lancaster ca
it's positively clear

October 23, 2013

Mr. Robert Oglesby
California Energy Commission
1516 Ninth Street, MS 39
Sacramento, CA 95814-5514

RE: LOCAL ENERGY ORDINANCE FOR IMPLEMENTATION OF SOLAR PV SYSTEMS

Dear Mr. Oglesby,

Per the request of Commission Staff, the City of Lancaster would like to express to you our firm commitment to enforce the 2013 Title 24, Part 6 Building Energy Efficiency Standards of the California Building Code as part of the implementation of our local energy ordinance. As the Chief Building Official, I will work with my staff to provide training on enforcement of the energy standards and the new requirements for developers to install solar energy systems for new dwelling units as contained in Ordinance No. 994.

On October 22, 2013, I presented to the Lancaster City Council, Ordinance No. 994 including the requirement for implementation of solar energy systems. The City Council recognized the reports, resolution and ordinance at the public hearing and approved Ordinance No. 994 on the same date, with the finding that the requirement is cost-effective.

Per the request of Commission Staff, the ordinance for implementation of solar energy systems was amended to reflect Commission Staff comments to require the demonstration of compliance with the Building Energy Efficiency Standards. The City of Lancaster is committed to enforcing these standards, with the ultimate goal of being the first net-zero city in state of California.

Commission Staff has requested that we summarize our California Environmental Quality Act (CEQA) procedure and findings. The City Council approved a resolution on October 22, 2013 determining that the proposed ordinance is intended to preserve and enhance the environment of the City of Lancaster and is not subject to the CEQA pursuant to Section 15061(b)(3) of the CEQA Guidelines, because there is no possibility that the ordinance may have a significant negative impact on the environment. In addition, it was determined that the ordinance is exempt from the requirements of CEQA pursuant to Section 15308 of the CEQA Guidelines, which exempts actions taken by regulatory agencies for the enhancement and protection of the environment. The City of Lancaster is filing a notice of exemption with Los Angeles County Clerk's office.

Sincerely,

Robert C. Neal

Robert Neal, CBO
Public Works Director

RN/cn

October 31, 2013

Application for:

City of Lancaster Locally Adopted Energy Standards

From:
Robert Neal, Public Works Director CBO
City of Lancaster
44933 Fern Avenue
Lancaster, CA 93534
(661) 723-6040

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RESOLUTION NO. 13-61

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LANCASTER, CALIFORNIA, PRESENTING FINDINGS FOR MODIFYING THE 2013 CALIFORNIA BUILDING, RESIDENTIAL, ELECTRICAL, AND ENERGY CODES WHICH ARE REASONABLY NECESSARY DUE TO LOCAL CLIMATIC, GEOLOGICAL, OR TOPOGRAPHICAL CONDITIONS.

WHEREAS, the State of California Building Standards Commission is mandated by Sections 18928 and 18929 of the Health and Safety Code to adopt, by reference, the most recent edition of the International Building Code of the International Conference Council; the International Residential Code of the International Conference Council; the National Electrical Code of the National Fire Protection Association; and the California Energy Code, hereafter collectively referred to as "Codes"; and

WHEREAS, permission is granted to Cities or Counties to make changes or modifications in requirements contained in the provisions published in the California Building Standards Code pursuant to Sections 17958 and 17958.5 of the Health and Safety Code; and

WHEREAS, Health and Safety Code Section 17958.7 provides that, before making any modifications or changes to the California Building Standards Code, the governing body of the City or County shall make an express finding that such changes or modifications are reasonably necessary because of local climatic, geological, or topographical conditions; and

WHEREAS, permission is granted to Cities or Counties to make changes or modifications in requirements contained in the provisions published in the California Energy Code pursuant to Section 25402.1(h)2 of the Public Resources Code; and

WHEREAS, Public Resources Code Section 25402.1(h)2 provides that, before making any modifications or changes to the California Building Standards Code, the governing body of the City or County shall make an express finding that such changes or modifications are cost effective and will require buildings to be designed to consume no more energy than permitted by Title 24, Part 6; and

WHEREAS, the City Engineering Division of the City of Lancaster has recommended that changes and modifications to the Codes be made, such changes and modifications being necessary due to local conditions, and further recommend other changes and modifications which are of an administrative, definitional, and/or procedural nature and not deemed to be Building Standards.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED BY THE CITY COUNCIL OF THE CITY OF LANCASTER, STATE OF CALIFORNIA, THAT:

Section 1. Sections 15.08.020 and 15.08.030 of the Lancaster Municipal Code change, add and/or modify Sections 903.2, 1505.6, 1505.7, 1507.8, 1507.9, 3425 and Tables 1507.8, 1507.8.5, 1507.8.7, 1507.9.6 and 1507.9.8, of the 2013 California Building Code, Title 24, Part 2 of the California Code of Regulations. Section 15.09.020 of the Lancaster Municipal Code change, add and/or modify Sections R905.7, R905.8 and Tables R905. 7.4, R905.7.5, R905.8.5 and R905.8.6, of the 2013 California Residential Code, Title 24, Part 2.5 of the California Code of Regulations. Section 15.12.040 of the Lancaster Municipal Code changes, adds and/or modifies Article 690.15 of the 2013 California Electrical Code, Title 24, Part 3 of the California Code of Regulations. All the above are incorporated by reference as if fully set forth herein and are hereby found to be reasonably necessary due to the following local conditions:

Local Climatic Conditions:
The City of Lancaster is located in the western portion of the southeast desert air basin. The seasonal temperatures vary greatly. Summer is relatively hot with temperatures as high as 117° F with very little precipitation. In winter it is very frigid with temperatures as low as 2° F. Lancaster experiences high winds and a significant portion of the prevailing winds are due to the desert heat low pressure systems and the phenomena known as the "orographic effect" (the air is forced over the mountain range and loses moisture as it rises, when it descends, it also compresses and heats up).

With these conditions, Lancaster is a prime locality to experience snow, flooding, heat wave, drought and devastating fires. Therefore, to further reduce the likelihood of loss of human life, and property damage from a catastrophe which would extremely tax the resources of the City thereby making less resources available for other concurrent incidences, to further preserve the natural environment in sensitive areas of the City, to conserve water for use in irrigation systems, and to provide for adequate ventilation and rest areas, it is therefore reasonably necessary because of the above mentioned climatic conditions to adopt, change, add and/or modify the above mentioned Sections and Chapters of Title 24 of the California Code of Regulations.

Section 2. Section 15.28.020 of the Lancaster Municipal Code adds Section 110.11 to the 2013 California Energy Code. This Section is incorporated by reference as if fully set forth herein and has been found to be cost effective and will require buildings to be designed to consume no more energy than permitted by Title 24, Part 6. The proposed Ordinance is intended to preserve and enhance the environment of the City of Lancaster and is not subject to the California Environmental Quality Act pursuant to Section 15061(b)(3) of the CEQA Guidelines, because there is no possibility that the ordinance may have a significant negative impact on the environment and is exempt from the requirements of CEQA pursuant to Section 15308 of the CEQA Guidelines, which exempts actions taken by regulatory agencies for the enhancement and protection of the environment. In addition, this Section places Ordinance 989, approved by the City Council in April 2013, requiring the implementation of solar energy systems in new residential construction, within the Lancaster Energy Code.

PASSED, APPROVED and ADOPTED this 22nd day of October, 2013, by the following vote:

AYES: **Council Members: Johnson, Mann, Smith, Vice Mayor Crist, Mayor Parris**

NOES: **None**

ABSTAIN: **None**

ABSENT: **None**

ATTEST:

GERI K. BRYAN, CMC
City Clerk
City of Lancaster

APPROVED:

R. REX PARRIS
Mayor
City of Lancaster

STATE OF CALIFORNIA }
COUNTY OF LOS ANGELES }ss
CITY OF LANCASTER }

CERTIFICATION OF RESOLUTION
CITY COUNCIL

I, _____, _____ City of Lancaster, California, do hereby certify that this is a true and correct copy of the original Resolution No. 13-61, for which the original is on file in my office.

WITNESS MY HAND AND THE SEAL OF THE CITY OF LANCASTER, on this _____ day of _____, _____.

(seal)

_____

ORDINANCE NO. 994

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF LANCASTER, CALIFORNIA AMENDING TITLE 15 OF THE LANCASTER MUNICIPAL CODE BY REPEALING ORDINANCE NUMBER 958, AND ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA BUILDING CODE AS AMENDED HEREIN; ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA RESIDENTIAL CODE AS AMENDED HEREIN; ADOPTING THE LANCASTER STRAW-BALE CONSTRUCTION STANDARDS AS CONTAINED HEREIN; ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA ELECTRICAL CODE AS AMENDED HEREIN; ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA MECHANICAL CODE; ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA PLUMBING CODE AS AMENDED HEREIN; ADOPTING THE LANCASTER SECURITY CODE AS CONTAINED HEREIN; ADOPTING BY REFERENCE THE 2012 EDITION OF THE INTERNATIONAL PROPERTY MAINTENANCE CODE AS AMENDED HEREIN; ADOPTING BY REFERENCE THE 1997 EDITION OF THE UNIFORM CODE FOR THE ABATEMENT OF DANGEROUS BUILDINGS AS AMENDED HEREIN; ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA ENERGY CODE AS AMENDED HEREIN; ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA HISTORICAL BUILDING CODE; ADOPTING BY REFERENCE THE 2014 EDITION OF THE LOS ANGELES COUNTY FIRE CODE; AND ADOPTING BY REFERENCE THE 2013 EDITION OF THE CALIFORNIA GREEN BUILDING STANDARDS CODE, AS THE LANCASTER CODES FOR BUILDINGS AND CONSTRUCTION

THE CITY COUNCIL OF THE CITY OF LANCASTER, CALIFORNIA, DOES HEREBY ORDAIN AS FOLLOWS:

Section 1. Chapter 15.04 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.04
ADMINISTRATIVE CODE

15.04.010 California Building Code Chapter 1, Division II Adopted by Reference.

A. That certain Building Code known as the 2013 California Building Code, Chapter 1, Division II, incorporating by adoption the 2012 edition of the International Building Code with necessary California amendments, all published by the International Conference of Building Officials, and as herein amended, is hereby adopted by reference, and such code shall be and become the Lancaster Administrative Code for Buildings and Construction, to serve as the administrative, organizational and enforcement rules and regulations for the technical codes which regulate the site preparation and construction, alteration, moving, demolition, repair, use, occupancy and maintenance of buildings, structures and building service equipment.

B. One (1) copy of said California Building Code 2013 Edition has been deposited in the Office of the City Clerk of the City of Lancaster, and shall be at all times maintained by said Clerk for use and examination by the public.

15.04.020 Definitions.

Section 101.4.7 of the California Building Code, Chapter 1, Division II, is hereby added to read as follows:

101.4.7 Definitions. Whenever any of the names or terms defined in this section are used in this Code, each such name or term shall be deemed and construed to have the meaning ascribed to be in this section as follows:

"Building Code" shall mean chapter 15.08 of the Lancaster Municipal Code.

"Building Official" shall mean the Building and Safety Official of the City of Lancaster.

"Code Enforcement Agency" or "Local Building Department" shall mean the Building and Safety Division of the Department of Public Works of the City of Lancaster.

"Electrical Code" shall mean Chapter 15.12 of the Lancaster Municipal Code.

"Elevator Code" shall mean the 2013 California Elevator Safety Construction Code.

"Energy Code" shall mean Chapter 15.28 of the Lancaster Municipal Code.

"Fire Code" shall mean Chapter 15.32 of the Lancaster Municipal Code.

"Green Building Standards Code" shall mean Chapter 15.34 of the Lancaster Municipal Code.

"Historical Building Code" shall mean Chapter 15.30 of the Lancaster Municipal Code.

"Jurisdiction" shall mean the City of Lancaster.

"Mechanical Code" shall mean Chapter 15.16 of the Lancaster Municipal Code.

"Plumbing Code" shall mean Chapter 15.20 of the Lancaster Municipal Code.

"Property Maintenance Code" shall mean Chapter 15.24 of the Lancaster Municipal Code.

"Residential Code" shall mean Chapter 15.09 of the Lancaster Municipal Code.

"Technical Codes" shall mean Chapters 15.08, 15.09, 15.10, 15.12, 15.16, 15.20, 15.22, 15.24, 15.28, 15.30, 15.32 and 15.34 of the Lancaster Municipal Code.

15.04.030 Duties and Powers of the Building Official.

Section 104 of the California Building Code, Chapter 1, Division II, is hereby amended by adding subsection 104.12, as follows:

104.12 Regulations. The building official is authorized to promulgate rules and regulations to implement the provisions of this code.

15.04.040 Permit Exempt.
Section 105.2 of the California Building Code, Chapter 1, Division II, is hereby amended by adding the following:

"14. Minor repairs to roof covering which cumulatively totals 100 square feet or 10% of the roof area of any structure regulated by the technical codes, whichever is the least, in any 12 month period. The exemption of a permit shall not be construed to mean that the repairs shall not comply with Chapter 15 of the Building Code."

15.04.050 Permits – Expiration.
Section 105.5 of the California Building Code, Chapter 1, Division II, is hereby amended to read as follows:

105.5 Expiration. Except as set forth in subsection 105.5.1, every permit issued for property within the city of Lancaster shall expire by limitation and become null and void as follows:
(i) If work authorized by such permit is not commenced within 180 days from the issuance date of the permit.

(ii) If work authorized by such permit is commenced within 180 days from the issuance date of the permit, such permit shall expire by limitation and become null and void if the work authorized by such permit is suspended or abandoned. For purposes of this subsection, "suspended or abandoned" shall mean that the permittee has, for a period of 180 days or longer after commencing the work authorized by such permit, failed to make substantial progress toward completion of the work, as determined by the building official. Failure to schedule, undergo and/or pass a requisite interim or final inspection for a period of 180 days or longer since the issuance date of the permit or since the most recent interim inspection may be deemed to constitute a failure to make substantial progress toward completion of the work. The building official may, in his/her sole discretion, grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

(iii) In the event of permit expiration, before work authorized pursuant to the expired permit can be commenced or recommenced, a new permit shall first be obtained (hereafter, a "renewal permit"). To obtain a renewal permit, the applicant may be required to resubmit plans and specifications, if deemed necessary by the building official and/or the city's planning director. The applicant must pay all applicable fees, including but not limited to a plan check fee and building permit fees, in the amount then established by resolution of the City Council. If renewal permits are applied for, a mandatory site inspection shall be performed by the Building and Safety Division to determine that existing conditions and materials comport with this code. All work to be performed under a renewal permit must be performed in accordance with all

applicable technical codes, regulations, laws and ordinances in effect on the date of issuance of the renewal permit. Renewal permits are subject to expiration as set forth in (ii), above.

(iv) In the event of permit expiration, any work performed under that permit is "unpermitted" as defined in Section 114.1 of this chapter, and is subject to the legalization provisions of section 114.5 of this chapter.

