance

The Tiburon Town Council adopted their Green Building Ordinance on January 19, 2011 including review and approval of energy cost-effectiveness based on the *Marin County Green Building Ordinance Energy Cost-Effectiveness Study* (dated 12/10/09 and contained in the Appendix). The new ordinance is scheduled to take effect under the state's 2008 Building Energy Efficiency Standards on or around April 1, 2011. 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 Tiburon Green Building Ordinance

New ordinance or revision to previous ordinance?	New Ordinance
Projected Effective Date:	April 1, 2011
Green building or stand-alone energy ordinance?	Energy Efficiency Ordinance
Do minimum energy requirements increase after initial effective date?	No
Occupancies covered?	Single Family Homes > 3,500 sf
Energy requirements apply to new construction, additions, alterations?	New Construction and Additions > 500 sf
Special or unusual energy requirements?	Yes
Third party verification?	No
Implementation details in the ordinance or in a separate document?	Within the Ordinance

Key Features of the Tiburon Ordinance By Occupancy Type

Occupancy Type	General Requirements	Minimum Energy Requirement Effective April 1, 2011
Single Family Residential Buildings:		
3,501 sf - 4,499 sf	Not Applicable	**8.2% Better-than-Title 24**
4,500 sf - 5,499 sf	Not Applicable	**17.4% Better-than-Title 24**
5,500 sf - 6,499 sf	Not Applicable	**30.0% Better-than-Title 24**
6,500+ sf	Not Applicable	**37.1% Better-than-Title 24**

ORDINANCE NO. 523 N. S. (DRAFT)

AN ORDINANCE OF THE TOWN COUNCIL OF THE TOWN OF TIBURON AMENDING PROVISIONS OF TITLE IV, CHAPTER 13 OF THE TIBURON MUNICIPAL CODE (BUILDING REGULATIONS)

The Town Council of the Town of Tiburon does ordain as follows:

Section 1. Findings.

A. The Town Council held a public hearing on January 5, 2011, and has heard and considered any and all public testimony on this matter.

B. The Town Council finds that all notices and procedures required by law attendant to the adoption of this Ordinance have been followed.

C. The Town Council finds that the amendments made by this Ordinance are necessary for the protection of the public health, safety, and welfare.

D. The Town Council has found that the amendments made by this Ordinance are consistent with the goals and policies of the Tiburon General Plan.

E. The Town Council finds that the adoption of this Ordinance is ministerially exempt from the requirements of CEQA and is also exempt pursuant to Section 15061(b)(3) of the CEQA Guidelines.

Section 2. Amendments.

Tiburon Municipal Code Title IV, Chapter 13 (Building Regulations) is hereby amended as follows:

A. Article I (In General) of Chapter 13 of the Tiburon Municipal Code is amended in its entirety to read as follows:

13-1 Building Inspection Division and Building Official position established.

(a) There is established a building inspection division of the town pursuant to section 103 of the California Building Code as adopted in Article II of this chapter.

(b) The position of building official is hereby established and the Building Official shall act as the administrative head of the building division of the town.

13-2 Permits required.

(a) Building permits. No person shall erect, construct, enlarge, alter, ~~repair~~, move, improve, ~~remove~~, ~~correct~~ ~~or~~ demolish, or perform non-maintenance related repairs to any building or structure in the town, or cause the same to be done, without first obtaining a separate building permit for each such building or structure, as required by the Technical Codes adopted in Article II of this chapter, from the Building Inspection Division.

(b) Plumbing permits. No person shall do or cause or permit to be done any plumbing or sanitary drainage work without first obtaining a permit for such work, as required by the Technical Codes adopted in Article II of this chapter, from the building inspection division.

(c) Heating and comfort cooling permits. No person shall install, alter, construct or perform non-maintenance related repairs to any heating, ventilating, comfort cooling or refrigeration equipment without first obtaining a permit for such work, as required by the Technical Codes adopted in Article II of this chapter, from the Building Inspection Division.

(d) Electrical permits. No person shall do any wiring or install any fixed electrical equipment without first obtaining a permit for such work, as required by the Technical Codes adopted in Article II of this chapter, from the building inspection division.

(e) Excavation and grading permits. Except as exempted in Appendix J, Section 103.2 of the California Building Code adopted in Article II of this chapter, no person shall do any excavating or grading without first obtaining a grading permit from the building inspection division.

(f) Swimming pools and similar. No person shall install, alter, or perform non-maintenance related repairs to any swimming pool, hot tub or spa without first obtaining a permit for such work, as required by the Technical Codes adopted in Article II of this chapter, from the building inspection division.

(g) The building official may impose supplemental permit conditions that are in his reasonable discretion necessary to promote the public health, safety or welfare.

13-3 Fees.

(a) Before any permit required by this chapter is issued, the applicant shall pay to the building inspection division the prescribed fee as established by the current Building Division Fee Schedule adopted by resolution of the town council. If any work that requires a permit is commenced without a permit having first been obtained, the fee for the required permit shall be as set forth in the current Building Division Fee Schedule adopted by resolution of the town council and the penalty shall be as set forth in the current Schedule of Fines adopted by resolution of the town council.

(b) Where it is found that work is being done under this chapter without a permit and that such work would, under the terms of this chapter, require a permit,

there shall be charged an investigation fee in the amount established in the current Building Division Fee Schedule adopted by resolution of the town council. The investigation fee shall be in addition to all other fees and fines/penalties set forth in subsection (a).The fees and penalties shall be paid before any application for permit shall be considered.

(c) Where more than one reinspection of any item requiring inspection has to be made because work has not been ready or defects have not been corrected, a fee, as established in the current Building Division Fee Schedule adopted by resolution of the Town Council, will be charged for each additional reinspection, and shall be paid before final approval of the work.

(d) No permit for new work on a property shall be issued until all outstanding fines, fees, and/or penalties have been paid and all inspections completed on work performed under previously-issued permits that have not been finaled and have expired by limitation.

B. Article II (Technical Codes) of Chapter 13 of the Tiburon Municipal Code is amended in its entirety to read as follows:

13-4 Adoption by reference of technical codes.

For the purpose of establishing proper regulations for building construction, for the installation of plumbing, gas appliances and electrical systems, and for the storage and handling of flammable liquids, the codes or portions thereof set forth in this article are adopted and are made a part of this chapter by reference without further publication or posting thereof, and not less than one certified copy, along with the deletions and exceptions therefrom and additions and amendments thereto, shall be kept on file for use and examination by the public in the office of the town clerk.

13-4.1 Building Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety and welfare of the general public, that certain code known as the 2010 California Building Code, (based on the International Building Code, 2009 Edition), Volume 1 and Volume 2, including the following appendices: Appendix Chapter 1, and Appendices F, H, I and J as published by the California Building Standards Commission in the California Code of Regulations, Title 24, Part 2, hereinafter referred to as the "California Building Code", save and except such portions as are hereinafter amended or modified by Section 13-4.1.1 of this chapter.

13-4.1.1 Amendments made to the 2010 California Building Code.

The California Building Code is amended to read as follows:

(a) Section 1.8.5.1 is amended to read as follows:

1.8.5.1 General. Subject to the provisions of law, including Code of Civil Procedure Section 1822.50 et. seq., officers and agents of the building official may enter and inspect public and private properties to secure compliance with the provisions of this code and the rules and regulations promulgated by the department of housing and community development. For limitations and additional information regarding enforcement, see the following:

(The remainder of this section is unchanged.)

(b) Section 1.8.8.1 is amended by adding a sentence to the end that reads as follows:

Nothing contained in this section shall prevent the town council from appointing the town council as the local appeals board or housing appeals board.

(c) Chapter 1, Division II is modified as follows:

(1) Section 104.6 is amended to add the following phrase to the end of the last sentence:

", including the warrant provisions of Section 1822.50 et. seq. of the Code of Civil Procedure of the State of California."

(2) Section 105.2 is amended to delete subsections 2, 4, 5, 6, and 12, and to revise subsections 1 and 7 as follows:

1. Detached accessory structures used as playhouses or play structures providing the floor area does not exceed 120 square feet, the structure does not exceed twelve feet in height as defined by Article X, Section 16-100 of the Tiburon Municipal Code, and the structure contains no plumbing, electrical or heating appliances.

7. Painting, papering, tiling, carpeting, counter tops and similar finish work, except that repaving and/or restriping of parking lots shall require a permit.

(3) Section 105.5 is amended to read as follows:

1. All permits issued by the Building Official shall expire by limitation and become null and void eighteen months from the date the permit is issued, except as follows:

a. Where the project is unusually large or complex, a twenty-four month permit may be issued in the reasonable discretion of the Building Official at the time of initial application; or

b. Where the permittee has proceeded with due diligence and made substantial progress but is unable to complete the project because of unforeseen circumstances beyond the control of the permittee, one extension of up to six months may be granted, without payment of additional fees or penalties. In determining whether due diligence has been exercised, the Building Official shall consider whether work began promptly after permit issuance, whether work was conducted on a regular basis and any other relevant facts. Decisions of the Building Official made pursuant to this paragraph may be appealed to the local appeals board.

2. Once the initial permit and/or approved six month extension has expired, a Stop Work Order shall be issued and work shall not recommence until the permit is reactivated. Reactivation shall be allowed only if there have been no changes in the original plans and specifications and a Reactivation Charge equal to the full original fee is paid. A Reactivation Charge, for purposes of this section, is both a fee to recover the cost of providing additional building inspection division services and a penalty for failure to complete the project within the allotted time. A permit reactivated under this subsection shall be valid for six months from the date of initial expiration.

3. If the project is not completed within the six month extension allowed under subsection (2) above, a Stop Work Order shall be issued on the date of expiration and work shall not recommence until the permit is reactivated. Reactivation of the permit for a second six month period shall be allowed only if there have been no changes in the original plans and specifications and a Reactivation Charge equal to three times the full original fee is paid. The Building Official may, in his sole discretion, reduce the penalty based on such reasons as the project's nearness to completion and/or the cause of the delay. A permit reactivated under this subsection shall be valid for an additional six months from the date of initial expiration.

4. If the project is not completed within the six month extension allowed under subsection (3) above, a Stop Work Order shall be issued and the matter referred to the local appeals board for resolution. The local appeals board may reactivate the permit upon submission and acceptance of a completion schedule for the project and payment of five times the full original fee as a Reactivation

Charge, and provided that there have been no changes in the original plans and specifications. The local appeals board may, in its sole discretion, reduce the penalty based on such reasons as the project's nearness to completion and/or the cause of the delay.

5. If the project is not completed within the six month extension allowed under subsection (4) above, or pursuant to this subsection (5), a Stop Work Order shall be issued and the matter referred to the local appeals board for resolution. The local appeals board may impose additional requirements, such as the retention of a qualified contractor for owner/builder projects or retention of a qualified construction manager for a contracted project, in order to promote swift completion. The local appeals board may reactivate the permit upon imposition of any such conditions deemed reasonable, and payment of five times the full original fee as a Reactivation Charge, provided that there have been no changes in the original plans and specifications.

(5) Section 109.2 is amended to read as follows:

109.2 Schedule of Fees.

On buildings, structures, electrical, gas, mechanical and plumbing system alterations requiring a permit, a fee for each permit shall be required as set forth in the Building Division Fee Schedule as adopted by resolution of the Tiburon Town Council and amended from time to time.

(6) Section 109.4 is amended to read as follows:

109.4 Work commencing before permit issuance.

Any person who commences any work without a permit on a building, structure, electrical, gas, mechanical or plumbing system before obtaining the necessary permits shall be subject to a penalty as set forth in the Town's Schedule of Fines, established by resolution of the Tiburon Town Council and amended from time to time.

(7) Section 113.3 is amended by adding thereto the following sentence:

Nothing contained in this section shall prevent the town council from appointing the town council as the board of appeals.