105.5.1 Expiration – Unpermitted structures or grading. Notwithstanding any provision of section 105.5, if a building permit was issued in order to bring an unpermitted structure, unpermitted grading, or other unlawful, substandard or hazardous condition into compliance with any applicable law, ordinance, rule or regulation, such permit shall expire by limitation and become null and void sixty (60) days after the issuance date of such permit, if the permittee has failed to make substantial progress toward completion of the work as determined by the building official. Failure to schedule, undergo and/or pass a requisite interim or final inspection for a period of 60 days since the issuance date of the permit or since the most recent interim inspection may be deemed to constitute a failure to make substantial progress toward completion of the work. The building official may, in his/her sole discretion, grant, in writing, one or more extensions of time, for periods not more than 60 days each. The extension shall be requested in writing and justifiable cause demonstrated.

15.04.060 Standard Plans.
Section 107 of the California Building Code, Chapter 1, Division II, is hereby amended by adding the following:

107.6 Standard Plans. The Building Official may approve a set of plans for a building or structure as a "standard plan," provided that the applicant has made proper application, submitted complete sets of plans as required by this section, and paid the plan review fees required.

Plans shall reflect laws and ordinances in effect at the time a permit is issued except as provided herein. Nothing in this section shall prohibit modifying the permit set of plans to reflect changes in laws and ordinances, which have become effective since the approval of the standard plan. The standard plan shall become null and void where the work required by such changes exceeds ten percent (10%) of the value of the building or structure. When it is desired to use an approved "standard plan" for an identical structure, the Building Official may require two plot plans and two duplicate plans to be submitted. Such duplicate plans shall be compared and stamped prior to permit issuance. All fees in effect at the time of permit issuance shall be paid prior to permit issuance.
Standard plans shall be valid for a period of one year from the date of approval. The Building Official may extend this period when no changes in codes or ordinances have occurred.

15.04.070 Fees.
Section 109.2 of the California Building Code, Chapter 1, Division II, is hereby amended to read as following:

109.2 Schedule of Permit fees. "On buildings, structures, electrical, gas, mechanical and plumbing systems or alterations requiring a permit, a fee for each permit shall be paid as

required, in accordance with the schedule *as adopted by resolution of the City Council of the City of Lancaster.*"

15.04.080 Use or Occupancy.
Section 111.1 of the California Building Code, Chapter 1, Division II, is hereby amended to read as following:

111.1 Use and Occupancy. No building or structure, *regardless of occupancy classification,* shall be used or occupied, and no change in the existing *business* or occupancy classification of a building or structure or portion thereof shall be made until the building official has issued a certificate of occupancy therefore as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction.

Exception: Certificates of occupancy are not required for work exempt from permits under Section 105.2.

111.1.1 "No building shall be occupied for any purpose until all permanent utilities have been installed and are fully functional. There shall be no exceptions without the express written consent of the building official."

15.04.090 Board of Appeals.
Section 113 of the California Building Code, Chapter 1, Division II, is hereby deleted in its entirety and replaced with the following:

113 Appeals. Appeals of orders, decisions or determinations of the building official are limited to those enumerated in this section, and shall be filed, scheduled and conducted in accordance with this section.

113.1 Scope.
A. Notwithstanding the provisions of the Technical Codes or the State Housing Law (commencing with Section 17910 of Chapter 1 of Division 13 of the Calif. Health and Safety Code), an appeal is limited to the following orders, decisions or determinations of the building official:

(1) Denials of the proposed use of alternative materials, design or method of construction, installation and/or equipment;

(2) Orders to Vacate and/or Not Enter a building, structure or premises; however, such order shall not be stayed during the pendency of the appeal;

(3) Orders to Demolish a building or structure; however, an order to vacate that may be issued in conjunction with an Order to Demolish shall not be stayed during the pendency of the appeal;

B. The right of appeal shall not exist for determinations of the building official, or a designee thereof, that a violation of any provision of the Technical Codes exists in a building or structure, or portion thereof, or on any premises.

113.2 Appeal Procedure.

A. Any person who is aggrieved by an order, decision or determination of the building official as provided in subsection 113.1 may contest said order, decision or determination by filing an appeal, in writing on a city approved form, with the City Clerk within ten (10) business days from the date of service of the order, decision or determination being appealed. The appeal must specify the basis for the appeal in detail, provide a mailing address and telephone number for the appellant, and include the applicable fee. If a timely appeal is not received by the City Clerk, the right to appeal is waived and the order, decision or determination of the building official is deemed final and binding.

B Appeals shall be heard before an impartial hearing officer, designated by the city manager or his/her designee. Only those matters or issues specifically raised in the written appeal shall be considered in the hearing.

C If the appellant fails to appear, the hearing officer shall cancel the hearing and send a notice thereof to the appellant by first class mail to the address stated on the appeal form. A cancellation of a hearing due to non-appearance of the appellant shall constitute the appellant's waiver of the right to appeal. In such instances, the order, decision or determination of the building official is final and binding.

D Appeal hearings are informal, and formal rules of evidence and discovery do not apply. The order, decision or determination of the building official shall be prima facie evidence of the violation. The appellant, and the building official or his/her designee shall have the opportunity to present evidence and to cross-examine witnesses. The appellant may represent himself/herself or be represented by anyone of his/her choice. The appellant may bring an interpreter to the hearing at his/her sole expense.

E Within thirty calendar days following the appeal hearing, the hearing officer shall affirm, modify or rescind the order, decision or determination of the building official. A written decision shall be served on the appellant by first class mail to the address stated on the appeal form. Failure of an appellant to receive a properly addressed decision shall not invalidate any action or proceeding by the city.

F Any person who is aggrieved by the decision of the hearing officer may appeal said decision to the Board of Appeals, which shall be comprised of members of the City Council and the building official, who shall be an ex officio member. An appeal shall be in writing, must be filed in the same manner, within the same time period, and contain the same information, as an appeal to hearing officer, as provided in Subsection A of this Section. A second appeal fee must accompany the written appeal. If a timely appeal is not received by the City Clerk, the decision of the hearing officer is deemed final and binding. Failure to appeal a decision to the Board of Appeals shall constitute a failure to exhaust the aggrieved person's administrative remedy.

G Appeals before the Board of Appeals shall be conducted in the manner set forth in Chapter 2.44 of the Lancaster Municipal Code.

113.3 Limitation on Authority of Board of Appeals. The Board of Appeals shall have no authority to waive the technical requirements of the Building Code or other technical codes adopted in Title 15 of the Lancaster Municipal Code.

113.4 Appeals of Actions Related to Access to Public Accommodation by Physically Handicapped Persons. The City Council shall have the authority to review decisions by the building official in enforcement of the requirements of the California Health & Safety Code, sections 19955 through 19959, related to access to public accommodation by physically handicapped persons. Appeals of such decisions shall be filed, scheduled and conducted in the manner set forth in Chapter 2.44 of the Lancaster Municipal Code.

15.04.100 Violations – Unlawful Acts
Subsection 114.1 of the California Building Code, Chapter 1, Division II, is hereby amended to read as follows:

114.1 Unlawful acts. It shall be unlawful for any person firm, or corporation to erect, construct, alter, extend, repair, move, remove, demolish, occupy or maintain any building, structure, equipment, installation or land regulated by the Technical Codes, or cause or permit the same to be done, in conflict with or in violation of any of the provisions of the Technical Codes.

114.1.1 Unpermitted structures. No person shall own, use, occupy or maintain an unpermitted structure. For purposes of this section, "unpermitted structure" shall be defined as any building or structure, or portion thereof, or any electrical, plumbing, mechanical or other installation or fixture, that was erected, constructed, enlarged, altered, repaired, moved, improved, removed, connected, installed, converted, demolished or equipped, at any point in time by any person, without the required permit(s) having first been obtained from the building official or with a valid permit as issued by the building official which subsequently expired and became null and void.

114.1.2 Unpermitted grading. No person shall own, use, occupy or maintain unpermitted grading. For purposes of this section, "unpermitted grading" shall be defined as any land which has been excavated, cut, filled, graded, compacted or terraced, at any point in time by any person, without the required permit(s) having first been obtained from the building official or with a valid permit as issued by the building which subsequently expired and became null and void.

15.04.110 Violations – Violation Penalties
Subsection 114.4 of the California Building Code, Chapter 1, Division II, is hereby amended to read as follows:

114.4 Violation Penalties. Any person, firm or corporation who violates any provision of the Technical codes, or fails to comply with any of the requirements thereof, or who erects, constructs, alters, repairs or maintains a building, structure, installation or equipment, or excavates, cuts, fills, grades, compacts or maintains land in violation of approved construction documents or directive of the building official, or of a permit or certificate issued under the provisions of the Technical Codes, shall be deemed guilty of a misdemeanor, and upon

conviction thereof shall be subject to the punishments set forth in Chapter 1.12 of the Lancaster Municipal Code.

15.04.120 Violations – Legalizing Procedures

Subsection 114 of the California Building Code, Chapter 1, Division II, is hereby amended by adding thereto Subsection 114.5, Procedure for Legalizing Unpermitted Structures or Grading, to read as follows:

114.5 Procedure for legalizing unpermitted structures or grading. The procedures specified within subsections 114.5.1 through 114.5.6 shall be followed whenever an attempt is made to legalize an unpermitted structure or unpermitted grading.

114.5.1 Permits. Any person who wishes to legalize an unpermitted structure or unpermitted grading, as defined in Subsections 114.1.1 and 114.1.2, shall obtain all applicable permits. Unpermitted structures and grading shall comply with all current Technical Code requirements and other required approvals pursuant to the Lancaster Municipal Code in order to be legalized. Permits obtained to legalize unpermitted structures or grading shall expire as set forth in Section 105.5.1 of this code.

114.5.2 Plans. Prior to the issuance or granting of any permit to legalize an unpermitted structure, plans showing the plot plan, exterior elevations, existing structures, proposed structures and proposed finish materials shall be submitted to the building official and planning director, or their designees, for review and approval.

114.5.3 Grading. Prior to the issuance or granting of any permit to legalize unpermitted grading, a grading and drainage plan showing the original grade and existing unpermitted grade on the premises the existing grade on adjoining properties, and a soils report shall be submitted to the building official for review and approval.

114.5.4 Inspections. Unpermitted structures or unpermitted grading for which a permit has subsequently been obtained shall be subject to inspection by the building official in accordance with, and in the manner prescribed in, the Technical Codes. The building official may require the removal of finish materials in order to expose framing elements, electrical components, plumbing fixtures or mechanical systems, or may require the removal of fill, to verity that installation, construction or grading was performed in conformance with the Technical Codes.

114.5.5 Investigation. Whenever any work for which a permit is required by this code has commenced on land or in connection with any type of structure without first obtaining said permit a special investigation shall be made before a permit may be issued for such work. For purposes of this section, "special investigation" shall include, but is not limited to, inspecting premises and structures, reviewing permit, license and other records of the City or other agencies, reviewing plans, taking photographs, engaging in conferences and communications with other officials of the City or other agencies, and engaging in conferences and communications with owners or other responsible persons concerning the unpermitted structure or grading.

114.5.5.1 Fee. A special investigation fee shall be paid prior to the issuance of a permit for an unpermitted structure or unpermitted grading. The fee shall be equal to the amount of time expended by city officials in undertaking the special investigation, as defined in Section 114.5.5, charged at the hourly rate that has been established by resolution of the City Council for recovery of code enforcement reinspection fees. The payment of such investigation fee shall not exempt any person from compliance with all other provisions of this code nor from any penalty prescribed by law.

114.5.6 Unpermitted structures or grading which cannot be legalized. If the planning director determines that the City's zoning regulations prohibit legalization of any unpermitted structure, the structure shall be demolished or, if previously permitted, restored to its original approved condition, with all requisite permits, inspections and approvals.

If the building official determines that an unpermitted structure cannot be made to conform to the current applicable Technical Code requirements, the structure shall be demolished or, if previously permitted, restored to its original approved condition, with all requisite permits, inspections and approvals.

If the building official determines that unpermitted grading and/or lot drainage cannot be made to conform with current applicable Technical Code requirements, the land shall be fully restored to the condition that preceded the unpermitted grading, with all requisite permits, inspections and approvals.

Section 2. Chapter 15.08 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.08
BUILDING CODE

15.08.010 California Building Code Provisions Adopted by Reference.

A. That certain Building Code known and designated as volumes 1 and 2 of the 2013 California Building Code, including Appendix C; Appendix F; Appendix G; Appendix H; Appendix I; and Appendix J; incorporating by adoption the 2012 edition of the International Building Code with necessary California amendments, all published by the International Conference of Building Officials, and as herein amended, are hereby adopted by reference, and such codes shall be and become the Lancaster Building Code, regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, use, height, area and maintenance of all structures and certain equipment therein, and the grading of premises, and providing penalties for violation of such codes.

B. One (1) copy of said 2013 California Building Code has been deposited in the office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

15.08.020 Fire Sprinkler System.

Section 903.2 of the 2013 California Building Code is hereby amended to read as follows:

903.2 Where Required. Approved automatic sprinkler systems shall be provided in all buildings and structures, regardless of occupancy group, with a total floor area of 10,000 square feet or more without regard to fire walls of less than four (4) hour fire resistive construction; in existing buildings, other than single family residences, where additions are constructed which increase the total floor area to 10,000 square feet or more; and in the locations described in Sections 903.2.1 through 903.2.12.

15.08.030 Roof Covering - Wood Shakes and Wood Shingles.
Sections 1505.6, 1505.7, 1507.8, 1507.9 and Tables 1507.8,1507.8.5, 1507.8.7, 1507.9.6 and 1507.9.8 of the 2013 California Building Code and all references in any of the technical or administrative codes to said sections or to wood shakes and/or wood shingles, whether or not fire-rated, fire treated, or fire-retardant-treated or any similar terminology, are hereby deleted.

15.08.040 Existing Structures.
Chapter 34 of the 2013 California Building Code is hereby amended by adding section 3425 to read as follows:

SECTION 3425
REPAIRS TO BUILDINGS AND STRUCTURES DAMAGED
BY THE OCCURRENCE OF A NATURAL DISASTER OR FIRE

3425.1 Purpose. The purpose of this section is to provide a defined level of repair for buildings damaged by a natural disaster in the City of Lancaster when a formal state of emergency has been proclaimed. This section shall also apply when an individual building has been damaged by fire or other disaster.

3425.2 General. Required repair levels shall be based on the ratio of the estimated value of the repairs required to restore the structural members to their pre-event condition to the estimated replacement value of the building or structure.

3425.2 Structural Repairs. When the damage ratio does not exceed 0.10 (10 percent), buildings and structures, except essential service facilities, shall at a minimum be restored to their pre-event condition.

When the damage ratio is greater than 0.10 (10 percent) but less than 0.5 (50 percent), buildings and structures, except essential service facilities, shall have the damaged structural members including all critical ties and connections associated with the damaged structural members, all structural members supported by the damaged member, and all structural members supporting the damaged members repaired and strengthened to bring them into compliance with the force levels and connection requirements of the Building Code. These criteria shall apply to essential service facilities when the damage ratio is less than 0.30 (30 percent).

EXCEPTION: For buildings with rigid diaphragms where the above-required repair and strengthening increases the rigidity of the resisting members, the entire lateral-force-resisting

system of the building shall be investigated. When, in the opinion of the building official, an unsafe or adverse condition has been created as a result of the increase in rigidity, the condition shall be corrected.