(d) Section 501.2 is amended to read as follows:

501.2 Address Numbers.

1. The following standards for address markings shall apply to residential buildings:

    a. All residential structures shall display a street number in a prominent position so that it shall be easily visible from the street. The numerals in these numbers shall be no less than four inches in height, and one-half inch in width, of a color contrasting to the background and located so they may be clearly seen and read. If a building is not easily visible from the street, then the numbers are to be mounted at the access drive leading to the building.
    b. At each vehicular access to a multiple family dwelling complex having four or more buildings, there shall be an illuminated diagrammatic representation (plot plan) of the complex, which shows the location of the viewer and the building units within the complex.
    c. In multiple family dwelling complexes, any building having a separate identifying factor other than the street number shall be clearly identified in the manner described in subsection a. Each individual unit of residence shall have a unit identifying number, letter, or combination thereof displayed upon the door.
    d. Maps of the multiple family complex will be furnished to the police and fire departments upon completion of construction. The maps shall include building identification and unit identification.
    e. Buildings shall be numbered in such a manner and sequence as to meet with the approval of the enforcing authority.
    f. This section shall not prevent supplementary numbering such as reflective numbers on street curbs or decorative numbering, but this shall be considered supplemental only and shall not satisfy the requirements of this section.

2. The following standards for address markings shall apply to commercial buildings:

    a. The address number of every commercial building shall be located and displayed so that it shall be easily visible from the street.
    b. The numerals in these numbers shall be no less than six inches in height, one-half inch in width, and of a color contrasting to the background. In addition, any business which affords vehicular access to the rear through any

driveway, alleyway, or parking lot shall also display the same numbers on the rear of the building.

c. When required by the building official, approved numbers or addresses shall be placed on all new and existing buildings in such a position as to be plainly visible and legible from the fire apparatus road at the back of a property or where rear parking lots or alleys provide an acceptable vehicular access. Number height and width shall comply with Section 501.2.

(e) Section 903.2, first sentence, is amended to read as follows:

903.2 Where required.

Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in this section, provided that where applicable code provisions adopted by either the Tiburon Fire Protection District or Southern Marin Fire Protection District are more restrictive, the latter shall control.

(f) Section 1013.1 is amended by adding the following sentence:

Guards are also required at waterfront bulkheads, fixed piers and gangways.

(g) Section 1505 is amended to read as follows:

The roof covering on any structure regulated by this code shall be as specified in California Building Code Chapter 15 with the following conditions:

1. All new buildings and new additions shall have at least a Class A-listed or noncombustible roof covering.
2. Where alterations or repairs to existing roofs involve more than fifty percent of the total area of an existing building within a one year time period, the entire roof shall be retrofitted with at least a Class A-listed or noncombustible roof.
3. Where applicable code provisions adopted by either the Tiburon Fire Protection District or Southern Marin Fire Protection District are more restrictive, the latter shall control.

(h) Appendix J “GRADING” is amended as follows:

J103.3 Grading Permit Fees. Fees shall be as set forth in the Building Division Fee Schedule established by resolution of the Tiburon Town Council as amended from time to time.

J110.3 Mud, Loose Dirt, or Debris on Public Street. No person, firm or corporation who has a valid building, demolition or grading permit shall permit any mud, loose dirt or debris to be removed from the job site and deposited on any public street or sidewalk.

13-4.2 Residential Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety, and welfare of the general public, that certain code known as the 2010 California Residential Code (based on the International Residential Code, 2009 edition), including Appendices G, H, and J published by the International Code Council, and as amended by the California Building Standards Commission in the California Code of Regulations, Title 24, Part 2.5, hereinafter referred to as the "California Residential Code," save and except such portions as are hereinafter amended or modified by Section 13-4.2.1 of this chapter.

13-4.2.1 Amendments to the 2010 California Residential Code.

The 2010 California Residential Code is amended as follows:

(a) Section 1.8.5.1 is amended to read as follows:

1.8.5.1 General. Subject to the provisions of law, including Code of Civil Procedure Section 1822.50 et. seq., officers and agents of the building official may enter and inspect public and private properties to secure compliance with the provisions of this code and the rules and regulations promulgated by the department of housing and community development. For limitations and additional information regarding enforcement, see the following:

(The remainder of this section is unchanged.)

(b) Section 1.8.8.1 is amended by adding a sentence to the end that reads as follows:

"Nothing contained in this section shall prevent the town council from appointing the town council as the local appeals board or housing appeals board."

(c) Chapter 1, Division II is modified as follows:

(1) Section 104.6 is amended to add the following phrase to the end of the last sentence:

", including the warrant provisions of Section 1822.50 et. seq. of

the Code of Civil Procedure of the State of California."

(2) Section 105.2 is amended to delete (building) subsections 2, 3, 4, 5, 9, and 10, and to revise subsections 1 and 6 to read as follows:

1. Detached accessory structures used as playhouses or play structures providing the floor area does not exceed 120 square feet, the structure does not exceed twelve feet in height as defined by Article X, Section 16-100 of the Tiburon Municipal Code, and the structure contains no plumbing, electrical or heating appliances.

6. Painting, papering, tiling, carpeting, counter tops and similar finish work, except that repaving and/or restriping of parking lots shall require a permit.

(3) Section 105.5 is amended to read as follows:

Section 105.5 Expiration.

1. All permits issued by the Building Official shall expire by limitation and become null and void eighteen months from the date the permit is issued, except as follows:

   a. Where the project is unusually large or complex, a twenty-four month permit may be issued in the reasonable discretion of the Building Official at the time of initial application; or

   b. Where the permittee has proceeded with due diligence and made substantial progress but is unable to complete the project because of unforeseen circumstances beyond the control of the permittee, one extension of up to six months may be granted, without payment of additional fees or penalties. In determining whether due diligence has been exercised, the Building Official shall consider whether work began promptly after permit issuance, whether work was conducted on a regular basis and any other relevant facts. Decisions of the Building Official made pursuant to this paragraph may be appealed to the local appeals board.

2. Once the initial permit and/or approved six month extension has expired, a Stop Work Order shall be issued and work shall not recommence until the permit is reactivated. Reactivation shall be allowed only if there have been no changes in the original plans and specifications and a Reactivation Charge equal to the full original fee

is paid. A Reactivation Charge, for purposes of this section, is both a fee to recover the cost of providing additional building inspection division services and a penalty for failure to complete the project within the allotted time. A permit reactivated under this subsection shall be valid for six months from the date of initial expiration.

3. If the project is not completed within the six month extension allowed under subsection (2) above, a Stop Work Order shall be issued on the date of expiration and work shall not recommence until the permit is reactivated. Reactivation of the permit for a second six month period shall be allowed only if there have been no changes in the original plans and specifications and a Reactivation Charge equal to three times the full original fee is paid. The Building Official may, in his sole discretion, reduce the penalty based on such reasons as the project's nearness to completion and/or the cause of the delay. A permit reactivated under this subsection shall be valid for an additional six months from the date of initial expiration.

4. If the project is not completed within the six month extension allowed under subsection (3) above, a Stop Work Order shall be issued and the matter referred to the local appeals board for resolution. The local appeals board may reactivate the permit upon submission and acceptance of a completion schedule for the project and payment of five times the full original fee as a Reactivation Charge, and provided that there have been no changes in the original plans and specifications. The local appeals board may, in its sole discretion, reduce the penalty based on such reasons as the project's nearness to completion and/or the cause of the delay.

5. If the project is not completed within the six month extension allowed under subsection (4) above, or pursuant to this subsection (5), a Stop Work Order shall be issued and the matter referred to the local appeals board for resolution. The local appeals board may impose additional requirements, such as the retention of a qualified contractor for owner/builder projects or retention of a qualified construction manager for a contracted project, in order to promote swift completion. The local appeals board may reactivate the permit upon imposition of any such conditions deemed reasonable, and payment of five times the full original fee as a Reactivation Charge, provided that there have been no changes in the original plans and specifications

(d) Section R319.1 is amended to read as follows:

R319.1 Address Numbers.

(1) The following standards for address markings shall apply to residential buildings:

a. All residential structures shall display a street number in a prominent position so that it shall be easily visible from the street. The numerals in these numbers shall be no less than four inches in height, and one-half inch in width, of a color contrasting to the background and located so they may be clearly seen and read. If a building is not easily visible from the street, then the numbers are to be mounted at the access drive leading to the building.

b. At each vehicular access to a multiple family dwelling complex having four or more buildings, there shall be an illuminated diagrammatic representation (plot plan) of the complex, which shows the location of the viewer and the building units within the complex.

c. In multiple family dwelling complexes, any building having a separate identifying factor other than the street number shall be clearly identified in the manner described in subsection a. Each individual unit of residence shall have a unit identifying number, letter, or combination thereof displayed upon the door.

d. Maps of the multiple family complex will be furnished to the police and fire departments upon completion of construction. The maps shall include building identification and unit identification.

e. Buildings shall be numbered in such a manner and sequence as to meet with the approval of the enforcing authority.

f. This section shall not prevent supplementary numbering such as reflective numbers on street curbs or decorative numbering, but this shall be considered supplemental only and shall not satisfy the requirements of this section.

(e) Section 1013.1 is amended by adding the following sentence:

"Guards are also required at waterfront bulkheads, fixed piers and gangways."

(f) Sections R313.3, first sentence, is amended to read as follows:

R313.3 Where required.

Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in this section, provided that where

applicable code provisions adopted by either the Tiburon Fire Protection District or Southern Marin Fire Protection District are more restrictive, the latter shall control.

(g) Section R905 is amended to read as follows:

The roof covering on any structure regulated by this code shall be as specified in California Residential Code Chapter 9 with the following conditions:

1. All new buildings and new additions shall have at least a Class A-listed or noncombustible roof covering.
2. Where alterations or repairs to existing roofs involve more than fifty percent of the total area of an existing building within a one year time period, the entire roof shall be retrofitted with at least a Class A-listed or noncombustible roof.
3. Where applicable code provisions adopted by either the Tiburon Fire Protection District or Southern Marin Fire Protection District are more restrictive, the latter shall control.

13-4.3 Plumbing Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety and welfare of the general public, that certain code known as the 2010 California Plumbing Code, (based on the Uniform Plumbing Code, 2009 Edition), including Appendices A, B, D, I, and L published by the International Association of Plumbing and Mechanical Officials, and as amended by the California Building Standards Commission in the California Code of Regulations, Title 24, Part 5, hereinafter referred to as the "California Plumbing Code", save and except such portions as are hereinafter amended or modified by Section 13-4.3.1 of this chapter.

13-4.3.1 Amendments made to the 2010 California Plumbing Code.

The 2010 California Plumbing Code is amended as follows:

(a) Section 1.8.5.1 is amended to modify the first sentence to read as follows:

Section 1.8.5.1 General. Subject to the provisions of law, including Section 1822.50 et. seq. of the Code of Civil Procedure of the State of California, officers and agents of the building official may enter and inspect public and private properties to secure compliance with the provisions of this code.

(The remainder of this section is unchanged)

(b) Section 1.8.8.1 is amended by adding the following sentence:

Nothing contained in this section shall prevent the town council from appointing the town council as the local appeals board or housing appeals board.

(c) Section 203.0 is amended to read as follows:

The definition of "AUTHORITY HAVING JURISDICTION" is amended to read as follows:

AUTHORITY HAVING JURISDICTION -- The Authority Having Jurisdiction shall mean the building official or his duly authorized representative.

(d) Section 207.0 is amended as follows:

The definition of "ENFORCING AGENCY" is amended to read as follows:

ENFORCING AGENCY -- The enforcing agency shall be the Building Division of the Community Development Department of the Town of Tiburon.

(e) Chapter 1, Division II is amended as follows:

(1) Section 101.1 is amended to read as follows:

These regulations shall be known as the California Plumbing Code, may be cited as such, and will be referred to herein as "this code".

(2) Section 103.2.1 is amended to read as follows:

103.2.1 Application. To obtain a permit, the applicant shall apply to the Authority Having Jurisdiction for that purpose. Every such application shall:

(The remainder of this section is unchanged.)