When the damage ratio is greater than 0.5 (50 percent), buildings and structures, except essential service facilities, shall at a minimum have the entire building or structure strengthened to comply with the force levels and connection requirements of the Building Code. This criteria shall apply to essential service facilities when the damage ratio is greater or equal to 0.3 (30 percent).

3425.4 Nonstructural Repairs to Light Fixtures and Suspended Ceilings. Under all damage ratios, when light fixtures and the suspension system of suspended ceilings are damaged, the damaged light fixtures and ceiling suspension systems shall be repaired to fully comply with the requirements of this code. In buildings and structures where suspended ceiling systems are present, undamaged light fixtures and ceiling suspension systems shall have the additional support and bracing, provided that is required in this code.

Section 3. Chapter 15.09 of the Lancaster Municipal Code is hereby created by adding the Chapter in its entirety to read as follows:

CHAPTER 15.09
RESIDENTIAL CODE

15.09.010 California Residential Code Provisions Adopted by Reference.

A. That certain Residential Code known and designated as the 2013 California Residential Code, including Appendix H, Appendix J, and Appendix K, incorporating by adoption the 2012 edition of the International Residential Code with necessary California amendments, all published by the International Conference of Building Officials, and as herein amended, are hereby adopted by reference, and such codes shall be and become the Lancaster Residential Code for Buildings and Construction regulating the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every detached one-and two-family dwelling, townhouse and certain equipment therein, and the grading of premises, and providing penalties for violation of such codes.

B. One (1) copy of said 2013 California Residential Code has been deposited in the Office of the City Clerk of the City of Lancaster, and shall be at all times maintained by said Clerk for use and examination by the public.

15.09.020 Roof Covering - Wood Shakes and Wood Shingles.

Sections R905.7, R905.8, and Tables R905.7.4, R905.7.5, R905.8.5, and R905.8.6 of the 2013 California Residential Code and all references in any of the technical or administrative codes to said sections or to wood shakes and/or wood shingles, whether or not fire-rated, fire treated, or fire-retardant-treated or any similar terminology, are hereby deleted.

Section 4. Chapter 15.10 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.10
STRAW-BALE CONSTRUCTION

15.10.010 Scope.
Straw-bale construction shall be limited to building of one story in height. This chapter shall establish minimum standards for straw-bale construction. Nothing in this chapter shall be construed as increasing or decreasing the authority of the Building Official to approve or disapprove of alternative construction methods pursuant to the State Housing Law, Part 1.5 (commencing with Section 17910) or the California Building Standards Code, Title 24 of the California Code of Regulations.

15.10.020 Fee Schedule incorporated by reference.
The fees charged for the construction of any straw-bale building shall be as adopted by resolution of the City Council for non-straw-bale construction of the same occupancy.

15.10.030 Architect or Engineer required.
Nothing in this chapter shall be construed as an exemption from Chapter 3 (commencing with Section 5500), or Chapter 7 (commencing with Section 6700) of Division 3 of the Business and Professions Code relative to preparation of plans, drawings, specifications, or calculations under the direct supervision of a licensed architect or civil engineer, for the construction of structures that deviate from the conventional framing requirements for wood frame construction.

15.10.040 Definitions.
For the purpose of this chapter, the following terms are defined as follows:

"Bales" means rectangular compressed blocks of straw, bound by strings or wire.

"Flakes" means slabs of straw removed from an untied bale.

"Laid flat" refers to stacking bales so that the sides with the largest cross-sectional area are horizontal and the longest dimension of this area is parallel with the wall plane.

"Laid on edge" refers to stacking bales so that the sides with the largest cross-sectional area are vertical and the longest dimension of this area is horizontal and parallel with the wall plane.

"Loadbearing" refers to plastered straw-bale walls that bear the dead and live loads of the roof.

"Non-loadbearing" refers to plastered straw-bale walls that bear only their own weight, such as infill panels within some type of post and beam structure.

"Plaster" means lime, gypsum, lime cement, or cement plasters, as defined by the California Building Standards Code, or earthen plaster with fiber reinforcing.

"Straw" means the dry stems of cereal grains left after the seed heads have been substantially removed.

15.10.050 Guidelines for Materials.

The following shall be the guidelines for all bales used in the construction of a straw-bale building.

A. Bales shall be rectangular in shape.

B. Bales used within a continuous wall shall be of consistent height and width to ensure even distribution of loads within wall systems.

C. Bales shall be bound with ties of either polypropylene string or baling wire. Bales with broken or loose ties shall not be used unless the broken or loose ties are replaced with ties which restore the original degree of compaction of the bales.

D. The moisture content of bales, at the time of installation, shall not exceed 20 percent of the total weight of the bale. Moisture content of bales shall be determined through the use of a suitable moisture meter, designed for use with baled rice straw or hay, equipped with a probe of sufficient length to reach the center of the bale, and used to determine the average moisture content of five bales randomly selected from the bales to be used.

E. Bales in loadbearing walls shall have a minimum calculated dry density of 7.0 pounds per cubic foot. The calculated dry density shall be determined after reducing the actual bale weight by the weight of the moisture content.

F. Where custom-made partial bales are used, they shall be of the same density, same string or wire tension, and, where possible, use the same number of ties as the standard size bales.

G. Bales of various types of straw, including wheat, rice, rye, barley, oats, and similar plants, shall be acceptable if they meet the minimum requirements of this chapter for density, shape, moisture content, and ties.

15.10.060 Construction Guidelines.

The following shall be the minimum construction guidelines for all straw-bale buildings.

A. Straw-bale walls, when covered with plaster, drywall, or stucco, shall be deemed to have the equivalent fire resistive rating as wood-frame construction with the same wall-finishing system.

B. Minimum bale wall thickness shall be 13 inches.

C. Buildings with loadbearing bale walls shall not exceed one story in height, and the bale portion of the loadbearing walls shall not exceed a height-to-width ratio of 5.6:1 (for example, the maximum height for a wall that is 23 inches thick would be 10 feet 8 inches).

D. The ratio of unsupported wall length to thickness, for loadbearing walls, shall not exceed 15.7:1 (for example, for a wall that is 23 inches thick, the maximum unsupported length allowed is 30 feet).

E. The allowable vertical load (live and dead load) on top of loadbearing bale walls plastered with cement or lime cement plaster on both sides shall not exceed 800 pounds per linear foot, and the resultant load shall act at the center of the wall. Straw-bale structures shall be designed to withstand all vertical and horizontal loads, and the resulting overturning and base shear, as specified in the latest edition of the California Building Standards Code. Straw-bale walls plastered with cement or lime cement plaster on both sides shall be capable of resisting in-plane lateral forces from wind or earthquake of 360 pounds per linear foot.

F. Foundations shall be designed in accordance with the California Building Standards Code to accommodate the load created by the bale wall plus superimposed live and dead loads. Supports for bale walls shall extend to an elevation of at least six inches above adjacent ground at all points, and at least one inch above floor surfaces.

G. 1. Bale walls shall be anchored to supports to resist lateral forces, as approved by the civil engineer or architect. This may be accomplished with one-half inch reinforcing bars embedded in the foundation and penetrating the bales by at least 12 inches, located along the center line of the bale wall, spaced not more than two feet apart. Other methods as determined by the engineer or architect may also be used.

2. Non-bale walls abutting bale walls shall be attached by means of one or more of the following methods or by means of an acceptable equivalent:

a. Wooden dowels of 5/8 inch minimum diameter and of sufficient length to provide 12 inches of penetration into the bale, driven through holes bored in the abutting wall stud, and spaced to provide one dowel connection per bale.

b. Pointed wooden stakes, a minimum of 12 inches in length and 1 ½ inches by 3 ½ inches at the exposed end, fully driven into each course of bales, as anchorage points.

c. Bolted or threaded rod connection of the abutting wall, through the bale wall, to a steel nut and steel or plywood plate washer, a minimum of 6 inches square and a minimum thickness of 3/16 of an inch for steel and ½ inch for plywood, in a minimum of three locations.

3. a. Bale walls and roof bearing assemblies shall be anchored to the foundation where necessary, as determined by the civil engineer or architect, by means of methods that are adequate to resist uplift forces resulting from the design wind load. There shall be a minimum of two points of anchorage per wall, spaced not more than 6 feet apart, with one located within 36 inches of each end of each wall.

b. With loadbearing bale walls, the dead load of the roof and ceiling systems will produce vertical compression of the walls. Regardless of the anchoring system used to attach the roof bearing assembly to the foundation, prior to installation of wall finish materials, the nuts, straps, or cables shall be retightened to compensate for this compression.

H. 1. A moisture barrier shall be used between the top of the foundation and the bottom of the bale wall to prevent moisture from migrating through the foundation so as to come into contact with the bottom course of bales. This barrier shall consist of one of the following:

a. Cementitious waterproof coating.

b. Type 30 asphalt felt over an asphalt emulsion.

c. Sheet metal flashing, sealed at joints.

d. Another building moisture barrier, as approved by the building official.

2. All penetrations through the moisture barrier, as well as all joints in the barrier, shall be sealed with asphalt, caulking, or an approved sealant.

3. There shall also be a drainage plane between the straw and the top of the foundation, such as a one inch layer of pea gravel.

I. 1. For non-loadbearing walls, bales may be laid either flat or on edge. Bales in loadbearing bale walls shall be laid flat and be stacked in a running bond, where possible, with each bale overlapping the two bales beneath it. Overlaps shall be a minimum of 12 inches. Gaps between the ends of bales which are less than 6 inches in width may be filled by an untied flake inserted snugly into the gap.

2. Bale wall assemblies shall be held securely together by rebar pins driven through bale centers as described in this chapter, or equivalent methods as approved by the civil engineer or architect.

3. The first course of bales shall be laid by impaling the bales on the rebar verticals and threaded rods, if any, extending from the foundation. When the fourth course has been laid, vertical #4 rebar pins, or an acceptable equivalent long enough to extend through all four courses, shall be driven down through the bales, two in each bale, located so that they do not pass through the space between the ends of any two bales, the layout of these rebar pins shall approximate the layout of the rebar pins extending from the foundation. As each subsequent course is laid, two pins, long enough to extend through that course and the three courses immediately below it, shall be driven down through each bale. This pinning method shall be continued to the top of the wall. In walls seven or eight courses high, pinning at the fifth course may be eliminated.

4. Alternative pinning method to the method described in paragraph 3: when the third course has been laid, vertical #4 rebar pins, or an acceptable equivalent, long enough to

extend through all three courses, shall be driven down through the bales, tow in each bale, located so that they do not pass through the space between the ends of any two bales. The layout of these rebar pins shall approximate the layout of the rebar pins extending from the foundation. As each subsequent course is laid, two pins, long enough to extend through that course and the two courses immediately below it, shall be driven down through each bale. This pinning method shall be continued to the top of the wall.

5. Only full-length bales shall be used at corners of loadbearing bale walls.

6. Vertical #4 rebar pins, or an acceptable alternative, shall be located within one foot of all corners or door openings.

7. Staples, made of #3 or larger rebar formed into a "U" shape, a minimum of 18 inches long with two 6-inch legs, shall be used at all corners of every course, driven with one leg into the top of each abutting corner bale.

J. 1. All loadbearing bale walls shall have a roof bearing assembly at the top of the walls to bear the roof load and to provide the means of connecting the roof structure to the foundation. The roof bearing assembly shall be continuous along the tops of loadbearing bale walls.

2. An acceptable roof bearing assembly option shall consist of two double 2-inch by 6-inch, or larger, horizontal top plates, one located at the inner edge of the wall and the other at the outer edge. Connecting the two doubled top plates, and located horizontally and perpendicular to the length of the wall, shall be 2-inch by 6-inch cross members, spaced no more than 72 inches center to center, and as required to align with the threaded rods extending from the anchor bolts in the foundation. The double 2-inch by 6-inch top plates shall be face-nailed with 16d nails staggered at 16-inch o.c., with laps and intersections face-nailed with four 16d nails. The crossmembers shall be face-nailed to the top plates with four 16d nails at each end. Corner connections shall include overlaps nailed as above or an acceptable equivalent, such as plywood gussets or metal plates. Alternatives to this roof bearing assembly option shall provide equal or greater vertical rigidity and provide horizontal rigidity equivalent to a continuous double 2 by 4 top plate.

3. The connection of roof framing members to the roof plate shall comply with the appropriate sections of the California Building Standards Code.

K. All openings in loadbearing bale walls shall be a minimum of one full bale length from any outside corner, unless exceptions are approved by an engineer or architect licensed by the state to practice. Wall or roof load present above any openings shall be carried, or transferred, to the bales below by one of the following:

1. A frame, such as a structural window or door frame.

2. A lintel, such as an angle-iron cradle, wooden beam, or wooden box beam. Lintels shall be at least twice as long as the opening is wide and extend a minimum of 24 inches beyond either side of the opening. Lintels shall be centered over openings.

3. A roof bearing assembly designed to act as a rigid beam over the opening.

L. 1. All weather–exposed bale walls shall be protected from water damage. No vapor impermeable barrier may be used on bale walls, and the civil engineer or architect may design the bale walls without any membrane barriers between straw and plaster, except as specified in this section, in order to allow natural transpiration of moisture from the bales and to secure a structural bond between plaster and straw.

2. Bale walls shall have special moisture protection provided at all horizontal surfaces exposed to the weather. This moisture protection shall be installed in a manner that will prevent water from entering the wall system.

M. 1. Interior and exterior surfaces of bale walls shall be protected from mechanical damage, flame, animals, and prolonged exposure to water. Bale walls adjacent to bath and shower enclosures shall be protected by a moisture barrier.

2. Cement stucco shall be reinforced with galvanized woven wire stucco netting or an equivalent, as approved by the building official. The reinforcement shall be secured by attachment through the wall at a maximum spacing of 24 inches horizontally and 16 inches vertically, unless substantiated otherwise by a civil engineer or architect.

3. Where bales abut other materials, the plaster or stucco shall be reinforced with galvanized expanded metal lath, or an acceptable equivalent, extending a minimum of 6 inches into the bales.

4. Earthen and lime-based plasters may be applied directly onto bale walls without reinforcement, except where applied over materials other than straw.

N. 1. All wiring within or on bale walls shall meet all the provisions of the California Electrical Code. Type "NM" or "UF" cable may be used, or wiring may be run in metallic or nonmetallic conduit systems.

2. Electrical boxes shall be securely attached to wooden stakes driven a minimum of 12 inches into the bales, or an acceptable equivalent.

O. Water or gas pipes within bale walls shall be encased in a continuous pipe sleeve to prevent leakage within the wall. Where pipes are mounted on bale walls, they shall be isolated from the bales by a moisture barrier.

P. Bales shall be protected from rain and other moisture infiltration at all times until protected by the roof of the structure.

15.10.070 To the extent this chapter does not address certain phases of construction, the applicable provisions of this Title shall govern.

Section 5. Chapter 15.12 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.12
ELECTRICAL CODE

15.12.010 California Electrical Code Adopted by Reference.

A. That certain Electrical Code known and designated as the 2013 California Electrical Code, incorporating by adoption the National Electrical Code, 2011 Edition, by the National Fire Protection Association, with necessary California amendments, all published by BNi Publications, inc., and as herein amended, is hereby adopted by reference, and such code shall be and become the Lancaster Electrical Code, regulating the installation, arrangement, alteration, repair, maintenance, use and operation of electrical wiring, connections, fixtures, equipment and other electrical appliances.