(3) Section 103.4.1 is amended to read as follows:

103.4.1 Permit Fees. Any person desiring a permit required by this code shall, at the time of issuance therefore, pay a fee, which fee shall be as set forth in the Building Division

Fee Schedule adopted by resolution of the Tiburon Town Council and amended from time to time.

(4) Section 103.4.2 is deleted.

(5) Section 103.5.6 is amended to replace the fourth paragraph with the following:

To obtain reinspection, the applicant shall first pay the reinspection fee in accordance with the Building Division Fee Schedule adopted by resolution of the Tiburon Town Council and amended from time to time.

(6) Table 1-1 is deleted.

(f) Section 701.1.2 is amended to read as follows:

ABS and PVC DWV piping installations shall be limited to residential construction not more than two stories in height.

13-4.4 Electrical Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety and welfare of the general public, that certain code known as the "2010 California Electrical Code" (based on the National Electrical Code, 2008 Edition) as published by the National Fire Protection Association, and as amended by the California Building Standards Commission in the California Code of Regulations, Title 24, Part 3.

13-4.4.1 Amendments made to the 2010 California Electrical Code.

The California Electrical Code is amended or modified as follows:

(a) Section 89.108.4.2 is amended to read as follows:

89.108.4.2 Fees. Any person desiring a permit required by this code shall, at the time of issuance thereof, pay a fee, which shall be as set forth in the Building Division Fee Schedule adopted by resolution of the Tiburon Town Council and amended from time to time.

(b) Section 89.108.5.1 is amended to modify the first sentence to read as follows:

Section 89.108.5.1 General. Subject to other provisions of law, including Section 1822.50 et. seq. of the Code of Civil Procedure of the State of

California, officers and agents of the Building Official may enter and inspect public and private properties to secure compliance with the provisions of this code.

(The remainder of this section is unchanged.)

(c) Section 89.108.8.1 is amended by adding the following sentence:

Nothing contained in this section shall prevent the Town Council from appointing the Town Council as the local appeals board or housing appeals board.

(d) Article 100 is amended to read as follows:

The definition of "Authority Having Jurisdiction" is amended to read as follows:

Authority Having Jurisdiction (AHJ)—The Authority Having Jurisdiction shall mean the Building Official or his or her duly authorized representative.

(e) Section 210.12 (B) is amended by adding the following sentence:

The provisions of this section shall apply to existing dwelling units when electrical service panels or sub-panels are replaced or upgraded.

13-4.5 Fire Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety and welfare of the general public, that certain code known as the 2010 California Fire Code, as adopted and modified by the current Tiburon Fire Protection District and Southern Marin Fire Protection District ordinances, which Code and ordinances are hereby referred to, ratified, and made a part hereof as if fully set forth herein. Copies of said ordinances are on file and available for public inspection in the office of the town clerk.

13-4.6. Housing Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety and welfare of the general public, that certain code known as the Uniform Housing Code, 1997 Edition, as published by the International Conference of Building Officials, hereinafter referred to as the "Uniform Housing Code", save and except such portions as are hereinafter changed or modified by Section 13-4.6.1 of this chapter.

13-4.6.1 Amendments made to the 1997 Uniform Housing Code.

The Uniform Housing Code is amended as follows:

(a) Section 103 is amended to revise the second sentence of the first paragraph to read as follows:

Such occupancies in existing buildings may be continued as provided by the California Existing Building Code, as contained in Title 24, Part 10 of the California Code of Regulations, except such structures as are found to be substandard as defined by this code.

(b) Section 104.1 is amended to read as follows:

Section 104.1 Additions, Alterations or Repairs. All buildings or structures that are required to be repaired under the provisions of this code shall be subject to the provisions of the California Existing Building Code, as contained in Title 24, Part 10 of the California Code of Regulations.

(c) Section 201.1 is amended to revise the first paragraph to read as follows:

The building official and his designees are hereby authorized and directed to enforce all of the provisions of this code. For such purposes, such officials shall have the powers of law enforcement officers.

(d) Section 201.2 is amended to read as follows:

Section 201.2. Right of Entry. Whenever necessary to make an inspection to enforce any of the provisions of this title, or whenever the building official or his authorized representative has reasonable cause to believe that there exists in any building or upon any premises an immediate threat to health and safety, the Building Official or his authorized representative may enter such building or premises at all reasonable times to inspect the same or to perform any duty imposed upon the Building Official by this code; provided, that if such building or premises be occupied he shall first present proper credentials and demand entry; and if such building or premises be unoccupied he shall first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and demand entry. If such entry is refused, the building official, or his authorized representative, shall have recourse to every remedy provided by law to secure entry, including the warrant provisions of Section 1822.50 et seq. of the Code of Civil Procedure of the State of California.

(e) Section 203.1 is amended by adding thereto the following sentence:

Nothing contained in this section shall prevent the town council from appointing the town council as the housing advisory and appeals board.

(f) Section 301 is amended to read as follows:

SECTION 301—GENERAL

No building or structure regulated by this code shall be erected, constructed, enlarged altered, repaired, moved, improved, removed, converted or demolished unless a separate permit for each building or structure has first been obtained as required by the Building Code.

(g) Section 302 is deleted.

(h) Section 303 is amended to read as follows:

SECTION 303-INSPECTION

Buildings or structures within the scope of this code and all construction or work for which a permit is required shall be subject to inspection by the building official as provided by this code and in accordance with the applicable requirements of the Building Code.

(i) Section 401 is amended as follows:

The definition of "Building Code" in Section 401 is amended to read as follows:

BUILDING CODE is the California Building Code as adopted with amendments by the Town of Tiburon.

(j) A definition for "Building Official" is added to Section 401 to read as follows:

BUILDING OFFICIAL is the building official in the Community Development Department of the Town of Tiburon.

(k) The definition of "Mechanical Code" in Section 401 is amended to read as follows:

MECHANICAL CODE is the California Mechanical Code as adopted with amendments by the Town of Tiburon.

The definition of "Plumbing Code" in Section 401 is amended to read as follows:

PLUMBING CODE is the California Plumbing Code as adopted with amendments by the Town of Tiburon.

13-4.7 Mechanical Code.

The Town Council hereby adopts, for the purpose of providing minimum requirements for the protection of life, limb, health, property, safety and welfare of the general public, that certain code known as the 2010 California Mechanical Code (based on the Uniform Mechanical Code, 2009 Edition) as amended by the California Building Standards Commission in the California Code of Regulations, Title 24, Part 4, hereinafter referred to as the "California Mechanical Code", save and except such portions as are hereinafter amended or modified by Section 13-4.7.1 of this chapter.

13-4.7.1 Amendments made to the 2010 California Mechanical Code.

The 2010 California Mechanical Code is amended as follows:

(a) Chapter 1, Division II is amended as follows:

(1) Section 101.0 is amended to read as follows:

These regulations shall be known as the California Mechanical Code, may be cited as such, and will be referred to herein as "this code"

(2) Section 108.3 is amended to add the following phrase to the end of the last sentence:

", including the warrant provisions of Section 1822.50 et. seq. of the Code of Civil Procedure of the State of California."

(3) Section 110.1 is amended by adding thereto the following sentence:

Nothing contained in this section shall prevent the town council from appointing the town council as the Board of Appeals.

(4) Section 115.1 is amended to read as follows:

115.1 General. Fees shall be assessed in accordance with the provisions of this section and as set forth in the Building Division

Fee Schedule adopted by resolution of the Tiburon Town Council and amended from time to time.

(5) Section 115.2 is amended to read as follows:

115.2 Permit Fees. Any person desiring a permit required by this code shall, at the time of issuance for the permit, pay a fee, which fee shall be as set forth in the Building Division Fee Schedule adopted by resolution of the Tiburon Town Council and amended from time to time.

(6) Section 115.3 is deleted.

(7) Section 116.6 is amended to replace the third paragraph with the following:

To obtain re-inspection, the applicant shall first pay the re-inspection fee in accordance with the Building Division Fee Schedule adopted by resolution of the Tiburon Town Council and amended from time to time.

(8) Table 1-1 is deleted.

(b) Section 203.0 is amended as follows:

The definition of "AUTHORITY HAVING JURISDICTION" is amended to read as follows:

AUTHORITY HAVING JURISDICTION -- The Authority Having Jurisdiction shall mean the building official or his duly authorized representative.

(c) Section 207.0 is amended as follows:

The definition of "ENFORCING AGENCY" is amended to read as follows:

ENFORCING AGENCY -- The enforcing agency shall be the Building Division of the Town of Tiburon.

13-4.8 Dangerous Building Code.

The Dangerous Building Code of the Town shall be the California Code for the Abatement of Dangerous Buildings, 1997 edition, as published by the International Conference of Building Officials, on file with the office of the Town Clerk, which Code is hereby referred to, adopted and made a part hereof as if fully set forth

herein, save and except such portions as are hereinafter amended or modified by Section 13-4.8.1 of this chapter.

13-4.8.1 Amendments made to the 1997 California Code for the Abatement of Dangerous Buildings.

The California Code for the Abatement of Dangerous Buildings is amended as follows:

(a) Section 103 is amended to read as follows:

SECTION 103—ALTERATIONS, ADDITIONS AND REPAIRS

All buildings or structures which are required to be repaired under the provisions of this code shall be subject to the provisions of the California Existing Building Code, as contained in Title 24, Part 10 of the California Code of Regulations.

(b) Section 201.3. Right of Entry. Whenever necessary to make an inspection to enforce any of the provisions of this title, or whenever the building official or his authorized representative has reasonable cause to believe that there exists in any building or upon any premises an immediate threat to health and safety, the building official or his authorized representative may enter such building or premises at all reasonable times to inspect the same or to perform any duty imposed upon the Building Official by this code; provided, that if such building or premises be occupied he shall first present proper credentials and demand entry; and if such building or premises be unoccupied he shall first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and demand entry. If such entry is refused, the Building Official, or his authorized representative, shall have recourse to every remedy provided by law to secure entry, including the warrant provisions of Section 1822.50 et seq. of the Code of Civil Procedure of the State of California.

(c) Section 203 is deleted.

(d) Section 204 is amended to read as follows:

SECTION 204—INSPECTION OF WORK

All buildings or structures within the scope of this code and all construction or work for which a permit is required shall be subject to inspection by the building official as provided in this code and in accordance with the applicable requirements of the Building Code.

(e) Section 205 is amended by adding thereto the following:

Nothing contained in this section shall prevent the town council from appointing the town council as the Board of Appeals.

(f) Section 301 is amended as follows:

The definition of "Building Code" is amended to read as follows:

BUILDING CODE is the California Building Code as adopted with amendments by the Town of Tiburon.

(g) A definition of "Building Official" is added to read as follows:

BUILDING OFFICIAL is the Building Official in the Community Development Department of the Town of Tiburon.

13-4.9 Green Building Standards Code.

The Town hereby adopts, for the purpose of providing minimum requirements to enhance the public health and welfare and assure that residential and commercial development is consistent with the Town's desire to create a more sustainable community by incorporating green building measures into the design, construction, and maintenance of buildings and appurtenant development, that certain code known as the California Green Building Standards Code, 2010 edition (also known as the 2010 CALGreen Code) as published by the California Building Standards Commission in the California Code of Regulations, Title 24, Part 11, herein referred to as the "CALGreen Code," save and except such portions as are hereinafter amended or modified by Section 13-4.9.1 of this chapter.

13-4.9.1 Amendments made to the 2010 CALGreen Code.

The California Green Building Standards Code is amended as follows:

(a) Section 101.3 is amended to read 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, additions to existing dwelling units that constitute at least five hundred square feet of conditioned floor area, additions to nonresidential buildings that equal or exceed three thousand square feet.

(The remainder of this section is unchanged.)

13-4.10 Energy Code.

The Energy Code of the Town shall be the California Energy Code, 2010 edition, and the appendices thereof, as published by the California Building Standards Commission, on file with the office of the Town Clerk, which Code and appendices are hereby referred to, adopted and made a part hereof as if fully set forth herein, except that the first paragraph of Section 20.3 is deleted.

13-4.11 Building Standards Code.