B. One (1) copy of said 2013 California Electrical Code has been deposited in the Office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

15.12.020 Registered Maintenance Electricians.

A. In lieu of an individual permit for each installation or alteration, an annual permit may be issued to any person, firm or corporation regularly employing one or more registered maintenance electricians for the installation and maintenance of electrical wiring, devices, appliances, apparatus, or equipment or premises owned or occupied by the applicant for the permit. The application for such annual permit shall be made in writing to the Building Official and shall contain a description of the premises upon which work is to be done under the permit. Within not more than fifteen (15) days following the end of each calendar month, the person, firm or corporation to which an annual permit is issued shall transmit to the Building Official a report of all electrical work which has been done under the annual permit during the preceding month. A fee specified in the Fee Schedule shall be paid for each annual registered maintenance electrician's permit at the time such permit is issued. In addition, fees shall be paid for all work installed under such a permit, in accordance with the fee schedule, at the time the work is inspected.

B. "Registered Maintenance Electrician" shall mean a person holding a valid Certificate of Registration as Maintenance Electrician issued by the County of Los Angeles.

15.12.030 Dangerous Electrical Equipment.
For the purpose of this chapter, any electrical equipment existing in any type of occupancy which has any or all of the conditions or defects described as follows shall be deemed dangerous, and such equipment shall be replaced, repaired, reinstalled, reconstructed or removed:

A. The service panel(s) or sub-panel(s) show visual evidence of an overload.

B. The working space in front of any service panel or sub-panel as outlined in table 110.26(A)(1) is not properly maintained.

C. Live front panels are being maintained or used.

D. The fuses or circuit breakers are rated higher than those permitted by the Electrical Code.

E. The electrical conductor is in an unapproved raceway.

F. The electrical conductors from different classes of service are in a common raceway.

G. Drop cords greater than six (6) feet in length are used to connect electrical appliances.

H. The electrical equipment is not properly grounded for the protection of the electrical equipment as determined by the use being made thereof.

I. The electrical equipment is broken, cracked, or not properly maintained to meet the standards existing at the time the equipment was approved.

J. The electrical equipment is unsafe for the use intended.

15.12.040 Solar Photovoltaic Systems.
Article 690 of the 2013 California Electrical Code is hereby amended by adding the following:

690.15.1 Disconnecting Means for Multiple Arrays
Where more than one array is combined to form a single output rated more than 50 volts and/or 10 amperes, a disconnecting means rated for the output shall be installed immediately adjacent to the combiner box on the output side.

Exception: *If the combiner box is located adjacent to the inverter(s), the disconnecting means as stated above shall not be required.*

Section 6. Chapter 15.16 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.16
MECHANICAL CODE

15.16.010 California Mechanical Code Adopted by Reference.

A. That certain Mechanical Code known and designated as the 2013 California Mechanical Code, incorporating by adoption the Uniform Mechanical Code, 2012 Edition, published by the International Association of Plumbing and Mechanical Officials, with necessary California amendments, is hereby adopted by reference, and shall be and become the Lancaster Mechanical Code regulating the design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use and maintenance of heating, ventilating, cooling, refrigeration systems, incinerators, and other miscellaneous heating ventilating, and air conditioning appliances on premises within the City of Lancaster.

B. One (1) copy of said 2013 California Mechanical Code has been deposited in the Office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

Section 7. Chapter 15.12 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.20
PLUMBING CODE

15.20.010 California Plumbing Code Adopted by Reference.

A. That certain Plumbing Code known and designated as the 2013 California Plumbing Code, incorporating by adoption the Uniform Plumbing Code, 2012 Edition, published by the International Association of Plumbing and Mechanical Officials, including appendices A, B, D, G, I, K and L with necessary California amendments, and as herein amended, is hereby adopted by reference, and such code shall be and become the Lancaster Plumbing Code regulating plumbing, drainage, building sewers, and private sewage disposal systems and prescribing conditions under which such work may be carried on within the City of Lancaster and providing for the issuance of permits.

B. One (1) copy of said 2013 California Plumbing Code has been deposited in the office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

15.20.020 Minimum Number of Required Fixtures.

Section 412.1 of the 2013 California Plumbing Code is hereby amended to read as follows:

412.1 Fixture Count. Plumbing fixtures shall be provided for the type of building occupancy and in the minimum number shown in Table 4-1 or *Table 2902.1 of the 2012 International Building Code.*

15.20.030 Gray Water Systems.
State Chapter Appendix G Section G 3, Permit, is hereby amended by deleting the paragraph and substituting the following:

G 3 Permit
It shall be unlawful for any person to construct, install or alter, or cause to be constructed, installed or altered any gray water system in a building or on a premises without first obtaining a permit to do such work from the *Division of Building and Safety. The cost of such permit shall be equal to that required for private sewage disposal system as provided by resolution of the City Council. A plan check fee shall also be required for each application for a permit. The plan check fee shall be equal to the permit fee.*

15.20.040 General Registration Requirements.

A. Except as provided in Section 15.20.060 no person shall direct or perform any plumbing or gas fitting work unless, either he or she is a registered plumbing or gas fitting contractor or registered journeyman plumber or gas fitter registered by the County of Los Angeles.

B. There shall be no more than two (2) apprentices per journeyman plumber or gas fitter on a project at any time. There shall be no limit on the number of laborers per journeyman plumber or gas fitter on any project.

15.20.050 Issuance of Permits.

A. No permit shall be issued to any person to do or cause to be done any plumbing work regulated by this code unless such person is a duly licensed contractor as required by Chapter 9, Division 3 commencing with Section 7000 of the Business and Professions Code of the State of California except as otherwise provided herein.

B. Any permit required by this code may be issued to a person to do any plumbing work regulated by this code in a single-family dwelling used exclusively for living purposes, including common accessory and minor poultry or agricultural buildings in the event that such person is the bona fide owner of such dwelling and accessory buildings and that the same are occupied and used exclusively by or are designated to be occupied and used exclusively by said owner. An owner may be issued a permit for, or perform any plumbing work covered by this code on a duplex (Max. two units) where one unit is used and occupied exclusively by the bona fide owner. An owner or property manager shall not be issued a permit for, or perform any plumbing work regulated by this code on any rental or lease property except for a duplex (Max. two units) where one unit is exclusively used and occupied by the bona fide owner.

Section 8. Chapter 15.22 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.22
SECURITY CODE

15.22.010 **Purpose**
The purpose of this chapter is to set forth minimum standards of construction for resistance to unlawful entry.

15.22.020 **Scope**
The provisions of this chapter shall apply to enclosed Groups B, F, M, R and S occupancies and enclosed private garages.

15.22.030 **Limitations**
No provisions of this chapter shall require or be construed to require devices on exit doors or on sleeping room emergency exits contrary to the requirements specified in Chapter 10 and Section 310.4 of the California Building Code.

15.22.040 **Alternate Security Provisions**
The provisions of this chapter are not intended to prevent the use of any device or method of construction not specifically prescribed by this code when such alternate provides equivalent security based on a recommendation of the county sheriff or the City Public Safety Office.

15.22.050 **Definitions**
For the purpose of this chapter, certain terms are defined as follows:

"Cylinder Guard" is a protective metal device of hardened steel, or with a hardened steel insert, that covers or surrounds the exposed portion of the lock cylinder for the purpose of protecting the cylinder from wrenching, prying, cutting, driving through or pulling out by attack tools.

"Deadbolt" is a bolt which has no automatic spring action and which is operated by a key cylinder, thumb-turn or lever, and is positively held fast when in the projected position.

"Deadlocking Latch" is a latch in which the latch bolt is positively held in the projected position by a guard bolt, plunger or auxiliary mechanism.

"Latch" is a device for automatically retaining the door in a closed position upon its closing.

15.22.060 **Tests: Sliding Glass Doors**
Panels shall be closed and locked. Tests shall be performed in the following order:

15.22.061 **Test A.** With the panels in the normal position, a concentrated load of 300 pounds shall be applied separately to each vertical pull stile incorporating a locking device, at a point or the stile within 6 inches (152.4 mm) of the locking device, in the direction parallel to the plane of glass that would tend to open the door.

15.22.062 **Test B.** Repeat Test A while simultaneously adding a concentrated load of 150 pound to the same area of the same stile in a direction perpendicular to the plane of glass toward the interior side of the door.

15.22.063 **Test** C. Repeat Test B with the 150-pound (667.2 N) force in the reversed direction toward the exterior side of the door.

15.22.064 **Tests D, E and F.** Repeat Tests A, B and C with the movable panel lifted upwards to its full limit within the confines of the door frame.

15.22.065 **Identification** Sliding glass door assemblages subject to the provisions of this section shall bear a label or other approved means of identification indicating compliance with these tests. The label shall be a type authorized through a recognized testing agency which provides periodic follow-up inspection service.

15.22.070 **Tests: Sliding Glass Windows**
Sash shall be closed and locked. Tests shall be performed in the following order:

15.22.071 **Test A.** With the sliding sash in the normal position, a concentrated load of 150 pounds shall be applied separately to each sash member incorporating a locking device, at a point on the sash member within 6 inches (152.4 mm) of the locking device, in the direction parallel to the plane of glass that would tend to open the window.

15.22.072 **Test B.** Repeat Test A while simultaneously adding a concentrated load of 75 pounds to the same area of the same sash member in the direction perpendicular to the plane of glass toward the interior side of the window.

15.22.073 **Test C.** Repeat Test B with the 75 pounds of force in the reversed direction toward the exterior side of the window.

15.22.074 **Tests D, E and R** Repeat Tests A, B and C with the movable sash lifted upwards to its full limit within the confines of the window frame.

15.22.075 **Identification.** Sliding glass window assemblages subject to the provisions of this section shall bear a label or other approved means of identification indicating compliance with these tests. The label shall be a type authorized through a recognized testing agency which provides periodic follow up inspection service.

15.22.080 **Doors: General**
A door forming a part of the enclosure of a dwelling unit or of an area occupied by one tenant of a building shall be constructed, installed, and secured as set forth in Sections 15.22.090, 15.22.110 and 15.22.120, when such door is directly reachable or capable of being reached from a street, highway, yard, court, passageway, corridor, balcony, patio, breezeway, private garage, portion of the building which is available for use by the public or other tenants, or similar area. A

door enclosing a private garage with an interior opening leading directly to a dwelling unit shall also comply with said Sections 15.22.090, 15.22.100, 15.22.110 and 15.22.120.

15.22.090 **Doors: Swinging Doors**

15.22.091 Swinging wooden doors which are operable from the inside without the use of a key shall be of one of the following constructions or shall be of a construction having equivalent forced entry resistance:

15.22.091.1 Solid core doors not less than 1 3/8 inches (35 mm) in thickness.

15.22.091.2 Wood panel type doors with panels fabricated of lumber not less than 1 3/8 inches (34.9mm) thick, provided shaped portions of the panels are not less than 1/4 inch (6.4 mm) thick. Individual panels shall not exceed 300 square inches (0.19 m^2) in area. Stiles and rails shall be of solid umber with overall dimensions of not less than 1 3/8 inches (35 mm) in thickness and 3 inches (76mm) in width. Mullions shall be considered a part of adjacent panels unless sized as required here in for stiles and rails, except mullions not over 18 inches (457 mm) long may have an overall width of not less than 2 inches (51 mm). Carved areas shall have a thickness of not less than 3/8inch (9.5 mm). Dimensional tolerances published in recognized industry standards may be utilized.

15.22.091.3 Hollow core doors or doors less than 1 3/8 inches (35 mm) in thickness, either of which are covered on the inside face with 16-gauge sheet metal attached with screws at 6 inches (152mm) maximum centers around the perimeter. Lights in doors shall be as set forth in Sections 15.22.140 and 15.22.150.

15.22.092 A single swinging door, the active leaf of a pair of doors, and the bottom leaf of dutch doors shall be equipped with a deadbolt and a latch. A dead latch shall be used if a key locking feature is incorporated in the latching mechanism. The deadbolt and latch may be activated by one lock or by individual locks. Deadbolts shall contain hardened inserts, or the equivalent, so as to repel cutting tool attack. The deadbolt lock or locks shall be key operated from the exterior side of the door and engaged or disengaged from the interior side of the door by a device not requiring a key, tool or excessive force.

EXCEPTIONS:

1. The latch may be omitted from doors in Group B occupancies.
2. In other than residential occupancies, locks maybe key operated, or otherwise operated from the inside when not prohibited by Chapter 10 of the California Building Code or other laws and regulations.
3. A swinging door of greater than 5 feet (1524 mm) width may be secured as set forth in Section 15.22.110.
4. In residential occupancies, doors not required by Section 310.4 or 1004.1 of the California Building Code may be equipped with security type hardware which requires a key to release from the interior side of the door if the sleeping rooms are protected with a fire warning system as set forth in Section 310.9 of the California Building Code.

A straight deadbolt shall have a minimum throw of 1 inch (25.4 mm) and the embedment shall not be less than 5/8 inch (15.9 mm) into the holding device receiving the projected bolt. A hook shape or expanding lug deadbolt shall have a minimum throw of 3/4 inch (19 mm) All deadbolts of locks which automatically activate two or more deadbolts shall embed at least 1/2 inch (12.7 mm), but need not exceed 3/4 inch (19 mm), into the holding devices receiving the projected bolts.

15.22.093 The inactive leaf of a pair of doors and the upper leaf of Dutch doors shall be equipped with a deadbolt or deadbolts as set forth in Section 6709.2.

EXCEPTIONS:
1. The bolt or bolts need not be key operated, but shall not be otherwise activated, from the exterior side of the door.
2. The bolt or bolts may be engaged or disengaged automatically with the deadbolt or by another device on the active leaf or lower leaf.
3. Manually operated hardened bolts that are at the top and bottom of the leaf and which embed a minimum of 1/2 inch (12.7 mm) into the device receiving the projected bolt may be used when not prohibited by Chapter10 or other laws and regulations.

15.22.094 Doorstops on wooden jambs for in swinging doors shall be of one-piece construction with the jamb or joined by a rabbet.

15.22.095 Non removable pins shall be used in pin type hinges which are accessible from the outside when the door is closed.

15.22.096 Cylinder guards shall be installed on cylinder locks for deadbolts whenever the cylinder projects beyond the outside face of the door or is otherwise accessible to attack tools.

15.22.100 **Doors: Sliding Glass Doors**
Sliding glass doors shall be equipped with locking devices and shall be so installed that, when subjected to tests specified in Section 15.22.060, they remain intact and engaged. Movable panels shall not be rendered easily openable or removable from the frame during or after the tests. Cylinder guards shall be installed on all mortise or rim type cylinder locks installed in hollow metal doors whenever the cylinder projects beyond the face of the door or is otherwise accessible to gripping tools. Locking devices installed on sliding glass doors providing the exit required by Section 1003 or providing for the emergency escape or rescue required by Section 310.4 shall be releasable from the inside without the use of a key, tool or excessive force.