The Referenced Standards Code of the Town shall be the California Building Standards Code, California Code of Regulations, 2010 edition, Title 24, Part 8 (Historical Building Code), Part 10 (Existing Building Code), and 12 (Referenced Standards Code), as published by the International Code Council, on file with the office of the Town Clerk, which Code is hereby referred to, adopted and made a part hereof as if fully set forth herein.

13-4.12 Administrative Code.

The Administrative Code of the Town shall be the California Administrative Code, California Code of Regulations, Title 24, Part 1, 2010 edition, as published by the International Code Council, on file with the office of the Town Clerk, which Code is hereby referred to, adopted and made a part hereof as if fully set forth herein.

C. Article V (Energy Efficiency Standards for Single-Family Dwellings Greater Than Three Thousand Five Hundred Square Feet) of Chapter 13 of the Tiburon Municipal Code is amended in its entirety to read as follows:

13-5.1.1 Purpose.

The purpose of this section is to reduce the annual and peak energy consumption of large single-family homes.

13-5.1.2 Definitions.

As used in this section:

"Adjusted proposed design total" means the proposed building energy use, in KBtu/sf-yr, calculated by the state approved alternative calculation method (ACM) less any PV credit.

"Adjusted standard design total" means the performance energy budget, in KBtu/sf-yr, which this section establishes for all building to which it applies. It is defined as the standard design total (KBtu/sf-yr) obtained from any state-approved residential alternative calculation method (ACM) multiplied by the

Standard Design Adjustment Factor contained in Table A below.

Table A
Standard Design Adjustment Factors

House Size (Total Conditioned Sq. Ft.)	Adjustment Factor
3,501—4,499	0.918
4,500—5,499	0.826
5,500—6,499	0.700
6,500—7,499	0.629

"Conditioned floor area" has the meaning set forth in Section 101(b) of the 2010 California Energy Code.

"PV credit" means the energy credit applicable to the proposed design for a solar photovoltaic system that is capable of generating electricity from sunlight and supplying it directly to the building; and is connected, through a reversible meter, to the utility grid. The amount of PV credit under this chapter is defined as W_o multiplied by 13.262 KBtu/sf-yr time dependent value energy, where W_o is a unitless value calculated as the rated watts of the proposed photovoltaic system divided by the total conditioned floor area of the building.

13-5.1.3 Buildings covered.

The provisions of this section shall apply to all new single-family dwellings greater than three thousand five hundred (3,500) square feet of total conditioned floor area, and additions to existing single-family dwellings which together with any other additions made after the enactment of this chapter in the aggregate exceed five hundred (500) square feet where the total conditioned floor area of the building exceeds three thousand five hundred (3,500) square feet.

13-5.1.4 Exceptions.

The provisions of this section shall not apply to building area used for a secondary dwelling unit, or to any project that received and maintains a valid planning approval or a building permit, or which has submitted a complete planning application or building permit application prior to the effective date of the ordinance, unless otherwise required as a condition of approval of the planning application.

13-5.1.5 Basic requirements.

All buildings covered by this section shall meet both of the following:
A. The adjusted standard design total energy budget, in source KBtu/sf-yr, using the state-approved performance compliance approach, and
B. All other provisions applicable to low rise residential buildings contained in the 2010 California Energy Code.

13-5.1.6 Permit forms.

In addition to the standard Title 24 report submitted to the building division, an ordinance compliance form and worksheet will be required, which shall be available at the building division.

Section 3. Findings Pursuant to Health & Safety Code.

A. California Health and Safety Code Sections 17958.5, 17958.7, and 18941.5 require that findings be made in order to change or modify building standards found in the California Building Standards Code based on local climatic, geologic, or topographic conditions. Therefore, the Town of Tiburon hereby finds that these changes or modifications to the Building Code as adopted herein are reasonably necessary because of the following local climatic, geological and topographical conditions:

I. Climatic conditions:

a. Most of the annual rainfall in Tiburon occurs during the winter, it receives no measurable precipitation between May and October. During this time, temperatures average between 60 and 85 degrees. These conditions eliminate most of the moisture in the natural vegetation and heavily wooded hillsides. The area also suffers periodic droughts that can extend the dry periods to other months of the year. These conditions can be further exacerbated by occasional off-shore hot, dry, Santa-Ana winds.
b. Most of the annual rainfall in Tiburon occurs during the winter, and some portions of Tiburon are subject to tidal influences, there are times that flooding conditions occur in low-lying areas.
c. Tiburon is situated within a densely populated major metropolitan area (the San Francisco Bay Area) that generates and releases into the atmosphere significant quantities of greenhouse gases, which have detrimental effects to the local climate as determined by the State of California.

II. Geologic conditions:

a. Tiburon lies near several earthquake faults, including the very active San Andreas Fault and the Hayward Fault, and there are significant potential hazards such as road

closures, fires, collapsed buildings, and isolation of residents requiring assistance.

b. Much of the Downtown commercial area is located on bay alluvial soils, which are subject to liquefaction in the event of an earthquake.

III. Topographic conditions:

a. Much of Tiburon is located in steep, hilly areas; many of the residential areas are heavily landscaped; and many exist adjacent to hilly open space areas which are characterized by dry vegetation and have limited access. In addition, the steepness of grades located in the hills and dales results in narrow and winding roads, and limited water supply.

b. The major arterial route between Tiburon and U. S. Highway 101 is Tiburon Boulevard (State Highway 131). Should that highway become impassable, the only alternative roadway on and off the Peninsula is Paradise Drive, a narrow, winding road easily subject to closure in storms and having an extensive history of lane failures due to unstable soils and poor drainage. This would result in traffic congestion, severely limiting emergency access.

IV. Adoption by Reference of Tiburon Fire Protection District Findings:

The Town Council further adopts by reference all applicable climatic, geological, and topographical conditions findings of the Tiburon Fire Protection District and Southern Marin Fire Protection District in their most recently-enacted ordinances adopting and modifying the California Fire Code.

B. The above modified building standards are listed below with the corresponding climatic, geological or topographical condition which necessitates the modification.

Building Code Section Number	Climatic, geological and topographical condition
501.2	Ia, IIa, IIIa, IV
903.2	Ia, IIa, IIIa,IIIb, IV
1013.1	Ib, IIa, IV
1505	Ia, IV
101.3 (CALGreen)	Ic

Section 4. Severability.

If any section, subsection, clause, sentence, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of a Court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of the

Ordinance. The Town Council of the Town of Tiburon hereby declares that it would have passed this Ordinance, any section, subsection, sentence, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases may be declared invalid or unconstitutional.

Section 5. Effective Date.

A summary of this Ordinance shall by published and a certified copy of the full text of this Ordinance shall be posted in the office of Town Clerk at least five (5) days prior to the Council meeting at which it is adopted. This Ordinance shall be in full force and effect thirty (30) days after the date of adoption, and the summary of this Ordinance shall be published within fifteen (15) days after its adoption, together with the names of the Councilmembers voting for or against same, in a newspaper of general circulation in the Town of Tiburon, County of Marin, State of California.

This ordinance was read and introduced at a regular meeting of the Town Council of the Town of Tiburon, held on the 5th day of January, 2011, and was adopted at a regular meeting of the Town Council of the Town of Tiburon, held on the 19th day of January, 2011, by the following vote:

AYES: COUNCILMEMBERS:

NOES: COUNCILMEMBERS:

ABSENT: COUNCILMEMBERS:

_____
JEFF SLAVITZ, MAYOR
TOWN OF TIBURON

ATTEST:

_____
DIANE CRANE IACOPI, TOWN CLERK

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Appendix:

Marin County Energy Cost-Effectiveness Study

December 10, 2009

Codes and Standards
Title 24 Energy-Efficient Local Ordinances

Title:
Marin County Green Building Ordinance
Energy Cost-Effectiveness Study

Prepared for:

Bob Brown
City of San Rafael
Community Development Director

Pat Eilert
Codes and Standards Program
Pacific Gas and Electric Company

Omar Pena
Marin County Community
Development Agency

Maril Pitcock
Government Partnership Program
Pacific Gas and Electric Company

Prepared by:

Michael Gabel
Gabel Associates, LLC

Last Modified: December 10, 2009

Marin County Green Building Ordinance
Energy Cost-Effectiveness Study

December 10, 2009

Report prepared for:
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LEGAL NOTICE

This report was prepared by Pacific Gas and Electric Company and funded by the California utility customers under the auspices of the California Public Utilities Commission.

Table of Contents

1.0 Executive Summary

This report presents the results of Gabel Associates' research and review of the feasibility and energy cost-effectiveness of building permit applicants exceeding the 2008 Building Energy Efficiency Standards to meet the minimum energy-efficiency requirements of the proposed Marin County Ordinance for local energy efficiency standards. The proposed ordinance states that residential new construction projects must meet the overall requirements summarized in the Resolution printed on the following pages.

The study contained in this report shall be included in Marin County's application to the California Energy Commission (CEC) which must meet the requirements specified in Section 10-106 of the California Code of Regulations, Title 24, Part 1, LOCALLY ADOPTED ENERGY STANDARDS. The proposed Ordinance shall be enforceable after the CEC has reviewed and approved the local energy standards as meeting all requirements of Section 10-106; and the Ordinance has been adopted by the County and filed with the Building Standards Commission.

The 2008 Building Energy Efficiency Standards, scheduled to take effect on January 1, 2010, are the baseline used to calculate the cost-effectiveness of the proposed Ordinance.

MARIN COUNTY MODEL GREEN BUILDING ORDINANCE (Draft)

TABLE A: GREEN BUILDING STANDARDS FOR COMPLIANCE FOR RESIDENTIAL CONSTRUCTION AND RENOVATION

Covered Project	Green Building Rating System	Minimum Compliance Threshold	Energy Budget Below CA Title 24 Part 6	Verification
Single-Family or Two-Family Residential: New construction				
500-2,499 sq. ft.	GPR New Home	75 points	15%	Green Point Rated[1]
2,500-3,999 sq. ft.	GPR New Home	100 points	15%	Green Point Rated[1]
4,000-5,499 sq. ft.	GPR New Home	125 points	20%	Green Point Rated[1]
5,500-6,999 sq. ft.	GPR New Home	150 points	30%	Green Point Rated[1]
7,000+ sq. ft.	GPR New Home	200 points	Net zero energy	Green Point Rated[1]
Single-Family or Two-Family Residential: Renovations (including additions to existing buildings)				
Less than $50,000 valuation	n/a	Insulate exposed hot water pipes; Install radiant barrier when reroofing and removing sheathing		City building inspector
Less than 500 sq. ft. or $50,000-$99,999 valuation[3]	GPR Existing Home	Checklist submittal and completion of a HERSII or BPI home performance audit		City plan check
500-749 sq. ft. or $100,000-$149,999 valuation[3]	GPR Existing Home – Elements	25 points		GreenPoint Rater[2]
750-999 sq. ft. or $150,000-$299,999 valuation[3]	GPR Existing Home – Elements	35 points		GreenPoint Rater[2]
1,000+ sq. ft. or $300,000+ valuation[3]	GPR Existing Home – Whole House	50 points + 20% improvement in HERSII or BPI home performance audit results or a HERSII score 100 or better		GreenPoint Rated[2]
Multi-Family Residential: New Construction				
Less than 1,000 sq. ft. average unit size	GPR Multi-Family	60 points	15%	GreenPoint Rated[1]
1,000+ sq. ft. average unit size	GPR Multi-Family	75 points	15%	GreenPoint Rated[1]

[1] Project verification by GreenPoint Rater and certification by Build It Green

[2] Project verification by GreenPoint Rater

[3] Project valuation will be the primary determinate in establishing the Minimum Compliance Threshold for the project, with use of project size range when valuation is uncertain or in the opinion of the building official does not accurately reflect the project scope.