15.22.110 **Doors: Overhead and Sliding Doors**
Metal or wooden overhead and sliding doors shall be secured with a deadbolt lock, padlock with a hardened steel shackle, or equivalent when not otherwise locked by electric power operation. Locking devices, when installed at the jamb of metal or wooden overhead doors, shall be installed on both jambs when such doors exceed 9 feet (2743 mm) in width. Metal or wooden sliding doors exceeding 9 feet (2743 mm) in width and provided with a jam blocking device shall have the door side opposite the lock restrained by a guide or retainer. Cylinder guards shall be

installed on all mortise or rim type cylinder locks installed in hollow metal doors whenever the cylinder projects beyond the face of the door or is otherwise accessible to gripping tools.

15.22.120 **Doors: Metal Accordion Grate or Grille-Type Doors**
Metal accordion grate or grille type doors shall be equipped with metal guides at top and bottom, and a cylinder lock or padlock and hardened steel shackle shall be provided. Cylinder guards shall be installed on all mortise or rim type cylinder locks installed in hollow metal doors whenever the cylinder projects beyond the face of the door or is otherwise accessible to gripping tools.

15.22.130 **Lights: General**
A window, skylight or other light forming a part of the enclosure of a dwelling unit or of an area occupied by one tenant of a building shall be constructed, installed and secured as set forth in Sections 15.22.140 and 15.22.150, when the bottom of such window, skylight or light is not more than 16 feet (4877 mm) above the grade of a street, highway, yard, court, passageway, corridor, balcony, patio, breezeway private garage, portion of the building which is available for use by the public or other tenants, or similar area. A window enclosing a private garage with an interior opening leading directly to a dwelling unit shall also comply with Sections 15.22.140 and 15.22.150.

15.22.140 **Lights: Material**
Lights within 40 inches (1016 mm) of a required locking device on a door when in the closed and locked position and openable from the inside without the use of a key, and lights with a least dimension greater than 6 inches (152 mm) but less than 48 inches (1219 mm) in Groups B, F, M and S occupancies, shall be fully tempered glass, laminated glass of at least 1/4 inch (6.4 mm) thickness, approved burglary resistant material, or guarded by metal bars, screens or grilles in an approved manner.

15.22.150 **Lights: Locking Devices**

15.22.151 Locking devices installed on windows providing the emergency egress required by Section 310.4 shall be releasable from the inside without use of a key, tool or excessive force.

15.22.152 Sliding glass windows shall be provided with locking devices that, when subject to the tests specified in Section 15.22.070, remain intact and engaged. Movable panels shall not be rendered easily openable or removable from the frame during or after the tests.

15.22.153 Other openable windows shall be provided with substantial locking devices which render the building as secure as the devices required by this section. In Groups B, F, M and S occupancies, such devices shall be a glide bar, bolt, cross bar, and/or padlock with hardened steel shackle.

15.22.154 Special. Louvered windows, except those above the first story in Group R occupancies which cannot be reached without a ladder, shall be of material or guarded as specified in Section 15.22.140, and individual panes shall be securely fastened by mechanical

fasteners that require a tool for removal and are not accessible on the outside when the window is in the closed position.

15.22.160 **Other Openings: General**
Openings, other than doors or lights, which form a part of the enclosure, or portion thereof, housing a single occupant, and the bottom of which is not more than 16 feet (4877 mm) above the grade of a street, highway, yard, court, passageway, corridor, balcony, patio, breezeway or similar area, or from a private garage, or from a portion of the building which is occupied, used or available for use by the public or other tenants, or an opening enclosing a private garage attached to a dwelling unit with openings therein, shall be constructed, installed and secured as set forth in Section 15.22.170.

15.22.170 **Hatchways, Scuttles and Similar Openings**

15.22.171 Wooden hatchways of less than 1 3/4-inch-thick (44 mm) solid wood shall be covered on the inside with 16-gage sheet metal attached with screws at 6-inch-maximum (152 mm) centers around perimeter.

15.22.172 The hatchway shall be secured from the inside with a slide bar, slide bolt, and/or padlock with a hardened steel shackle.

15.22.173 Outside pin type hinges shall be provided with non removable pins or a means by which the door cannot be opened through removal of hinge pins while the door is in the closed position.

15.22.174 **Other** openings exceeding 96 square inches (0.062 m^2) with a least dimension exceeding 8 inches (203 mm) shall be secured by metal bars, screens or grilles in an approved manner.

Section 9. Chapter 15.24 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.24
PROPERTY MAINTENANCE CODE

15.24.010 International Property Maintenance Code Provisions Adopted by Reference.
A. That certain Property Maintenance Code known and designated as of the 2012 International Property Maintenance Code, including Appendix A, published by the International Conference of Building Officials, as herein amended, is hereby adopted by reference, and such codes shall be and become the International Property Maintenance Code of Lancaster, regulating the use and maintenance of all existing structures, premises and certain equipment therein, and providing penalties for violation of such codes.

B. One (1) copy of said 2012 Property Maintenance Code has been deposited in the office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

15.24.020 Title
Section 101.1 of the International Property Maintenance Code is hereby amended to read as follows:

101.1 Title. These regulations shall be known as the *International Property Maintenance Code of Lancaster*, hereinafter referred to as "this code."

15.24.030 Application of Other Codes
Section 102.3 of the International Property Maintenance Code is hereby amended to read as follows:

102.3 Application of other codes. Repairs, additions or alterations of a structure, or changes of occupancy, shall be done in accordance with the procedures and provisions of the *Lancaster Building Code, Lancaster Energy Code, Lancaster Fire Code, Lancaster Zoning Code, Lancaster Plumbing Code, Lancaster Mechanical Code and Lancaster Electrical Code*.

15.24.040 Fees.
Section 103.5 of the International Property Maintenance Code is hereby amended to read as follows:

103.5 Fees. The fees for activities and services performed by the department in carrying out its responsibilities under this code shall be paid as required, in accordance with the schedule as adopted by resolution of the City Council of the City of Lancaster.

15.24.050 Duties and Powers of the Code Official.
Section 104 of the International Property Maintenance Code is hereby amended by adding subsection 104.7, to read as follows:

104.7 Regulations. The code official is authorized to promulgate rules and regulations to implement the provisions of this code.

15.24.060 Violations.
Section 106 of the International Property Maintenance Code is hereby deleted in its entirety and replaced with the following:

106 Violations. It is unlawful for any person to violate any provision or to fail to comply with any requirement of this code. Any person violating this code is subject to the penalty, administrative and abatement provisions set forth in Chapters 1.12, 1.16 and 8.28 of the Lancaster Municipal Code.

15.24.070 Notices and Orders

Section 107 of the International Property Maintenance Code is hereby deleted in its entirety and replaced with the following:

107 Notices and orders. Whenever the code official determines that there has been a violation of this code or has grounds to believe that a violation has occurred, he/she may give notice in a manner that comports with the Lancaster Administrative Code, Lancaster Dangerous Buildings Code, other applicable provisions of the Lancaster Municipal Code, and/or the State Housing Law (commencing with Section 17910 of the California Health & Safety Code).

15.24.080 Terms Defined in Other Codes.
Section 201.3 of the International Property Maintenance Code is hereby amended to read as follows:

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the *Lancaster Building Code, Lancaster Fire Code, Lancaster Zoning Code, Lancaster Plumbing Code, Lancaster Mechanical Code or Lancaster Electrical Code,* such terms shall have the meanings ascribed to them as stated in those codes.

15.24.090 Definitions.
Section 201.6 of the International Property Maintenance Code is hereby added to read as follows:

201.6 Definitions. Whenever any of the names or terms defined in this section is used in this Code, each such name or term shall be deemed and construed to have the meaning ascribed to be in this section as follows:

"Building Code" shall mean chapter 15.08 of the Lancaster Municipal Code.

"Code Official" shall mean the Building and Safety Official of the City of Lancaster.

"Electrical Code" shall mean Chapter 15.12 of the Lancaster Municipal Code.

"Elevator Code" shall mean the 2013 California Elevator Safety Construction Code.

"Energy Code" shall mean Chapter 15.28 of the Lancaster Municipal Code.

"Fire Code" shall mean Chapter 15.32 of the Lancaster Municipal Code.

"Green Building Standards Code" shall mean Chapter 15.34 of the Lancaster Municipal Code.

"Historical Building Code" shall mean Chapter 15.30 of the Lancaster Municipal Code.

"Jurisdiction" shall mean the City of Lancaster.

"Mechanical Code" shall mean Chapter 15.16 of the Lancaster Municipal Code.

"Plumbing Code" shall mean Chapter 15.20 of the Lancaster Municipal Code.

"Property Maintenance Code" shall mean Chapter 15.24 of the Lancaster Municipal Code.

"Residential Code" shall mean Chapter 15.09 of the Lancaster Municipal Code.

"Technical Codes" shall mean Chapters 15.08, 15.09, 15.10, 15.12, 15.16, 15.20, 15.22, 15.24, 15.28, 15.30, 15.32 and 15.34 of the Lancaster Municipal Code.

15.24.100 General.
Section 202 of the International Property Maintenance Code is hereby amended by amending the definitions of "Owner" and "Person" and by adding the definition of "Responsible Person," as follows:

202 General definitions.
Owner. Any person having legal title to, or who leases, rents, occupies or has charge, control or possession of, any real property in the city, and/or the personal property thereon, including all persons shown as owners on the last equalized assessment roll of the Los Angeles County Assessor's Office. Owners include persons with powers of attorney, executors of estates, trustees, or who are court appointed administrators, conservators, guardians or receivers.

Person. Any individual, partnership of any kind, corporation, limited liability company, association, joint venture or other organization or entity, however formed, as well as trustees, heirs, executors, administrators or assigns, or any combination of such persons. "Person" also includes any public entity or agency that acts as an owner in the city.

Responsible Person. Any person, whether as an owner as defined herein, or otherwise, that allows, causes, creates, maintains or permits a violation of this code, by any act or the omission of any act or duty. The actions or inactions of a responsible person's agent, employee, representative or contractor may be attributed to that responsible person.

15.24.110 Weeds.
Section 302.4 of the International Property Maintenance Code is hereby amended to read as follows:

302.4 Weeds. All premises and exterior property shall be maintained free from weeds or plant growth in excess of six (6) inches. All noxious weeks shall be prohibited. Weeds shall be defined as all grasses, annual plans and vegetation, other than trees or shrubs; however, this term shall not include cultivated flowers, fruits and/or vegetables.

15.24.120 Insect Screens.
Section 304.14 of the International Property Maintenance Code is hereby amended to read as follows:

304.14 Insect screens. Every door, window and other outside opening required for ventilation of habitable rooms, food preparation areas, food service areas or any areas where products to be included or utilized in food for human consumption are processed, manufactured, packaged or stored shall be supplied with approved tightly fitting screens of minimum 16 mesh per inch (16 mesh per 25 mm), and every screen door used for insect control shall have a self-closing device in good working condition.

Exception: Screens shall not be required where other approved means, such as air curtains or insect repellent fans, are employed.

15.24.130 Heating and Air Conditioning Facilities.
Section 602 of the International Property Maintenance Code is hereby amended to read as follows:

602 Heating and Air Conditioning Facilities

15.24.140 Facilities Required.
Section 602.1 of the International Property Maintenance Code is hereby amended to read as follows:

602.1 Facilities required. Heating and air conditioning facilities shall be provided in structures as required by this section.

15.24.150 Residential Occupancies.
Section 602.2.1 of the International Property Maintenance Code is hereby added as follows:

602.2.1 Residential occupancies. Dwellings shall be provided with air conditioning facilities at all times, capable of maintaining a maximum room temperature of 80°F in all habitable rooms.

15.24.160 Heat and Air Conditioning Supply
Section 602.3 of the International Property Maintenance Code is hereby amended to read as follows:

602.3 Heat supply. Every owner and operator of any building who rents, leases or lets one or more dwelling units or sleeping units shall supply heat at all times to maintain a minimum temperature of 68° F (20° C) in all habitable rooms, bathrooms and toilet rooms.

15.24.170
Section 602.3.1 of the International Property Maintenance Code is hereby added as follows:

602.3.1 Air conditioning supply. Every owner and operator of any building who rents, leases or lets one or more dwelling units or sleeping units shall supply air conditioning at all times, to maintain a maximum temperature of 80° F in all habitable rooms,

15.24.180 Occupiable Work Spaces.

Section 602.4 of the International Property Maintenance Code is hereby amended to read as follows:

602.4 Occupiable work spaces. Indoor occupiable work spaces shall be supplied with heat at all times to maintain a minimum temperature of 65° F (18° C) during the period the spaces are occupied.

Exceptions:

1. Processing, storage and operation areas that require cooling or special temperature conditions.
2. Areas in which persons are primarily engaged in vigorous physical activities.

Section 15, 24.190 Mechanical Equipment
Section 603.1 of the International Property Maintenance Code is hereby amended to read as follows:

603.1 Mechanical appliances All mechanical appliances, fireplaces, evaporative coolers, solid fuel-burning appliances, cooking appliances and water heating appliances shall be properly installed and maintained in a safe working condition, and shall be capable of performing the intended function.

Section 10. Chapter 15.26 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.26
DANGEROUS BUILDINGS CODE

15.26.010 Abatement of Dangerous Buildings Adopted by Reference.
A. That certain Dangerous Buildings Code known and designated as the Uniform Code for the Abatement of Dangerous Buildings, 1997 Edition, published by the International Conference of Building Officials, as herein amended, is hereby adopted by reference, and such code shall be and become the Lancaster Dangerous Buildings Code regulating the repair, vacation, or demolition of buildings or structures which from any cause endanger the life, limb, health, morals, property, safety or welfare of the general public or the occupants or such building or structure. Said code shall be cumulative with and in addition to any other remedy or provision of the Lancaster Municipal Code, and where any provisions of this code conflict with any other provision of the Lancaster Municipal Code, the most restrictive or the provision that provides greater safety shall apply.

B. One (1) copy of said Uniform Code for the Abatement of Dangerous Buildings 1997 Edition has been deposited in the Office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

15.26.020 Appeals.
Section 205 Board of Appeals, of the Uniform Code for the Abatement of Dangerous Buildings is hereby deleted in its entirety and replaced with the following:

205 Appeals. Appeals shall be filed, scheduled and conducted in the manner set forth in Chapter 15.04 of the Lancaster Municipal Code.

15.26.030 Definitions.
Section 301 of the Uniform Code for the Abatement of Dangerous Buildings is hereby deleted in its entirety and replaced with the following:

301-- General. Whenever any of the names or terms defined in this section is used in this Code, each such name or term shall be deemed and construed to have the meaning ascribed to be in this section as follows:

"Building Code" shall mean chapter 15.08 of the Lancaster Municipal Code.

"Building Official" shall mean the Building and Safety Official of the City of Lancaster.

"Code Enforcement Agency" or "Local Building Department" shall mean the Building and Safety Division of the Department of Public Works of the City of Lancaster.

"Electrical Code" shall mean Chapter 15.12 of the Lancaster Municipal Code.

"Elevator Code" shall mean the 2013 California Elevator Safety Construction Code.

"Energy Code" shall mean Chapter 15.28 of the Lancaster Municipal Code.

"Fire Code" shall mean Chapter 15.32 of the Lancaster Municipal Code.

"Green Building Standards Code" shall mean Chapter 15.34 of the Lancaster Municipal Code.

"Historical Building Code" shall mean Chapter 15.30 of the Lancaster Municipal Code.

"Jurisdiction" shall mean the City of Lancaster.

"Mechanical Code" shall mean Chapter 15.16 of the Lancaster Municipal Code.

"Plumbing Code" shall mean Chapter 15.20 of the Lancaster Municipal Code.

"Property Maintenance Code" shall mean Chapter 15.24 of the Lancaster Municipal Code.

"Residential Code" shall mean Chapter 15.09 of the Lancaster Municipal Code.

"Technical Codes" shall mean Chapters 15.08, 15.09, 15.10, 15.12, 15.16, 15.20, 15.22, 15.24, 15.28, 15.30, 15.32 and 15.34 of the Lancaster Municipal Code.

15.26.040 Terms Defined in Other Codes.
Section 301.1 of the Uniform Code for the Abatement of Dangerous Buildings is hereby added to read as follows:

301.1 Terms defined in other codes. Where terms are not defined in this code and are defined in the *Lancaster Building Code, Lancaster Fire Code, Lancaster Zoning Code, Lancaster Plumbing Code, Lancaster Mechanical Code or Lancaster Electrical Code,* such terms shall have the meanings ascribed to them as stated in those codes.

Section 11. Chapter 15.28 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.28
ENERGY CODE

15.28.010 California Energy Code Provisions Adopted by Reference.

A. That certain Energy Code known as the 2013 California Energy Code, including Appendix 1-A, published by the International Conference of Building Officials, is hereby adopted by reference, and such code shall be and become the Lancaster Energy Code, regulating the construction, enlargement, alteration, repair, moving, conversion, use, occupancy and maintenance of all structures and certain equipment therein and providing penalties for violation of such codes.

B. One (1) copy of said 2013 California Energy Code has been deposited in the office of the City Clerk of the City of Lancaster and shall be at all times maintained by said Clerk for use and examination by the public.

15.28.020 Implementation of Solar Energy Systems

Subchapter 2 of the California Energy Code is hereby amended by adding Section 110.11 to read as follows:

SECTION 110.11
MANDATORY REQUIREMENTS FOR THE IMPLEMENTATION OF SOLAR ENERGY SYSTEMS

(a) Purpose and intent. It is the purpose and intent of this section to provide standards and procedures for builders of new dwelling units to install solar energy systems in an effort to achieve energy savings and greater usage of alternative energy. It is intended that each dwelling unit owner or tenant shall be the beneficiary of achieved energy savings.

(b) Applicability. These specific standards are applicable for all new dwelling units with a building permit issuance date on or after January 1, 2014.

Exception: Accessory dwelling units.

(c) Provision of solar energy systems.

1. A builder shall provide solar energy systems for new homes in accordance with the energy generation requirements as listed in Section 17.08.060 of the Lancaster Municipal Code. It is intended that no individual installed system shall produce less than 1.0 kW.

2. Installation of solar energy systems is not required for all homes within a production subdivision; however, the builder shall meet the aggregate energy generation requirement within the subdivision (as calculated by the per-unit energy generation requirement multiplied by the number of homes in the subdivision). For example, an R-7000 subdivision with ten (10) homes that is required to provide 1.0 kW per unit would have an aggregate energy generation requirement of 10 kW for the subdivision. The 10 kW energy generation requirement can be met with two homes having solar energy systems generation 5 kW each, or with four homes having systems generating 2.5 kW each.

3. Homebuilders shall demonstrate through building plan check their intention to meet the solar energy generation requirement.

4. Homebuilders shall build solar energy systems on model homes, reflective of the products that will be offered to homebuyers.

5. If a tract is built in phases, the solar energy generation requirement shall be fulfilled for each phase, or release of homes.

6. Solar energy systems shall meet the development standards and guidelines as described in the Lancaster Zoning Code.

7. Solar energy systems for multi-family developments may be provided on rooftops, or on solar support/shade structures.

(d) Alternative methods of compliance. If site-specific situations make it impractical for a developer to meet the requirements of this section, the developer may propose an alternative method of compliance with the intent of this section. An alternative method of compliance shall be approved where the building official finds that the proposed alternative is satisfactory and complies with the intent of the provisions of this section.

Section 12. Chapter 15.30 of the Lancaster Municipal Code is hereby created by adding the Chapter in its entirety to read as follows:

CHAPTER 15.30
HISTORICAL BUILDING CODE

15.30.010 California Historical Building Code Provisions Adopted by Reference.

A. That certain Historical Building Code known and designated as the 2013 California Historical Building Code, published by the International Conference of Building Officials, is hereby adopted by reference, and such code shall be and become the Lancaster Historical Building Code, regulating the enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, use, height, area and maintenance of all qualified historical structures and certain equipment therein and providing penalties for violation of such codes.

B. One (1) copy of said California Historical Building Code 2013 Edition has been deposited in the Office of the City Clerk of the City of Lancaster, and shall be at all times maintained by said Clerk for use and examination by the public.

Section 13. Chapter 15.32 of the Lancaster Municipal Code is hereby amended by rewriting the Chapter in its entirety to read as follows:

CHAPTER 15.32
FIRE CODE

15.32.10 Los Angeles County Fire Code Adopted by Reference.

A. That certain Fire Code known and designated as the 2014 County of Los Angeles Fire Code, incorporating by adoption the 2013 California Building Code, including Appendix B of the California Fire Code, Appendix C of the California Fire Code, Appendix J of the 2013 California Fire Code, Appendix K, and Appendix L, all published by the International Conference of Building Officials, as herein amended, is hereby adopted by reference and such code shall be and become the Lancaster Fire Code which prescribes regulations governing conditions hazardous to life and property from fire or explosion within the City of Lancaster.

B. One (1) copy of said County of Los Angeles Fire Code 2014 Edition has been deposited in the Office of the City Clerk of the City of Lancaster, and shall be at all times maintained by said Clerk for use and examination by the public.

15.32.020 Board of Appeals

Section 103.1.4 of the Los Angeles County Fire Code, Appeals, is hereby deleted in its entirety and replaced with the following:

103.1.4 Appeals. Appeals shall be filed, scheduled and conducted in the manner set forth in Chapter 15.04 of the Lancaster Municipal Code.

15.32.030 Definitions and Abbreviations

Article 2 of the Los Angeles County Fire Code, Definitions and Abbreviations, is hereby added or amended to whenever any of the names or terms defined in this section are used in this Code, and each such name or term shall be deemed and construed to have the meaning ascribed to be in this section as follows:

"Building Code" shall mean chapter 15.08 of the Lancaster Municipal Code.

"Building Official" shall mean the Building and Safety Official of the City of Lancaster.

"Garage" is a building or portion thereof in which a motor vehicle containing flammable or combustible liquids or gas in its tank or an electric vehicle with a rechargeable storage battery, fuel cell, photovoltaic array, or other sources of electric current is stored, repaired, charged (electric vehicle only) or kept.

"Garage, Private" is a building or portion of a building not more than 1,000 square feet in area in which a motor vehicle containing flammable or combustible liquids or gas in its tank or an electric vehicle with a rechargeable storage battery, fuel cell, photovoltaic array, or other sources of electric current is stored, repaired, charged (electric vehicle only) or kept.

"Governing Body" shall mean Lancaster City Council.

"Jurisdiction" shall mean the City of Lancaster.

"Mechanical Code" shall mean chapter 15.16 of the Lancaster Municipal Code.

"Plumbing Code" shall mean chapter 15.20 of the Lancaster Municipal Code.

15.32.040 Obstruction of fire apparatus access roads.
Section 503.4 shall read as published in the 2013 California Fire Code without Los Angeles County amendments.

15.32.050 Traffic calming devices.
Section 503.4.1 shall be deleted in its entirety.

Section 14. Chapter 15.34 of the Lancaster Municipal Code is hereby created by adding the Chapter in its entirety to read as follows:

CHAPTER 15.34
GREEN BUILDING STANDARDS CODE

15.34.010 California Green Building Standards Code Provisions Adopted by Reference.
A. That certain Green Building Standards Code known and designated as the 2013 California Green Building Standards Code, published by the International Conference of Building Officials, is hereby adopted by reference, and such codes shall be and become the Lancaster Green Building Standards Code, regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, use, height, area and maintenance of all structures and certain equipment therein and providing penalties for violation of such codes.

B. One (1) copy of said California Green Building Standards Code 2013 Edition has been deposited in the Office of the City Clerk of the City of Lancaster, and shall be at all times maintained by said Clerk for use and examination by the public.

Section 15. Finding - Necessity. Findings made pursuant to Section 17958.7 of the State Health and Safety Codes are contained in Resolution No.13-XXX.

Section 16. Constitutionality. That if any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The City Council hereby declares that it would have adopted this ordinance, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one (1) or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

Section 17. Effective Date. This ordinance shall be in full force and effect on January 1, 2014.

Section 18. Posting. The City Clerk shall certify to the passage of this ordinance and shall cause it to be published according to legal requirements.

I, Geri K. Bryan, CMC, City Clerk of the City of Lancaster, do hereby certify that the foregoing ordinance was regularly introduced and placed upon its first reading on the _____day of _____, _____, and placed upon its second reading and adoption at a regular meeting of the City Council on the _____day of _____, _____ by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

ATTEST:

_____
GERI K. BRYAN, CMC
City Clerk
City of Lancaster

APPROVED:

_____
R. REX PARRIS
Mayor
City of Lancaster

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss
CITY OF LANCASTER)

CERTIFICATION OF ORDINANCE
CITY COUNCIL

I, _____, _____ City of Lancaster, California, do hereby certify that this is a true and correct copy of the original Ordinance No. 994, for which the original is on file in my office.

WITNESS MY HAND AND THE SEAL OF THE CITY OF LANCASTER, on this _____ day of _____, _____.

_____

(seal)

_____

Selected pages from the zoning code showing required solar energy generation by zone

17.08.060 Development regulations by building types.

A. Single-family house on Rural Residential lot.

A single-family house on a rural residential lot is a residence for one household, with its primary entrance accessed through the front yard, on a lot ranging from 20,000 to 100,000 square feet or greater.

1. Development standards.

Rural Residential Development Standards			
	ZONES		
	RR-2.5	RR-1	SRR
Site specifications.			
Minimum lot size (sq. ft.).	100,000	40,000	20,000
Minimum width (feet).	165	110	85
Minimum depth (feet).	250	130	120
Building placement.			
Front yard (feet).	40	30	30
Garage location.	All garages shall be located at or behind the wall plane where the front entrance is located.		
Rear yard (feet).	30	25	20
Interior side yard: minimum (feet).	20	15	10
Interior side yard: total sum of two yards (feet).	40	30	25
Street side yard (feet).	40	30	20
Building size and massing.			
Lot coverage (percentage).	30%	40%	40%
Building height (feet).	40	40	35
Parking.			
Number of parking spaces.	2 spaces within an enclosed garage per Section 17.08.100		
Solar energy system provision.			
Minimum photo-voltaic kW per unit per Section 17.08.305.	1.5 kW	1.5 kW	1.5 kW

B. Single-family house on Residential lot.

1. Development standards.

Development Standards						
	ZONES / LOT TYPE					
	R-15,000	**R-10,000**	**R-7,000**	**Infill R-7,000 (with RPD)**	**Infill R-7,000 (alley access, with RPD)**	**SFR corner duplex**
Site specifications.						
Minimum lot size (sq. ft.).	15,000	10,000	7,000	5,000	3,500	10,000
Minimum width (ft.).	85	70	60	50	40	100
Min. width – corner lot (ft.).	100	85	75	60	50	
Minimum depth (ft.).	120	100	100	85	75	100
Building placement.						
Front plane build-to line (ft.).	20-32	16-28	14-26	12-20	10-18	16-28
Required minimum porch size (feet x feet).	6 x 12	6 x 12	6 x 12	6 x 10	6 x 8	6 x 12
	To the satisfaction of the Planning Director, an alternative frontage feature may be proposed in lieu of a porch if it achieves the same design intent and variation.					
Porch encroachment.	Up to additional 6' beyond front plane build-to line					
Garage location.	All garages shall be located at or behind the wall plane where the front entrance is located. A homebuilder with a subdivision with at least four floor plans may have one floor plan that has a garage located in front of the front entrance plane.					
Rear yard (ft.).	20	20	15	12	0	N/A
Interior side yard: min. (ft.).	5	5	5	5	0	10
Interior side yard: sum of two yards (ft.).	20	15	15	10	10	N/A
Street side yard (ft.).	15	15	10	10	10	N/A
Building size and massing.						
Lot coverage (percentage).	40%	40%	50%	55%	60%	45%
Building height (ft.).	35	35	35	35	35	35
Parking.						
Number of parking spaces.	2 spaces within an enclosed garage (Section 17.08.100)					
Solar provision.						
Minimum photo-voltaic kW per unit per Section 17.08.305.	1.50 kW	1.25 kW	1.0 kW	0.75 kW	0.50 kW	1.0 kW
a. A tandem garage parking arrangement may be considered if the applicant cannot meet the requirement to place a 2-car garage behind the plane of the house. b. Corner lots featuring side yard driveway access require a minimum 20-foot driveway and street side yard setback.						

C. Small apartment/condominium building/complex (2 to 15 units).

1. Development standards.

Development standards	
	MDR or HDR ZONE
Site specifications.	
Minimum lot size (sq. ft.)	6,000
Minimum width (feet).	60
Minimum width – corner lot (feet).	80
Minimum depth (feet).	100
Building placement.	
Front build-to line.	
Fronting local, collector, or other residential street with on-street parking (feet). Transitional infill design guidelines apply (Section 17.08.070.D).	0-12
Fronting local, collector, or other residential street with on-street parking and adjacent to single-family uses along the same street (feet).	8-20
Fronting arterial street with no on-street parking (feet).	20-32
Rear yard (feet).	15
Interior side yard (feet).	10
Street side yard (feet).	15
Building size and massing.	
Lot coverage (percentage).	50%
Building height within 100 feet of SFR zone (feet).	35
Maximum building height (feet).	55
Parking.	
Location of on-site parking.	Behind the front façade of the residential building
Number of parking spaces.	Per Section 17.08.100
Open space.	
Required usable open space/recreation area.	Minimum 8% of lot area, minimum 20' width and depth
Landscaping.	
Required landscaping (percentage).	Minimum 15% of lot area
Solar provision.	
Minimum photo-voltaic kW per unit per Section 17.08.305.	0.5 kW

a. On-site management shall be provide for apartments 4 units or greater.
b. A minimum 4' x 4' covered entryway shall be provided for each apartment or condominium unit. The entryway may be enlarged and designed as a porch.
c. Required amenities for units in a small apartment include in-unit laundry hook-ups.
d. Required amenities for units in a small condominium, beyond those required for apartments, include garage parking with storage shelves for each unit, and a minimum 4' x 8' porch, patio, or balcony area.
e. Other site amenities may include a barbeque area, pool, recreation courts, and shall be centrally located and easily accessible for residents.