MARIN COUNTY MODEL GREEN BUILDING ORDINANCE (Draft)

TABLE B: GREEN BUILDING STANDARDS FOR COMPLIANCE FOR NONRESIDENTIAL CONSTRUCTION AND RENOVATION

Covered Project	Green Building Rating System	Minimum Compliance Threshold	Energy Budget Below CA Title 24 Part 6	Verification
New construction (including additions to existing buildings)				
2,000-4,999 sq. ft.	LEED® New Construction or Core & Shell	Checklist submittal + compliance with Prerequisites		LEED® AP with additional GreenPoint Rater or BPI Certification
5,000-49,999 sq. ft.	LEED® New Construction or Core & Shell	LEED® Silver	15%	LEED® AP with additional GreenPoint Rater or BPI Certification
50,000+ sq. ft.	LEED® New Construction or Core & Shell	LEED® Gold	15%	GBCI Certified
Renovations				
500-4,999 sq. ft. or less than $500,000 valuation[3]	LEED® Commercial Interiors or Operations & Maintenance	**Voluntary** compliance with the following Prerequisites: WE P1 (Water Efficiency – Baseline Requirements only) EA P3 (Fundamental Refrigerant Management) for renovations of ≥50% of the building interior area **Voluntary** compliance with the following Credits: EA C1.3 (Optimize Energy Performance – HVAC) for renovations of ≥50% of the building interior area		None
5,000-24,999 sq. ft. or $500,000 - $5 million valuation[3]	LEED® Commercial Interiors or Operations & Maintenance	Same as above, but Required.		City building inspector
25,000+ sq. ft. or greater than $5 million valuation[3]	LEED® Commercial Interiors or Operations & Maintenance	LEED® Silver		LEED® AP with additional GreenPoint Rater or BPI Certification

[3] Project valuation will be the primary determinate in establishing the Minimum Compliance Threshold for the project, with use of project size range when valuation is uncertain or in the opinion of the building official does not accurately reflect the project scope.

SOLAR ELECTRIC SYSTEMS

A solar photovoltaic (PV) energy system may be used to meet the Energy Budget Below CA Title 24 Part 6 requirements of this resolution which exceed 15%. To qualify for energy credits, the PV energy system must be capable of generating electricity from sunlight, supply the electricity directly to the building, and the system is connected, through a reversible meter, to the utility grid. The installation of any qualifying PV energy system must meet all installation criteria contained in the California Energy Commission's Guidebook "Eligibility Criteria and Conditions for Incentives for Solar Energy Systems." The methodology used to calculate the energy equivalent to the PV credit shall be the CECPV Calculator, using the most recent version, provided by the California Energy Commission.

INCENTIVES [optional]

A City Green Building emblem for construction signage shall be provided for all residential and non-residential projects that obtain a GreenPoint or LEED rating.

The following incentives shall be provided for residential projects that achieve at least 100 GreenPoints or non-residential projects that achieve at least a LEED® Gold rating:

1. Expedited building permit plan check (typically 2-week turnaround)
2. Reimbursement for the cost of the GreenPoint Rater services (residential projects only, up to a maximum of $1,000)
3. Provision of a bronze plaque for building mounting, identifying the project as a green building

EXCEPTIONS [optional]

The following shall not be included as Covered Projects:

1. Second dwelling units,
2. Buildings which are temporary,
3. Building area which is not or is not intended to be conditioned space, and
4. Any requirement which would impair the historic integrity of any building listed on a local, state or federal register of historic structures.

The following shall not be included in project valuation:

1. Improvements primarily intended for seismic upgrades or required disabled access,
2. Building replacement due to catastrophic loss due to flood or earthquake damage, and
3. Installation of renewable energy systems.

2.0 Impacts of the New Ordinance

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

- Single family house: 2-story 1,582 sf (CZ3)
- Single family house: 2-story 2,025 sf (CZ2, CZ3)
- Single family house: 2-story 2,682 sf (CZ2)
- Single family house: 2-story 5,000 sf (CZ2, CZ3): Exceeding Title 24 by 20%
- Single family house: 2-story 6,500 sf (CZ2, CZ3): Exceeding Title 24 by 30%
- Single family house: 2-story 7,500 sf (CZ2, CZ3): Net Energy Zero TDV
- Low-rise Multi-family building, 8 dwelling units: 2-story 8,442 sf (CZ2, CZ3)
- High-rise Multi-family building, 40 dwelling units: 4-story 36,800 sf (CZ2, CZ3)
- Nonresidential office building: 2-story, 21,160 sf (CZ2, CZ3)
- Nonresidential office building: 5-story, 52,900 sf (CZ2, CZ3)

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 CO2-equivalent reductions in greenhouse gases.

2.1 Single Family Homes

CLIMATE ZONE 2

The following energy design descriptions of single family building prototypes just meet the 2008 Title 24 Building Energy Efficiency Standards in **Climate Zone 2:**

CZ2: Single Family House 2,025 square feet, 2-story, 20.2% glazing/floor area ratio

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
R-19 Raised Floor over Garage/Open at 2nd Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: 13 SEER
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
50 Gallon Gas Water Heater: EF=0.60

CZ2: Single Family House 2,682 square feet, 2-story, 21.1% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: 13 SEER
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
50 Gallon Gas Water Heaters: EF=0.60

CZ2: Single Family House 5,000 square feet, 2-story, 22.0% glazing/floor area ratio

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
(2) Air Conditioners: 13 SEER, 11 EER (HERS)
(2) Air Conditioners: Refrig. Charge (HERS)
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.60

CZ2: Single Family House 6,500 square feet, 2-story, 22.0% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Quality Insulation Installation (HERS)
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(3) Furnaces: 80% AFUE
(3) Air Conditioners: 13 SEER, 11 EER (HERS)
(3) Air Conditioners: Refrig. Charge (HERS)
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(3) 50 Gallon Gas Water Heaters: EF=0.60

CZ2: Single Family House 7,500 square feet, 2-story, 22.0% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Quality Insulation Installation (HERS)
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(3) Furnaces: 80% AFUE
(3) Air Conditioners: 13 SEER, 11 EER (HERS)
(3) Air Conditioners: Refrig. Charge (HERS)
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(3) 50 Gallon Gas Water Heaters: EF=0.60

Climate Zone 2 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** (except homes equal or greater than 4,000 square feet as indicated).

In any actual project, the designer, builder or owner selects which measures will be included to meet the proposed Ordinance requirements. There are a number of factors in choosing the final mix of energy measures including first cost, aesthetics, maintenance and replacement considerations. The analysis includes at least two different options to meet the proposed Ordinance requirements for each prototypical design.

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,025 SF, Option 1 **2025 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 2,550 sf @ $0.55 to $0.85/sf	Upgrade	$ 1,403	$ 2,168	$ 1,786
R-0 Slab on Grade	-	$ -	$ -	$ -
R-19 Raised Floor over Garage/Open at 2nd Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 80% AFUE	-	$ -	$ -	$ -
Air Conditioner: 13 SEER, 11 EER (HERS)	Upgrade	$ 25	$ 75	$ 50
Air Conditioner: Refrig. Charge (HERS)	Upgrade	$ 150	$ 200	$ 175
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.60	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,578**	**$ 2,443**	**$ 2,011**
Total Incremental Cost per Square Foot:		**$ 0.78**	**$ 1.21**	**$ 0.99**

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 2 **2025 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-13): 2,550 sf @ $0.70 to $0.95/sf	Upgrade	$ 1,785	$ 2,423	$ 2,104
R-0 Slab on Grade	-	$ -	$ -	$ -
R-19 Raised Floor over Garage/Open at 2nd Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 80% AFUE	-	$ -	$ -	$ -
Air Conditioning: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.60	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,785**	**$ 2,423**	**$ 2,104**
Total Incremental Cost per Square Foot:		**$ 0.88**	**$ 1.20**	**$ 1.04**

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,682 SF, Option 1 **2682 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 2,638 sf @ $0.55 to $0.85/sf	Upgrade	$ 1,451	$ 2,242	$ 1,847
R-19 Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 80% AFUE	-	$ -	$ -	$ -
Air Conditioner: 13 SEER, 11 EER (HERS)	Upgrade	$ 25	$ 75	$ 50
Air Conditioner: Refrig. Charge (HERS)	Upgrade	$ 150	$ 200	$ 175
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.60	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,626**	**$ 2,517**	**$ 2,072**
Total Incremental Cost per Square Foot:		**$ 0.61**	**$ 0.94**	**$ 0.77**

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,682 SF, Option 2 **2682 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30): 1,402sf @ 0.40 to 0.60/sf	Upgrade	$ 561	$ 841	$ 701
R-15 Walls (from R-13): 2,638 sf @ $0.12 to $0.20/sf	Upgrade	$ 317	$ 528	$ 422
R-19 Floor	-	$ -	$ -	$ -
Quality Insulation Installation (HERS)	Upgrade	$ 450	$ 600	$ 525
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	$ 500	$ 1,000	$ 750
Air Conditioner: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.62 (from EF=0.60)	Upgrade	$ 100	$ 200	$ 150
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,928**	**$ 3,169**	**$ 2,548**
Total Incremental Cost per Square Foot:		**$ 0.72**	**$ 1.18**	**$ 0.95**

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,682 SF, Option 3 **2682 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-13): 2,638 sf @ $0.70 to $0.95/sf	Upgrade	$ 1,847	$ 2,506	$ 2,177
R-19 Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 80% AFUE	-	$ -	$ -	$ -
Air Conditioner: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.62 (from EF=0.60)	Upgrade	$ 100	$ 200	$ 150
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,947**	**$ 2,706**	**$ 2,327**
Total Incremental Cost per Square Foot:		**$ 0.73**	**$ 1.01**	**$ 0.87**

For homes ≥ 4,000 square feet to 5,499 square feet, the following tables list the energy measures needed to improve a 5,000 square foot home so that it uses at least 20% less TDV energy than the corresponding Title 24 base case design.

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 5,000 SF, Option 1 **5000 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-13): 2,616 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,177	$ 1,831	$ 1,504
R-19 Raised Floor	-	$ -	$ -	$ -
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,100 sf @ $1.40 - $1.75 / sf	Upgrade	$ 1,540	$ 1,925	$ 1,733
(2) Furnace: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,000	$ 2,400	$ 1,700
(2) Air Conditioners: 13 SEER, 11 EER (HERS)	-	$ -	$ -	$ -
(2) Air Conditioner: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62 (from EF=0.60)	Upgrade	$ 200	$ 400	$ 300
Total Incremental Cost of Energy Efficiency Measures:		**$ 3,917**	**$ 6,556**	**$ 5,237**
Total Incremental Cost per Square Foot:		**$ 0.78**	**$ 1.31**	**$ 1.05**

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 5,000 SF, Option 2 **5000 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-13): 2,616 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,177	$ 1,831	$ 1,504
R-38 Raised Floor (from R-19): 3,000 sf @ $0.30 to $0.45	Upgrade	$ 900	$ 1,350	$ 1,125
Quality Insulation Installation (HERS)	Upgrade	$ 450	$ 600	$ 525
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,100 sf @ $1.40 - $1.75 / sf	Upgrade	$ 1,540	$ 1,925	$ 1,733
(2) Furnaces: 80% AFUE	-	$ -	$ -	$ -
(2) Air Conditioners: 13 SEER, 11 EER (HERS)	-	$ -	$ -	$ -
(2) Air Conditioner: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (650)	$ (450)	$ (550)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62 (from EF=0.60)	Upgrade	$ 200	$ 400	$ 300
Total Incremental Cost of Energy Efficiency Measures:		**$ 3,617**	**$ 5,656**	**$ 4,637**
Total Incremental Cost per Square Foot:		**$ 0.72**	**$ 1.13**	**$ 0.93**

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 5,000 SF, Option 3 **5000 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-13): 2,616 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,177	$ 1,831	$ 1,504
R-19 Raised Floor	-	$ -	$ -	$ -
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,100 sf @ $1.40 - $1.75 / sf	Upgrade	$ 1,540	$ 1,925	$ 1,733
(2) Furnace: 80% AFUE	-	$ -	$ -	$ -
(2) Air Conditioners: 13 SEER, 11 EER (HERS)	-	$ -	$ -	$ -
(2) Air Conditioner: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (650)	$ (450)	$ (550)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) Instantaneous Gas Water Heater: RE=0.80 (from (2) 50 Gal Gas: EF=0.62)	Upgrade	$ 1,800	$ 3,000	$ 2,400
Total Incremental Cost of Energy Efficiency Measures:		**$ 3,867**	**$ 6,306**	**$ 5,087**
Total Incremental Cost per Square Foot:		**$ 0.77**	**$ 1.26**	**$ 1.02**

For homes ≥ 5,500 square feet to 6,999 square feet, the following tables list the energy measures needed to improve a 6,500 square foot home so that it uses at least 30% less TDV energy than the corresponding Title 24 base case design.