D. Large apartment/condominium building/complex (16 or more units).

1. Development standards.

Development standards	
	MDR or HDR ZONE
Site specifications.	
Minimum lot size (sq. ft.)	6,000
Minimum width (feet).	60
Min. width – corner lot (feet).	75
Minimum depth (feet).	100
Building placement.	
Front build-to line.	
Fronting local, collector, or other residential street with on-street parking (feet). Transitional infill design guidelines apply (Section 17.08.070.D).	0-12
Fronting local, collector, or other residential street with on-street parking and adjacent to single-family uses along the same street (feet).	8-20
Fronting arterial street (feet).	20-32
Rear yard (feet).	15
Interior side yard (feet).	15
Street side yard (feet).	20
Building size and massing.	
Lot coverage (percentage).	50%
Building height within 100 feet of SFR zone (feet).	35
Maximum building height (feet).	72
Parking.	
Location of on-site parking.	40 ft. from front property line
Number of parking spaces.	Per Section 17.08.100
Open space.	
Required usable open space/recreation area.	Minimum 8% of lot area, minimum 50' width and depth
Landscaping.	
Required landscaping (percentage).	Minimum 15% of lot area
Solar provision.	
Minimum photo-voltaic kW per unit per Section 17.08.305.	0.5 kW

a. On-site management and security shall be provided for all large apartment complexes. Specific security provisions may include cameras, alarms, or active security guard surveillance, to the satisfaction of the Planning Director.
b. Required amenities for units in a large apartment include in-unit laundry hook-ups, and community pool and recreation room.
c. Required amenities for units in a large condominium, beyond those required for apartments, include garage parking with storage shelves for each unit, and a minimum 4' x 8' porch, patio, or balcony area.
d. Other amenities for units in a large multi-family complex may include courts for basketball, tennis or other sports, indoor gym, outdoor dog park, or daycare center.
e. All amenities shall be centrally located and easily accessible for residents.

Analysis on the cost-effectiveness of the "Implementation of Solar Energy Systems"

In 2013, the City of Lancaster revised its zoning and building codes to introduce a mandate to require solar energy systems, providing standards and procedures for builders of new homes to install photovoltaic (PV) solar energy systems. The standards are applicable to all new residential homes with a building permit issuance date on or after January 1, 2014.

The solar energy generation requirements are listed in Lancaster Municipal Code, Section 17.08.060. For the purpose of this analysis, it will be summarized as 1 kW of solar PV-generated energy per single-family home. The installation of PV solar energy systems is not required for all homes within a production subdivision; however, the builder shall meet the aggregate energy generation requirement within the subdivision (as calculated by the per-unit energy generation requirement multiplied by the number of homes in the subdivision). For example, an R-7000 subdivision with ten (10) homes that is required to provide 1.0 kW per unit would have an aggregate energy generation requirement of 10 kW for the subdivision. The 10-kW energy generation requirement can be met with two homes having solar energy systems generating 5 kW each, or with four homes having systems generating 2.5 kW each.

This analysis will reference heavily on the report prepared by Energy and Environmental Economics, Inc. ("E3") for the California Energy Commission, titled "Cost-Effectiveness of Rooftop Photovoltaic Systems for Consideration in California's Building Energy Efficiency Standards," dated May 2013. The authors measure photovoltaic's cost-effectiveness using two approaches: an average consumer savings analysis and a market-segmented savings analysis. An average consumer savings analysis evaluates whether PV is cost-effective to residential and commercial building owners on average. A market-segmented savings analysis evaluates whether PV is cost-effective to building owners based on their specific retail rate and annual electricity consumption.

E3's average consumer savings analysis determines cost-effectiveness using a benefit-cost ratio. The ratio is calculated by dividing the benefits (levelized bill savings) by the cost (levelized cost of solar electricity). A benefit-cost ratio greater than one is determined to be cost-effective. Figure 11 on Page 29 of E3's report shows that residential PV solar is cost-effective for year 2014, including the area of Climate Zone 14, identified as Palmdale, but representative for the Antelope Valley high desert, including Lancaster. PV is expected to be more cost-effective in the future as the installed capital costs of solar decreases, given advancements in technology development, and despite anticipated reductions in federal tax credits.

E3's market-segmented savings analysis evaluates benefits by including the avoided cost of retail electricity prices based on a customer's existing retail rate. Assumptions for this analysis vary, from the lifetime and cost of installation of solar PV systems, to the tiered retail rates that

Lancaster residents pay for electricity, as well as compensation parameters for an electricity company's Net Energy Metering program. Figure 14 on Page 33 of E3's report show that residential PV solar is cost-effective for year 2014 in the area of Climate Zone 14, including Lancaster. The cost-effectiveness increases with the size of the PV system.

In the past several years, KB Homes has been voluntarily installing solar PV systems on their new homes, with a 1.5 kW system as a standard feature, and upgrades up to a 3.8 kW system as options. KB has expressed that these features are a selling point and distinguishes their product from other homebuilders as well as resale homes. KB has not disclosed the exact costs for installation of the solar PV energy systems; however, E3's report provides additional details.

Table 2 on Page 9 of E3's report shows the cost in dollar/watt for installed PV systems, which for year 2012, averaged $5.38 per watt. Thus, for the minimum average of 1 kW, as required by the new solar requirement, the installation cost would be $5,380. However, E3's report notes that rack-mounted solar PV systems installed in newly constructed homes cost $0.80-$1.20/watt less than those installed as a retrofit on an existing home, likely due to built-in labor costs during construction of the home. Figure 1 on Page 11 of E3's report shows a reduction in installed costs for PV systems into the future, from a range of $4 to $5 per watt in 2014 to a range of $3 to $4 per watt by year 2020, thus reducing the installation cost for the minimum average of 1 kW to $3,000 to $4,000. Given a 3 kW solar PV system, typical for new construction, this calculates to cost of about $12,000 to $15,000 in year 2014 and $9,000 to $12,000 by year 2020. Anecdotally, city staff is aware that the installation costs may be even lower than what is reported in E3's study, given the rapidly declining costs of inverters and PV panels.

For new home construction, the added cost of solar PV systems is usually wrapped into the mortgage for the new house. The addition of a $12,000 to $15,000 solar PV system would result in an increase of the mortgage payment by about $75 to $100, given typical lending assumptions. This added cost is outweighed by the savings achieved by having a solar PV system that would reduce a household's utility bill by keeping the usage within the lower-rate pricing tiers.

Page 41 of E3's report summarizes the results of their cost-effectiveness analysis for rooftop PV solar. The average consumer and market-segmented savings results show that solar PV systems are largely cost-effective, especially for less expensive systems. More so, given the Antelope Valley's high desert location of ample sunshine, solar PV systems are cost-effective now and into the future as installation costs decline.

CONSULTANT REPORT

COST-EFFECTIVENESS OF ROOFTOP PHOTOVOLTAIC SYSTEMS FOR CONSIDERATION IN CALIFORNIA'S BUILDING ENERGY EFFICIENCY STANDARDS

DRAFT

Prepared for: California Energy Commission

Prepared by: Energy and Environmental Economics, Inc.

Energy + Environmental Economics

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ABSTRACT

This consultant report was written for the California Energy Commission in response to the requirements of Senate Bill 1 (Murray, Chapter 132, Statutes of 2006). The report provides information about the cost-effectiveness of rooftop photovoltaic systems, including the analysis approach and results. The report will be used to help the Energy Commission address the requirement in SB 1 for determining when and under which conditions solar electric systems should be required in the Building Energy Efficiency Standards. SB 1 guides the consideration of cost-effectiveness in making this determination.

Keywords: Photovoltaic, cost-effectiveness, Building Energy Efficiency Standards, rooftop.

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EXECUTIVE SUMMARY

This report was written for the California Energy Commission in response to the requirements of Senate Bill 1 (Murray, Chapter 132, Statutes of 2006), which calls for an evaluation of whether, and under what conditions, solar electric systems are cost-effective for inclusion in the state's Building Energy Efficiency Standards (Title 24, Part 6). The cost-effectiveness analysis, which forms the basis for the conclusions of this report, is based on the Warren-Alquist Act (1974), which requires the California Building Energy Efficiency Standards ("standards") to be cost-effective when taken in their entirety and when amortized over the economic life of the structure compared with historical practice.

Using the input assumptions and method described in this report, which projects the current trend in solar photovoltaic (PV) costs and maintains current rate structures and policies, we find that rooftop solar electric systems will be cost-effective in 2020 for a large portion of California's commercial and residential electricity consumers. The scope of this study is narrowly defined, with a particular focus on cost-effectiveness within the standards. Other factors besides cost-effectiveness must also be considered before PV installations are required in the standards. This report does not address any of the impacts of potential changes in practices within the construction or PV industries, nor does it consider the impacts of rooftop PV on the reliable operation of California's electric grid.

The cost-effectiveness analysis detailed here relies on several important assumptions about California's solar energy landscape through 2020. These key assumptions are:

- Utility electricity rate structures and Net Energy Metering (NEM) rules do not change significantly throughout the lifetime of rooftop PV systems installed through 2020. Changes in those areas could have a dramatic impact on solar's cost-effectiveness, but due to the difficulty in predicting what form such changes may take, the research team's analysis relies on existing rate structures and a continuation of the NEM policy.
- If rooftop PV systems are included in a Title 24 requirement, they will not be eligible for existing incentives such as the California Solar Initiative (CSI) and the New Solar Homes Partnership (NSHP).
- The federal investment tax credit (ITC) drops from 30 percent to 10 percent in 2017, as called for in existing legislation.
- Utility electricity rates increase at 2.11 percent per year through 2020 and 1.42 percent per year after 2020, in real terms. This is based on a forecast of retail rate escalation under an "AB 32" compliant scenario, which accounts for the impact of California's greenhouse gas reduction policies on retail electricity rates.
- Rooftop PV system costs continue to decline through 2020. The research team's PV cost forecast begins with reported 2012 costs from the CSI project database and then assumes that costs will drop significantly each year through 2020, continuing the trend in actual PV cost reductions observed from 2007 to 2012. For California's PV costs to meet this forecast, both module and installation costs must decline consistently, driven by a robust and competitive PV market.

The authors examine PV's cost-effectiveness using two approaches. The first approach, referred to as the average consumer analysis, follows the adopted time dependent valuation (TDV) method used in Title 24 evaluation since 2005. TDV is a time varying measure of energy that accounts for both the enery used at the building site and consumed in producing and delivering energy to the site, including, but not limited to power generation, transmission and distribution losses. Using the the average consumer analysis method, the authors find that rooftop PV will be cost-effective for both residential and nonresidential new construction across all climate zones by 2020.

The second approach, the market-segmented analysis, calculates PV's cost-effectiveness based on projected utility bill savings. Bill savings are calculated specific to different building types, annual electricity consumption, climate zones, and utility rates. The market-segmented analysis demonstrates the variability of PV cost-effectiveness based on those critical consumer characteristics. Rooftop solar installations are shown to be cost-effective in 2020 only for residential consumers whose annual electricity usage is above 5,000 kilowatt hours (kWh). Furthermore, while the average consumer analysis suggests that PV will be cost-effective for large and small commercial consumers in 2020, the market-segmented analysis projects that PV will be consistently cost-effective only for small commercial consumers, while cost-effectiveness for large commercial customers varies by utility service territory. This discrepancy is due to differences in rate structure: Small commercial consumers' rates allow them to access larger bill savings than large commercial customers. Contrasting the average consumer results to the market-segmented results demonstrates the importance of utility rate structures, climate zone, and annual consumption in determining PV cost-effectiveness.

CHAPTER 1: Introduction

This report prepared by Energy and Environmental Economics, Inc. (E3) was commissioned by the California Energy Commission to evaluate the cost-effectiveness of solar electric systems in the context of the state's Building Energy Efficiency Standards ("standards"). The report is written in compliance with the requirements of Senate Bill 1 (Murray, Chapter 132, Statutes of 2006) and is designed to help the Energy Commission determine whether, and under what conditions, solar electric systems[1] should be required on new residential and new nonresidential buildings as part of the state's standards. Furthermore, rooftop PV systems are expected to play an important role in meeting California's Long-Term Energy Efficiency Strategic Plan zero net-energy building goals and are included as part of the California Air Resources Board's *Scoping Plan* to meet the state's greenhouse gas reduction targets under Assembly Bill 32 (Nuñez, Chapter 488, Statutes of 2006).[2]

The conclusions in this report are based on a range of forecasts of the cost-effectiveness of rooftop photovoltaic installations on newly constructed buildings between 2014 and 2020. This report answers the following research questions:

- Under what conditions is rooftop PV on newly constructed residential and nonresidential buildings expected to be cost-effective from an average consumer savings perspective from 2014 to 2020?

- Is rooftop PV for newly constructed buildings expected to be cost-effective from 2014 to 2020 for specific residential or commercial market segments?

Approach

Cost-effectiveness is evaluated using two metrics: 1) average consumer savings, which evaluates whether PV is cost-effective to residential and commercial building owners on average across climate zones, and 2) market-segmented savings, which evaluates whether PV is cost-effective to building owners based on their specific retail rate and annual electricity consumption, again compared by climate zone. In both approaches, the life-cycle benefits and life-cycle costs of PV are evaluated over a 25-year horizon, corresponding with the current industry-standard PV module warranty lifetime. The life-cycle costs of PV are evaluated over a

1 For purposes of this report, solar electric systems are limited to rooftop photovoltaic (PV) systems.

2 See the *Energy Efficiency Strategic Plan* at http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/ ; the *ZNE Action Plan* at: http://www.cpuc.ca.gov/NR/rdonlyres/6C2310FE-AFE0-48E4-AF03-530A99D28FCE/0/ZNEActionPlanFINAL83110.pdf ; and the California Air Resources Board *Scoping Plan* at: http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm

20-year period, the standard duration of rooftop solar power purchase agreements (PPAs), followed by a 5-year period of no additional costs to the customer.

Average Consumer Savings Analysis[3]

The average consumer savings is analyzed for residential and nonresidential customer classes based on a forecast of average residential and nonresidential retail rates. The approach is the same as the one used to evaluate new building requirements in the Energy Commission Title 24 process based on time dependent valuation (TDV). The forecast reflects wholesale market forecasts for the future cost of electricity, including natural gas fuel, the cost of new conventional generation capacity, the cost of new renewable generation capacity, transmission, distribution, ancillary services, losses, and a forecast of market prices for carbon dioxide emissions and other air emissions criteria. The retail rate forecast includes the expected effects of current electricity sector policy goals, such as the 33 percent renewable electricity standard and higher levels of energy efficiency.

Market-Segmented Savings Analysis

In the market-segmented savings analysis[4], the benefits of a rooftop PV installation are calculated differently than for the average consumer analysis. The benefits include the avoided cost of retail electricity prices based on a customer's existing specific retail rate. Rate structures vary significantly by customer type. Most residential electricity rates in California are "inclining block," or tiered, meaning that the cost of electricity increases with higher volume consumption. In contrast, most commercial electricity rates in California do not increase with higher consumption. Many medium to large commercial rates vary based on the time of use (TOU) of electricity consumption. Under TOU rates, on-peak reductions in electricity use are valued more highly than off-peak reductions. An additional difference between residential and commercial rate structures is the inclusion of demand charges: Commercial consumers typically pay charges per their maximum energy demand in a specific period. For example, many TOU commercial rates include a high per kW demand charge during the summer on-peak period.