Incremental Cost Estimate to Exceed Title 24 by 30%
Single Family Prototype: 6,500 SF, Option 1 **6500 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 3,900 sf @ 0.15 to 0.20/sf	Upgrade	$ 585	$ 780	$ 683
R-21 Walls (from R-13): 2,808 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,264	$ 1,966	$ 1,615
R-30 Raised Floor (from R-19): 3,900 sf @ $0.25 to $0.35	Upgrade	$ 975	$ 1,365	$ 1,170
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,430 sf @ $1.40 - $1.75 / sf	Upgrade	$ 2,002	$ 2,503	$ 2,252
(3) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,500	$ 3,600	$ 2,550
(3) Air Conditioners: 13 SEER, 11 EER (HERS)	-	$ -	$ -	$ -
(3) Air Conditioner: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (975)	$ (675)	$ (825)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.80 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 3,000	$ 5,100	$ 4,050
Pipe Insulation	Upgrade	$ 450	$ 600	$ 525
Total Incremental Cost of Energy Efficiency Measures:		**$ 8,801**	**$ 15,238**	**$ 12,019**
Total Incremental Cost per Square Foot:		**$ 1.35**	**$ 2.34**	**$ 1.85**

Incremental Cost Estimate to Exceed Title 24 by 30%

Single Family Prototype: 6,500 SF, Option 2 **6500 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 3,900 sf @ 0.15 to 0.20/sf	Upgrade	$ 585	$ 780	$ 683
R-19 Walls (from R-13): 2,808 sf @ $0.31 to $0.54/sf	Upgrade	$ 870	$ 1,516	$ 1,193
R-19 Raised Floor	-	$ -	$ -	$ -
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,430 sf @ $1.40 - $1.75 / sf	Upgrade	$ 2,002	$ 2,503	$ 2,252
(3) Furnaces: 80% AFUE	-	$ -	$ -	$ -
(3) Air Conditioners: 13 SEER, 11 EER (HERS)	-	$ -	$ -	$ -
(3) Air Conditioner: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (975)	$ (675)	$ (825)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) 50 Gallon Gas Water Heaters: EF=0.62 (from EF=0.60)	Upgrade	$ 300	$ 600	$ 450
Solar Photovoltaic (PV) System: 1 KW	Upgrade	$ 4,500	$ 6,500	$ 5,500
Total Incremental Cost of Energy Efficiency Measures:		**$ 7,282**	**$ 11,224**	**$ 9,253**
Total Incremental Cost per Square Foot:		**$ 1.12**	**$ 1.73**	**$ 1.42**

For homes ≥ 7,000 square feet the following tables list the energy measures needed to improve a 7,500 square foot home so that its net Title 24 TDV energy use is zero (i.e. Net Zero TDV Energy) as compared with the corresponding Title 24 base case design. To achieve this level of performance, a solar PV system is added to the home sized to just meet the Net Zero Energy threshold by rounding up to the next largest whole KW of nominal solar PV capacity.

Incremental Cost Estimate of Net Zero TDV Energy

Single Family Prototype: 7,500 SF, Option 1 **7500 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,500 sf @ 0.15 to 0.20/sf	Upgrade	$ 675	$ 900	$ 788
R-21 Walls (from R-13): 2,904 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,307	$ 2,033	$ 1,670
R-38 Raised Floor (from R-19): 4,500 sf @ $0.30 to $0.45	Upgrade	$ 1,350	$ 2,025	$ 1,688
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,650 sf @ $1.40 - $1.75 / sf	Upgrade	$ 2,310	$ 2,888	$ 2,599
(3) Furnaces: 94% AFUE (from 80% AFUE)	Upgrade	$ 2,700	$ 5,400	$ 4,050
(3) Air Conditioners: 15 SEER, 12 EER (HERS) (from 13 SEER, 11 EER)	Upgrade	$ 1,500	$ 4,500	$ 3,000
(3) Air Conditioners: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.82 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 3,600	$ 6,000	$ 4,800
Pipe Insulation	Upgrade	$ 450	$ 600	$ 525
Solar Photovoltaic (PV) System: 4 KW	Upgrade	$ 18,000	$ 26,000	$ 22,000
Total Incremental Cost of Energy Efficiency Measures:		**$ 31,892**	**$ 50,345**	**$ 41,119**
Total Incremental Cost per Square Foot:		**$ 4.25**	**$ 6.71**	**$ 5.48**

Incremental Cost Estimate of Net Zero TDV Energy
Single Family Prototype: 7,500 SF, Option 1 **7500 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,500 sf @ 0.15 to 0.20/sf	Upgrade	$ 675	$ 900	$ 788
R-19 Walls (from R-13): 2,904 sf @ $0.31 to $0.54/sf	Upgrade	$ 900	$ 1,568	$ 1,234
R-30 Raised Floor (from R-19): 4,500 sf @ $0.25 to $0.35	Upgrade	$ 1,125	$ 1,575	$ 1,350
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Housewrap: 2,904 sf @ $0.50 to $0.75/sf	Upgrade	$ 1,452	$ 2,178	$ 1,815
Super Low E Vinyl Windows, U=0.36, SHGC=0.23 (from Low E2, U=0.36, SHGC=0.23): 1,650 sf @ $1.40 - $1.75 / sf	Upgrade	$ 2,310	$ 2,888	$ 2,599
(3) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,500	$ 3,600	$ 2,550
(3) Air Conditioners: 15 SEER, 12 EER (HERS) (from 13 SEER, 11 EER)	Upgrade	$ 1,500	$ 4,500	$ 3,000
(3) Air Conditioners: Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.82 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 3,600	$ 6,000	$ 4,800
Pipe Insulation	Upgrade	$ 450	$ 600	$ 525
Solar Photovoltaic (PV) System: 4 KW	Upgrade	$ 18,000	$ 26,000	$ 22,000
Total Incremental Cost of Energy Efficiency Measures:		**$ 31,512**	**$ 49,809**	**$ 40,660**
Total Incremental Cost per Square Foot:		**$ 4.20**	**$ 6.64**	**$ 5.42**

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

Energy Efficiency Measures to Meet Title 24
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

Energy Efficiency Measures to Meet Title 24
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

CZ3: Single Family House 5,000 square feet, 2-story, 22.0% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
Air Conditioners: None
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.60

CZ3: Single Family House 6,500 square feet, 2-story, 22.0% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Quality Insulation Installation (HERS)
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(3) Furnaces: 80% AFUE
Air Conditioners: None
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(3) 50 Gallon Gas Water Heaters: EF=0.60

CZ3: Single Family House 7,500 square feet, 2-story, 22.0% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Quality Insulation Installation (HERS)
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(3) Furnaces: 80% AFUE
Air Conditioners: None
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(3) 50 Gallon Gas Water Heaters: EF=0.60

Climate Zone 3 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** (except homes equal or greater than 4,000 square feet as indicated).

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	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,290**	**$ 2,485**	**$ 1,888**
Total Incremental Cost per Square Foot:		**$ 0.82**	**$ 1.57**	**$ 1.19**

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	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,005**	**$ 2,105**	**$ 1,555**
Total Incremental Cost per Square Foot:		**$ 0.50**	**$ 1.04**	**$ 0.77**

For homes ≥ 4,000 square feet to 5,499 square feet, the following tables list the energy measures needed to improve a 5,000 square foot home so that it uses at least 20% less TDV energy than the corresponding Title 24 base case design.

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 5,000 SF, Option 1 **5000 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-13): 2,616 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,177	$ 1,831	$ 1,504
R-19 Raised Floor	-	$ -	$ -	$ -
Quality Insulation Installation (HERS)	Upgrade	$ 450	$ 600	$ 525
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(2) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,000	$ 2,400	$ 1,700
Air Conditioners: None	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62 (from EF=0.60)	Upgrade	$ 200	$ 400	$ 300
Total Incremental Cost of Energy Efficiency Measures:		**$ 2,827**	**$ 5,231**	**$ 4,029**
Total Incremental Cost per Square Foot:		**$ 0.57**	**$ 1.05**	**$ 0.81**

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 5,000 SF, Option 2 **5000 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 2,616 sf @ $0.31 to $0.54/sf	Upgrade	$ 811	$ 1,413	$ 1,112
R-19 Raised Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(2) Furnaces: 80% AFUE	-	$ -	$ -	$ -
Air Conditioners: None	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (650)	$ (450)	$ (550)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) Instantaneous Gas Water Heater: RE=0.80 (from (2) 50 Gal Gas: EF=0.60)	Upgrade	$ 2,000	$ 3,400	$ 2,700
Total Incremental Cost of Energy Efficiency Measures:		**$ 2,161**	**$ 4,363**	**$ 3,262**
Total Incremental Cost per Square Foot:		**$ 0.43**	**$ 0.87**	**$ 0.65**

For homes ≥ 5,500 square feet to 6,999 square feet, the following tables list the energy measures needed to improve a 6,500 square foot home so that it uses at least 30% less TDV energy than the corresponding Title 24 base case design.

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 6,500 SF, Option 1 **6500 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 3,900 sf @ 0.15 to 0.20/sf	Upgrade	$ 585	$ 780	$ 683
R-21 Walls (from R-13): 2,808 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,264	$ 1,966	$ 1,615
R-30 Raised Floor (from R-19): 3,900 sf @ $0.25 to $0.35	Upgrade	$ 975	$ 1,365	$ 1,170
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(3) Furnaces: 80% AFUE	-	$ -	$ -	$ -
Air Conditioners: None	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.80 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 3,000	$ 5,100	$ 4,050
Pipe Insulation	Upgrade	$ 450	$ 600	$ 525
Total Incremental Cost of Energy Efficiency Measures:		**$ 6,274**	**$ 9,811**	**$ 8,042**
Total Incremental Cost per Square Foot:		**$ 0.97**	**$ 1.51**	**$ 1.24**

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 6,500 SF, Option 2 **6500 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 2,808 sf @ $0.31 to $0.54/sf	Upgrade	$ 870	$ 1,516	$ 1,193
R-19 Raised Floor	-	$ -	$ -	$ -
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(3) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,500	$ 3,600	$ 2,550
Air Conditioners: None	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.80 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 3,000	$ 5,100	$ 4,050
Total Incremental Cost of Energy Efficiency Measures:		**$ 5,370**	**$ 10,216**	**$ 7,793**
Total Incremental Cost per Square Foot:		**$ 0.83**	**$ 1.57**	**$ 1.20**

For homes ≥ 7,000 square feet the following tables list the energy measures needed to improve a 7,500 square foot home so that its net Title 24 TDV energy use is zero (i.e. Net Zero TDV Energy) as compared with the corresponding Title 24 base case design. To achieve this level of performance, a solar PV system is added to the home sized to just meet the Net Zero Energy threshold by rounding up to the next largest whole KW of nominal solar PV capacity.

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 7,500 SF, Option 1 **7500 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,500 sf @ 0.15 to 0.20/sf	Upgrade	$ 675	$ 900	$ 788
R-21 Walls (from R-13): 2,904 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,307	$ 2,033	$ 1,670
R-30 Raised Floor (from R-19): 4,500 sf @ $0.25 to $0.35	Upgrade	$ 1,125	$ 1,575	$ 1,350
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Housewrap: 2,904 sf @ $0.50 to $0.75/sf	Upgrade	$ 1,452	$ 2,178	$ 1,815
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(3) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,500	$ 3,600	$ 2,550
Air Conditioners: None	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.82 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 3,600	$ 6,000	$ 4,800
Solar Photovoltaic (PV) System: 2 KW	Upgrade	$ 9,000	$ 13,000	$ 11,000
Total Incremental Cost of Energy Efficiency Measures:		**$ 18,659**	**$ 29,286**	**$ 23,972**
Total Incremental Cost per Square Foot:		**$ 2.49**	**$ 3.90**	**$ 3.20**

Incremental Cost Estimate to Exceed Title 24 by 20%
Single Family Prototype: 7,500 SF, Option 2 **7500 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,500 sf @ 0.15 to 0.20/sf	Upgrade	$ 675	$ 900	$ 788
R-21 Walls (from R-13): 2,904 sf @ $0.45 to $0.70/sf	Upgrade	$ 1,307	$ 2,033	$ 1,670
R-38 Raised Floor (from R-19): 4,500 sf @ $0.30 to $0.45	Upgrade	$ 1,350	$ 2,025	$ 1,688
Quality Insulation Installation (HERS)	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(3) Furnaces: 94% AFUE (from 80% AFUE)	Upgrade	$ 2,700	$ 5,400	$ 4,050
Air Conditioners: None	-	$ -	$ -	$ -
R-8 Attic Ducts (from R-6)	Upgrade	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(3) Instantaneous Gas Water Heater: RE=0.84 (from (3) 50 Gal Gas: EF=0.60)	Upgrade	$ 4,200	$ 7,200	$ 5,700
Pipe Insulation	Upgrade	$ 450	$ 600	$ 525
Solar Photovoltaic (PV) System: 2 KW	Upgrade	$ 9,000	$ 13,000	$ 11,000
Total Incremental Cost of Energy Efficiency Measures:		**$ 19,682**	**$ 31,158**	**$ 25,420**
Total Incremental Cost per Square Foot:		**$ 2.62**	**$ 4.15**	**$ 3.39**

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:

CZ2: Low-rise Multi-family: 2-story 8,442 square feet, 8 units, 12.5% glazing

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-15 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(8) Furnaces: 80% AFUE
(8) Air Conditioners: 13 SEER
R-8 Attic Ducts
(8) 40 Gallon Gas Water Heaters: EF=0.63

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 2 Energy Measures Needed to Meet the Ordinance

See Section 2.0 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%
Low-rise Multifamily Prototype: 8,442 SF, Option 1 **8442 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-21 Walls (from R-15): 10,146 sf @ $0.50 to $0.75/sf	Upgrade	$ 5,073	$ 7,510	$ 6,292
R-0 Slab on Grade	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(8) Furnaces: 80% AFUE	-	$ -	$ -	$ -
(8) Air Conditioner: 13 SEER, 11 EER (HERS)	Upgrade	$ 200	$ 600	$ 400
(8) Air Conditioner: Refrig. Charge (HERS)	Upgrade	$ 1,200	$ 1,600	$ 1,400
R-8 Attic Ducts	-	$ -	$ -	$ -
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 6,473**	**$ 9,710**	**$ 8,092**
Total Incremental Cost per Square Foot:		**$ 0.77**	**$ 1.15**	**$ 0.96**

Incremental Cost Estimate to Exceed Title 24 by 15%
Low-rise Multifamily Prototype: 8,442 SF, Option 2 **8442 sf** **Climate Zone 2**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-15): 10,146 sf @ $0.45 to $0.75/sf	Upgrade	$ 4,566	$ 7,610	$ 6,088
R-0 Slab on Grade	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(8) Furnaces: 80% AFUE	-	$ -	$ -	$ -
(8) Air Conditioners: 13 SEER	-	$ -	$ -	$ -
R-4.2 Attic Ducts (from R-8)	Downgrade	$ (3,000)	$ (2,000)	$ (2,500)
Reduced Duct Leakage/Testing (HERS)	Upgrade	$ 2,000	$ 4,000	$ 3,000
(8) 40 Gallon Gas Water Heaters: EF=0.62 (from 0.63 EF)	Downgrade	$ -	$ (400)	$ (200)
Total Incremental Cost of Energy Efficiency Measures:		**$ 3,566**	**$ 9,210**	**$ 6,388**
Total Incremental Cost per Square Foot:		**$ 0.42**	**$ 1.09**	**$ 0.76**

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	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 7,855**	**$ 16,095**	**$ 11,975**
Total Incremental Cost per Square Foot:		**$ 0.93**	**$ 1.91**	**$ 1.42**

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:

CZ2: High-rise Residential: 4-story 36,800 sf, 40 units, Window Wall Ratio=35.2%

Energy Efficiency Measures to Meet Title 24
R-30 Attic; Cool Roof Reflectance=0.70, Emittance=0.75
R-19 in Metal Frame Walls
R-6 (2" K-13 spray-on) Raised Slab over parking garage
Vinyl Windows, NFRC U=0.36, SHGC=0.35
Split Heat Pumps: HSPF=7.2, EER=10.2
Central DHW boiler: 82.7% AFUE and recirculating system w/ timer-temperature controls & VSD hot water pump

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

Energy Efficiency Measures to Meet Title 24
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

CZ 2: Energy Measures Needed to Meet the County's Ordinance

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 1 **Climate Zone 2**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Attic; Cool Roof Reflectance=0.70, Emittance=0.75	-	$ -	$ -	$ -
R-19 in Metal Frame Walls	-	$ -	$ -	$ -
R-8 (2.5" K-13 spray-on) Raised Slab over parking garage	Upgrade	$ 3,680	$ 5,520	$ 4,600
Vinyl Windows, NFRC U=0.33, SHGC=0.25; 6,240 sf @ $1.40 to $1.60/sf	Upgrade	$ 8,736	$ 9,984	$ 9,360
(80) Room Heat Pumps: HSPF=7.84, eer=11.2 (No Ducts) @ $150 to $250/unit	Upgrade	$ 12,000	$ 20,000	$ 16,000
Premium Efficiency DHW Hot Water Pump	Upgrade	$ 150	$ 250	$ 200
Total Incremental Cost of Energy Efficiency Measures:		**$ 24,566**	**$ 35,754**	**$ 30,160**
Total Incremental Cost per Square Foot:		**$ 0.67**	**$ 0.97**	**$ 0.82**

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 2 **Climate Zone 2**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Attic; Cool Roof Reflectance=0.70, Emittance=0.75	-	$ -	$ -	$ -
R-19 in Metal Frame Walls + R-5 exterior rigid insulation 11,472 sf @ $5.00 to $8.00/sf	Upgrade	$ 57,360	$ 91,776	$ 74,568
R-6 (2" K-13 spray-on) Raised Slab over parking garage	-	$ -	$ -	$ -
Vinyl Windows, NFRC U=0.33, SHGC=0.25; 6,240 sf @ $1.40 to $1.60/sf	Upgrade	$ 8,736	$ 9,984	$ 9,360
Split Heat Pumps: HSPF=7.2, EER=10.2	-	$ -	$ -	$ -
(2) 94% AFUE DHW boilers @ $1500 to$2500 each	Upgrade	$ 3,000	$ 5,000	$ 4,000
Total Incremental Cost of Energy Efficiency Measures:		**$ 69,096**	**$106,760**	**$ 87,928**
Total Incremental Cost per Square Foot:		**$ 1.88**	**$ 2.90**	**$ 2.39**

CZ 3: 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**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
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
Total Incremental Cost of Energy Efficiency Measures:		**$ 34,465**	**$ 48,160**	**$ 41,313**
Total Incremental Cost per Square Foot:		**$ 0.94**	**$ 1.31**	**$ 1.12**

2.4 Nonresidential Buildings

The following is the energy design description of the nonresidential building prototypes which just meet the 2008 Title 24 Building Energy Efficiency Standards:

CLIMATE ZONE 2

The following energy design descriptions of nonresidential building prototypes just meet the 2008 Title 24 Building Energy Efficiency Standards in **Climate Zone 2:**

CZ2: Nonresidential 2-story office building: 21,160 sf, Window Wall Ratio= 37.1%

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

CZ2: Nonresidential 5-story office building: 52,900 sf, Window Wall Ratio= 29.1%

Energy Efficiency Measures to Meet Title 24
R-38 Attic w/ No Cool Roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Windows NFRC U=0.50 and SHGCc=0.31, 2' overhang 1st floor front elevation only
(720) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts & premium lamps, 50w; and (300) 18w CFLs @ 18w each; no lighting controls (beyond mandatory)
(5) 30-ton Packaged VAV units EER=10.4, 10,000 cfm; 20% VAV boxes w/ reheat; all standard efficiency fan motors
R-4.2 duct insulation w/ ducts in conditioned space
Standard hot water boiler, AFUE=80%

CZ2: Nonresidential 2-story office building: 21,160 sf, Window Wall Ratio= 37.1%

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 21,160 SF, Option 1 **Climate Zone 2**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Attic w/ No Cool Roof	-	$ -	$ -	$ -
R-19 in Metal Frame Walls	-	$ -	$ -	$ -
R-0 (un-insulated) slab-on-grade 1st floor				
Windows, NFRC U=0.50, SHGC=0.31; 5,160 sf @ $2.00 to $3.00/sf	Upgrade	$ 10,320	$ 15,480	$ 12,900
(248) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts & premium lamps, 50w @ $25.00 - $30.00 each	Upgrade	$ 6,000	$ 7,200	$ 6,600
(4) 10-ton Packaged DX units, EER= 13.4 @ $2300 - $2600 ea,	Upgrade	$ 16,000	$ 24,000	$ 20,000
(4) 7.5-ton Packaged DX units, EER= 13.4 @ $1950 - $2450 ea,	Upgrade	$ 12,000	$ 18,800	$ 15,400
(8) Premium Efficiency supply fans @ $100 to $200 each	Upgrade	$ 800	$ 1,600	$ 1,200
R-4.2 duct insulation w/ ducts in conditioned space	-	$ -	$ -	$ -
Standard 50 gallon gas water heater, EF=0.575	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 45,120**	**$ 67,080**	**$ 56,100**
Total Incremental Cost per Square Foot:		**$ 2.13**	**$ 3.17**	**$ 2.65**

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 21,160 SF, Option 2 **Climate Zone 2**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Attic w/ No Cool Roof	-	$ -	$ -	$ -
R-19 in Metal Frame Walls + R-6.5 (1") rigid insulation 8,752 sf @ $3.00 to $4.00/sf	-	$ 26,256	$ 35,008	$ 30,632
R-0 (un-insulated) slab-on-grade 1st floor				
Windows, NFRC U=0.50, SHGC=0.28; 5,160 sf @ $3.50 to $4.50/sf	Upgrade	$ 18,060	$ 23,220	$ 20,640
(72) [30% of] 2-lamp 4' T8 fixtures on (36) multi-level occupant sensors in small offices @ $65.00 to $85.00 each	Upgrade	$ 2,340	$ 3,060	$ 2,700
(248) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts & premium lamps, 50w @ $25.00 - $30.00 each	Upgrade	$ 6,000	$ 7,200	$ 6,600
(4) 10-ton Packaged DX units EER=11.0, 4,000 cfm; and (4) 7.5-ton Packaged DX units EER=11.0, 3,000 cfm; all standard efficiency fan motors	-	$ -	$ -	$ -
R-4.2 duct insulation w/ ducts in conditioned space	-	$ -	$ -	$ -
Standard 50 gallon gas water heater, EF=0.575	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 52,656**	**$ 68,488**	**$ 60,572**
Total Incremental Cost per Square Foot:		**$ 2.49**	**$ 3.24**	**$ 2.86**

CZ2: Nonresidential 5-story office building: 52,900 sf, Window Wall Ratio= 29.1%

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Attic w/ Cool Roof Reflectance=0.70, Emittance=0.75 10,580 sf @ $0.40 to $0.60/sf	Upgrade	$ 4,235	$ 6,348	$ 5,292
R-19 in Metal Frame Walls	-	$ -	$ -	$ -
R-0 (un-insulated) slab-on-grade 1st floor				
Windows, NFRC U=0.50, SHGC=0.31; 5,160 sf @ $2.00 to $3.00/sf	-	$ -	$ -	$ -
(180) [25% of] 2-lamp 4' T8 fixtures on (90) multi-level occupant sensors in small offices @ $65.00 to $85.00 each	Upgrade	$ 5,850	$ 7,650	$ 6,750
(5) 10-ton Packaged DX units, EER= 11.0 w/ Premium fan motors @ $10,800 to $15,600 ea,	Upgrade	$ 54,000	$ 78,000	$ 66,000
R-4.2 duct insulation w/ ducts in conditioned space	-	$ -	$ -	$ -
Standard hot water boiler, AFUE=80%	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 59,850**	**$ 85,650**	**$ 72,750**
Total Incremental Cost per Square Foot:		**$ 1.13**	**$ 1.62**	**$ 1.38**

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 2 **Climate Zone 2**

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Attic w/ Cool Roof Reflectance=0.70, Emittance=0.75 10,580 sf @ $0.40 to $0.60/sf	Upgrade	$ 4,235	$ 6,348	$ 5,292
R-19 in Metal Frame Walls + R-6.5 (1") rigid insulation 8,752 sf @ $3.00 to $4.00/sf	Upgrade	$ 26,256	$ 35,008	$ 30,632
R-0 (un-insulated) slab-on-grade 1st floor				
Windows, NFRC U=0.50, SHGC=0.28; 8,500 sf @ $2.00 to $3.00/sf	Upgrade	$ 17,000	$ 25,500	$ 21,250
(180) [25% of] 2-lamp 4' T8 fixtures on (90) multi-level occupant sensors in small offices @ $65.00 to $85.00 each	Upgrade	$ 5,850	$ 7,650	$ 6,750
(248) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts & premium lamps, 50w @ $25.00 - $30.00 each	Upgrade	$ 6,000	$ 7,200	$ 6,600
(5) 30-ton Packaged VAV units EER=10.4, 10,000 cfm; 20% VAV boxes w/ reheat; (10) Premium Effiiciency fan motors	Upgrade	$ 1,000	$ 1,500	$ 1,250
R-4.2 duct insulation w/ ducts in conditioned space	-	$ -	$ -	$ -
Standard hot water boiler, AFUE=80%	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 56,106**	**$ 76,858**	**$ 66,482**
Total Incremental Cost per Square Foot:		**$ 1.06**	**$ 1.45**	**$ 1.26**

CLIMATE ZONE 3

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%

Energy Efficiency Measures to Meet Title 24
R-38 Attic w/ No Cool Roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Windows NFRC U=0.50 and SHGCc=0.38, no exterior shading
(248) 2-lamp 4' T8 fixtures, 62w each; and (104) 26w CFLs
@ 26w each; no lighting controls (beyond mandatory)
(4) 10-ton Packaged DX units EER=11.0, 4,000 cfm; and
(4) 7.5-ton Packaged DX units EER=11.0, 3,000 cfm;
all standard efficiency fan motors
R-4.2 duct insulation w/ 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%

Energy Efficiency Measures to Meet Title 24
R-30 Attic w/ No Cool Roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Windows NFRC U=0.50 and SHGCc=0.38, no exterior shading
(720) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts
& premium lamps, 50w; and (260) 26w CFLs @ 26w
each; no lighting controls (beyond mandatory)
(5) 30-ton Packaged VAV units EER=10.4, 10,000 cfm; 20% VAV
boxes w/ reheat; all standard efficiency fan motors
R-4.2 duct insulation w/ ducts in conditioned space
Standard hot water boiler, AFUE=80%

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

Incremental Cost Estimate to Exceed Title 24 by 15%

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 + R-10 rigid insulation w/ Cool Roof Reflectance = 0.70, Emittance = 0.75; 10,580 sf @ $1.75 to $2.35/sf	Upgrade	$ 18,515	$ 24,865	$ 21,690
R-19 in Metal Frame Walls	-	$ -	$ -	$ -
R-0 (un-insulated) slab-on-grade 1st floor				
Windows, NFRC U=0.50, SHGC=0.31; 5,160 sf @ $2.00 to $3.00/sf	Upgrade	$ 10,320	$ 15,480	$ 12,900
(248) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts & premium lamps, 50w @ $25.00 - $30.00 each	Upgrade	$ 6,200	$ 7,440	$ 6,820
(64) [26% of] 2-lamp 4' T8 fixtures on (32) multi-level occupant sensors in small offices @ $65.00 to $85.00 each	Upgrade	$ 2,080	$ 2,720	$ 2,400
(24) additional recessed CFL fixtures w/ all CFLs 18w lamps @ $175 to $250 each	Upgrade	$ 4,200	$ 6,000	$ 5,100
(4) 10-ton Packaged DX units EER=11.0, 4,000 cfm; (4) 7.5-ton Packaged DX units EER=11.0, 3,000 cfm; and (8) Premium Efficiency fan motors @ $100 to $200 each	Upgrade	$ 800	$ 1,600	$ 1,200
R-4.2 duct insulation w/ ducts in conditioned space	-	$ -	$ -	$ -
Standard 50 gallon gas water heater, EF=0.575	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 42,115**	**$ 58,105**	**$ 50,110**
Total Incremental Cost per Square Foot:		**$ 1.99**	**$ 2.75**	**$ 2.37**

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-30 Attic w/ No Cool Roof	-	$ -	$ -	$ -
R-19 in Metal Frame Walls	-	$ -	$ -	$ -
R-0 (un-insulated) slab-on-grade 1st floor				
Windows NFRC U=0.50 and SHGCc=0.38, no exterior shading	-	$ -	$ -	$ -
(720) 2-lamp 4' T8 fixtures w/ high efficiency instant start ballasts & premium lamps, 50w @ $25.00 - $30.00 each	Upgrade	$ 18,000	$ 21,600	$ 19,800
(240) 33% of] 2-lamp 4' T8 fixtures on (120) multi-level occupant sensors in small offices @ $65.00 to $85.00 each	Upgrade	$ 7,800	$ 10,200	$ 9,000
(40) additional recessed CFL fixtures w/ all CFLs 18w lamps @ $175 to $250 each	Upgrade	$ 7,000	$ 10,000	$ 8,500
(5) 10-ton Packaged DX units, EER= 11.0 w/ Premium fan motors @ $10,800 to $15,600 ea,	Upgrade	$ 54,000	$ 78,000	$ 66,000
R-4.2 duct insulation w/ ducts in conditioned space	-	$ -	$ -	$ -
Standard hot water boiler, AFUE=80%	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 86,800**	**$119,800**	**$103,300**
Total Incremental Cost per Square Foot:		**$ 1.64**	**$ 2.26**	**$ 1.95**

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 Building Energy Efficiency Standards, Micropas 8.

- 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 2: 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)
2,025 sf (Option 1)	399	69	$2,011	$148	13.5
2,025 sf (Option 2)	348	81	$2,104	$153	13.7
Averages:	374	75	$2,057	$151	13.6

Annual Reduction in CO2-equivalent: 1,041 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)
2,682 sf (Option 1)	524	71	$2,072	$172	12.0
2,682 sf (Option 2)	338	111	$2,549	$186	13.7
2,682 sf (Option 3)	427	92	$2,327	$180	12.9
Averages:	430	91	$2,316	$179	12.9

Annual Reduction in CO2-equivalent: 1,256 lb./building-year
0.47 lb./sq.ft.-year

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

Climate Zone 2: 20% Better Than Title 24

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost ($)	Annual Energy Cost Savings ($)	Simple Payback (Years)
5,000 sf (Option 1)	908	129	$5,237	$305	17.1
5,000 sf (Option 2)	1040	116	$4,637	$313	14.8
5,000 sf (Option 3)	850	148	$5,087	$317	16.0
Averages:	933	131	$4,987	$312	16.0

Annual Reduction in CO2-equivalent: 1,945 lb./building-year
0.39 lb./sq.ft.-year

Climate Zone 3: 20% Better Than Title 24

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost ($)	Annual Energy Cost Savings ($)	Simple Payback (Years)
5,000 sf (Option 1)	171	146	$4,029	$197	20.4
5,000 sf (Option 2)	93	161	$3,262	$201	16.2
Averages:	132	154	$3,646	$199	18.3

Annual Reduction in CO2-equivalent: 1,846 lb./building-year
0.37 lb./sq.ft.-year

Climate Zone 2: 30% Better Than Title 24

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost ($)	Annual Energy Cost Savings ($)	Simple Payback (Years)
6,500 sf (Option 1)	1130	321	$12,020	$565	21.3
6,500 sf (Option 2)	1029	26	$9,253	$398	23.2
Averages:	1080	174	$10,636	$481	22.3

Annual Reduction in CO2-equivalent: 2,753 lb./building-year
0.42 lb./sq.ft.-year

Climate Zone 3: 30% Better Than Title 24

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost ($)	Annual Energy Cost Savings ($)	Simple Payback (Years)
6,500 sf (Option 1)	165	275	$8,043	$345	23.3
6,500 sf (Option 2)	95	281	$7,793	$340	22.9
Averages:	130	278	$7,918	$342	23.1

Annual Reduction in CO2-equivalent: 3,294 lb./building-year
0.51 lb./sq.ft.-year

Climate Zone 2: Net Zero TDV Energy
Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost ($)	Annual Energy Cost Savings ($)	Simple Payback (Years)
7,500 sf (Option 1)	1568	378	$41,119	$1,467	28.0
7,500 sf (Option 2)	1582	378	$40,661	$1,470	27.7
Averages:	1575	378	$40,890	$1,468	27.8

Annual Reduction in CO2-equivalent: 7,089 lb./building-year
0.95 lb./sq.ft.-year

Climate Zone 3: Net Zero TDV Energy
Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost ($)	Annual Energy Cost Savings ($)	Simple Payback (Years)
7,500 sf (Option 1)	212	375	$23,973	$849	28.3
7,500 sf (Option 2)	205	375	$25,420	$847	30.0
Averages:	209	375	$24,696	$848	29.1

Annual Reduction in CO2-equivalent: 5,449 lb./building-year
0.73 lb./sq.ft.-year

3.2 Low-rise Multi-family Building

Climate Zone 2: 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)	1575	261	$8,089	$573	14.1
8,442 sf (Option 2)	1468	284	$6,388	$581	11.0
Averages:	1522	273	$7,238	$577	12.6

Annual Reduction in CO2-equivalent: 3,857 lb./building-year
0.10 lb./sq.ft.-year

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 2: 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)	14292	0	$30,160	$2,473	12.2
36,800 sf (Option 2)	9590	268	$87,428	$1,967	44.4
Averages:	11941	134	$58,794	$2,220	28.3

Annual Reduction in CO2-equivalent: 6,933 lb./building-year
0.19 lb./sq.ft.-year

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 2: 15% 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)	19085	-95	$56,100	$3,192	17.6
21,160 sf (Option 2)	15862	90	$60,572	$2,848	21.3
Averages:	17474	-3	$58,336	$3,020	19.4

Annual Reduction in CO2-equivalent: 7,834 lb./building-year
0.37 lb./sq.ft.-year

Climate Zone 3: 15% 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)	19294	-75	$49,670	$3,252	15.3

Annual Reduction in CO2-equivalent: 7,809 lb./building-year
0.37 lb./sq.ft.-year

Climate Zone 2: 15% 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)	40514	-506	$80,417	$6,427	12.5
52,900 sf (Option 2)	35774	-653	$39,917	$5,438	7.3
Averages:	38144	-580	$60,167	$5,932	9.9

Annual Reduction in CO2-equivalent: 10,419 lb./building-year
0.20 lb./sq.ft.-year

Climate Zone 3: 15% 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)	47039	1450	$92,300	$9,805	9.4

Annual Reduction in CO2-equivalent: 38,046 lb./building-year
0.72 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 Marin 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 Marin Green Building Ordinance should carefully analyze building energy performance to reduce incremental first cost and the payback for the required additional energy efficiency measures.