Key Assumptions

Evaluating the cost-effectiveness of rooftop PV installations for newly constructed buildings is complex and depends on many variables. The authors address this complexity by using scenario analysis and categorizing the results by climate zone and broad customer classes. However, it would be impossible to evaluate every possible combination of conditions that

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3 The average consumer savings analysis is based on the time dependent valuation "base" values developed as part of the Commission's update to the *2013 Building Energy Efficiency Standards*. For more information on this method,
see: http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/

4 The market-segmented savings analysis approximates consumers' bill savings.

could affect PV's cost-effectiveness across California. Therefore, the results of the analysis should be interpreted as broadly indicative of cost trends for PV across the state.

PV system costs and characteristics are one set of critical variables that affect the cost-effectiveness analysis. The authors assume that the capital cost of PV will continue to decrease over time, in line with historical trends that have shown significant cost reductions since 2007 and earlier. Because the expected electricity generation of a PV system varies by location based on the solar resource available, the authors show PV cost-effectiveness results for each of California's 16 climate zones. PV system size is another important input; in this analysis, the authors assume that all residential and small commercial systems are smaller than 10 kW in size, while all large commercial PV installations are between 10 to 100 kW. The authors assume that all PV systems are roof-mounted and do not evaluate the cost-effectiveness of ground-mounted systems or larger "community solar" type installations.[5] Throughout this analysis, the authors assume that rooftop PV systems accrue benefits over a 25-year economic lifetime.

Another factor in this analysis is the forecast of electricity retail rate escalation. The research team assumes that retail rates will increase by 2.11 percent per year through 2020 and 1.42 percent per year after 2020 (in real terms), as California replaces much of its electricity generation with less-polluting resources and implements other greenhouse gas reduction measures in compliance with the Global Warming Solutions Act of 2006 (AB 32)[6].

E3's analysis assumes that if PV were incorporated into the building code, installations would not directly receive a financial credit for helping to meet the state's Renewables Portfolio Standard (RPS), nor would they be eligible for current state solar incentives such as the California Solar Initiative (CSI) and the New Solar Homes Partnership (NSHP).[7]

The structure of electricity rates and the Net Energy Metering (NEM) program is also important to the analysis. The authors assume that the structure of California utility rates will not change dramatically before 2020. Changes to utility rates, such as increasing demand and/or service charges while decreasing energy charges, could have a large effect on consumers' utility bill savings upon installing PV. Furthermore, the authors assume that California's existing NEM program will remain in place in its current form for the lifetime of systems installed through

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5 Community solar projects are expected to show some cost benefits over rooftop-mounted PV systems because the larger systems could achieve economies of scale. However, there are significant challenges to widespread deployment of community solar including tariffs and interconnection rules that are beyond the scope of this analysis.

6 For more information about AB 32, please see the California Environmental Protection Agency Air Resources Board website at http://www.arb.ca.gov/cc/ab32/ab32.htm.

7 Depending on how the Commission chooses to implement the updated Base Code and CALGreen Tiers 1 and 2, the NSHP incentive could continue to be available to new home construction. However, this analysis does not predicate the cost-effectiveness results based on the presence of state solar incentives.

2020. In reality, there is a cap on the installed capacity of NEM generation, and the NEM rules may change before 2020. The cost-effectiveness of rooftop PV could vary significantly depending on the compensation to NEM generators for exports to the grid. For this analysis, the authors rely on existing rate structures and NEM rules due to the large uncertainty in exactly how they might change and what alternatives could replace them.

While the cost-effectiveness analysis accounts for the major costs and benefits of rooftop PV, there are other less readily quantified attributes of solar that are not included. For example, in comparison to other renewable resources, rooftop PV has the benefit of being relatively quick to deploy and does not require additional land. Rooftop installations also have the potential to avoid new long-line transmission to interconnect generation to loads. Furthermore, rooftop PV does not use large quantities of water for thermal generation cooling. On the other hand, this report does not address any potential distribution system costs that could arise from introducing large quantities of behind-the-meter generation onto the grid.

Key Findings

Using an average consumer savings approach, rooftop PV installations are projected to be cost-effective by 2020 in residential new construction and both large and small commercial construction. While the degree of cost-effectiveness varies by climate zone, the average consumer benefits of installing PV outweigh the costs across all climate zones. In contrast, the market-segmented results indicate that rooftop PV will be cost-effective only for certain sectors of consumers in 2020, depending on climate zone, utility rate, and annual electricity usage. The central results of both the average consumer and market-segmented cost-effectiveness analysis in 2020 are shown in Table 1 below, segregated by building type.

Table 1: Summary of Cost-Effectiveness Results of California Rooftop PV for Newly Constructed Buildings, 2020

	Average Consumer Results, 2020	Market-Segmented Results, 2020
Residential Consumers	Cost-effective	Cost-effective in all climate zones only for consumers with annual electricity usage above 5,000 kWh
Small Commercial Consumers	Cost-effective	Cost-effective in most climate zones/utility service territories
Large Commercial Consumers	Cost-effective	Not cost-effective in most climate zones/utility service territories

Source: Energy and Environmental Economics, Inc.

Ultimately, deciding whether to include PV in the California Building Energy Efficiency Standards requires consideration of more than just the cost-effectiveness issues raised here. The integration of PV into the energy code should happen in a well-planned and phased manner, taking into account the state's policy objectives, as well as the costs, benefits, and less tangible attributes of PV. Any PV requirement would ideally be designed to ensure that the solar and building industries in California are ready to meet the additional need for solar installations with each successive building standard requirement. In addition, the code would need to include provisions to handle locations that are not suitable for solar generation. These other considerations are not addressed in this study.

CHAPTER 2:
Benefit–Cost Analysis Approach

The research team evaluates the cost-effectiveness of PV using an approach that compares the costs and benefits over the life of the system from the owner's perspective. To calculate a benefit-cost ratio, the life-cycle benefits of PV are divided by the life-cycle costs of PV. If the ratio of benefits to costs is greater than one with reasonable certainty, then PV is determined to be cost-effective.

The cost of electricity produced by a solar electric system depends on the installed capital cost, financing costs, taxes, and federal incentives associated with PV, as well as the amount of electricity generated by the PV system. The benefits of solar to the consumer (that is, building owner) are the avoided utility bills. In the average consumer savings analysis, average consumer savings are calculated using the hourly time dependent valuation (TDV) costs adopted in the 2013 Title 24 proceeding. These TDV factors reflect the shape of the underlying market value of electricity in each hour of the year, including avoided greenhouse gas emissions, avoided energy and capacity costs, and avoided transmission and distribution costs. In the market-segmented savings analysis, the current utility rates, such as tiered residential retail rates and time-of-use commercial retail rates, are used to calculate the bill savings by segmented customer class. Each component of these benefit-cost analyses is discussed in more detail below.

Costs: PV Cost Assumptions

Installed System Cost and Progress Ratios

Installed PV system costs are based on the PowerClerk database[8] of California Solar Initiative systems, with adjustments to create a forward-looking forecast of capital costs. The PowerClerk data reflect the "self-reported" cost of more than 100,000 actual PV systems installed on buildings between 2007 and 2012. This database was used because it is the most detailed rooftop PV dataset available for actual California installations. Installed capital cost data from the New Solar Homes Partnership program are used to benchmark capital cost data for rooftop PV installations on newly constructed buildings.

8 The research team obtained data directly from the PowerClerk database manager, Clean Power Research. The PowerClerk database holds solar system data from applicants who have participated California Solar Initiative solar incentive program.The data are available online at https://csi.powerclerk.com/CSIProgramData.aspx; however, some fields are not publicly available to protect customer identities.

Table 2 shows the median cost, in $/watt, of CSI installed systems by size category for the years 2007 to 2012, based on the system reservation date.

Table 2: CSI Installed Systems, in $/Watt, From the PowerClerk Database

System Size Category (kW)	2007	2008	2009	2010	2011	2012
< 10	$8.00	$7.95	$7.39	$6.55	$6.36	$5.38
10-100	$7.70	$7.68	$6.77	$5.89	$5.39	$4.52

Source: Energy and Environmental Economics, Inc.

Using data from the NSHP and CSI, the Lawrence Berkeley National Laboratory report *Tracking the Sun V*[9] compares the cost of rooftop PV systems installed as a part of a residential retrofit to those installed in residential new construction from 2007 to 2011. For new construction installations, the report distinguishes between rack-mounted and building-integrated systems. The comparison includes only systems between 2-3 kW, the most common size range for PV systems installed in residential new construction. Between 2007 and 2009, rack-mounted PV systems installed in newly constructed homes cost between $0.80-$1.20/watt less than those installed as a retrofit on an existing home. In 2010 and 2011, the cost difference was much smaller, possibly due to a reduced sample size driven by the slowdown in residential construction during those years. In this analysis, the authors assume a $1.20/watt cost difference for retrofit versus new construction rooftop PV systems. This cost difference represents some of the uncertainty in the future capital costs of PV systems.

9 Barbose, Galen, Naim Darghouth, Ryan Wiser. December 2010. *Tracking the Sun V: A Historical Summary of the Installed Price of Photovoltaics in the United States From 1998-2011.* Lawrence Berkeley National Laboratory.

The research team developed two scenarios of PV capital costs to reflect the uncertainty of the future cost of PV systems:

- In Scenario 1, the authors use the 2012 CSI capital costs as the starting point for the analysis. Since the CSI program provides incentives to retrofit installations, which are historically more costly than installations in new construction, the authors use CSI reported costs to represent a more conservative (higher) trajectory for solar capital costs. They apply the progress ratio assumption described below to the 2012 costs to develop a forecast through 2020.

- In Scenario 2, the authors adjust the 2012 CSI PV capital costs downward by $1.20/watt to reflect that PV systems on newly constructed buildings may cost less than installations on existing buildings. They apply the same progress ratio assumption to these costs to generate a lower cost forecast through 2020.

The authors use a "progress ratio" approach in their analysis to develop a forecast of PV system costs through 2020. A progress ratio estimates the change in capital cost of solar after a doubling in cumulative installed capacity. Based on evidence from the available literature, we apply an 80 percent progress ratio to 2012 installed system costs, meaning that for every doubling in cumulative installed capacity after 2012, installed system cost declines by 20 percent.[10]

While solar progress ratios generally apply to module cost, the research team applies the 80 percent progress ratio to the full installed system cost. A Lawrence Berkeley National Laboratory study found that markets with large solar deployment programs tend to have lower installed system costs, suggesting that balance-of-system costs (such as installation costs) decline with market growth.[11] Based on this evidence, the authors believe the simplifying assumption of applying an 80 percent progress ratio to total installed cost is reasonable over the period of this study. For more details about how the progress ratio is applied to PV costs, see the CPUC California Solar Initiative Cost-Effectiveness Evaluation.[12]

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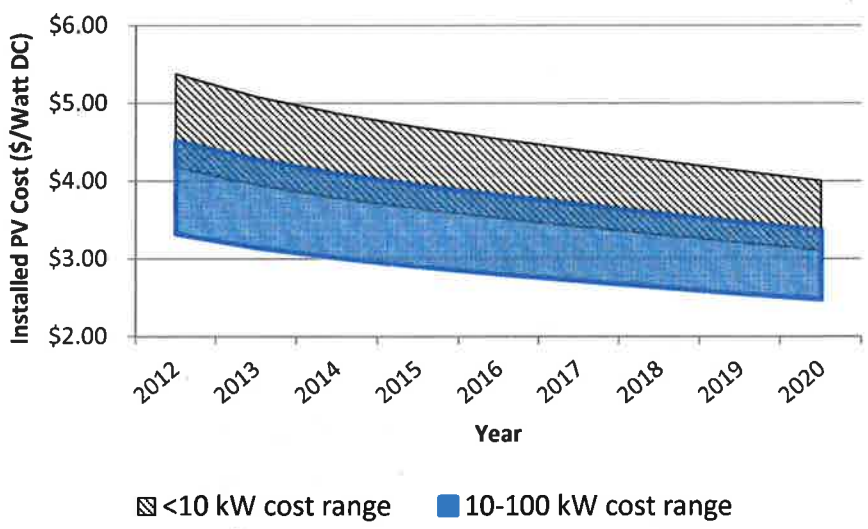
10 Surek, Thomas., 2007.National Renewable Energy Laboratory, *Progress in U.S. Photovoltaics: Looking Back 30 Years and Looking Ahead 20*; and, *Solar Energy Materials and Solar Cells Journal.*

11 Wiser, Ryan, Galen Barbose, and Carla Peterman. February 2009. *Tracking the Sun: The Installed Cost of Photovoltaics in the U.S. from 1998-2007.* Lawrence Berkeley National Laboratory,

12 CPUC CSI Program Evaluation, see the CSI Cost Effectiveness Evaluation of April 2011: http://www.cpuc.ca.gov/PUC/energy/Solar/evaluation.htm

The high and low forecasts of installed system cost for Scenarios 1 and 2 are shown in Figure 1 below.

Figure 1: High and Low PV Capital Cost Forecasts



Source: Energy and Environmental Economics, Inc

For this analysis, all residential and small commercial systems are modeled using the median cost of solar systems under 10 kW in size. For large commercial customers, the authors use the median average solar cost for systems between 10 and 100 kW in size.[13]

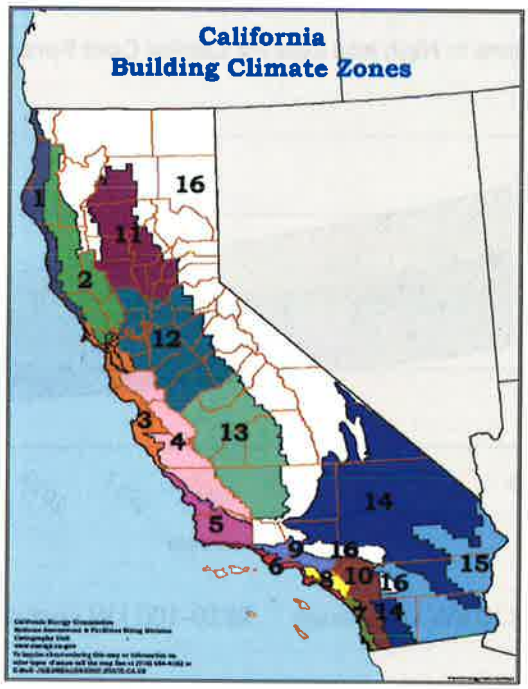
System Performance by Climate Zone

The amount of electricity generated by PV systems varies by climate zone based on the weather patterns and insolation (amount of solar radiation) in each region. The capacity factor of a PV system is a measure of the average energy produced over the year relative to the system's peak generating capacity. A difference in capacity factor of only a few percentage points can have a dramatic effect on solar's cost-effectiveness results.

The 16 climate zones used in this analysis are the same climate zones used in the Commission's Building Energy Efficiency Standards (see Figure 2).

13 *Small commercial* is defined as any rooftop PV installation under 10 kW in size, and large commercial is defined as any rooftop PV installation over 10 kW and under 100 kW in size.

Figure 2: California Building Energy Efficiency Standards Climate Zones



Source: California Energy Commission

Given the importance of the capacity factor assumption to the final results and the uncertainty in actual PV production forecasts for a given installation, the authors develop two scenarios of capacity factors by climate zone:

- Scenario 1 uses the capacity factor estimates by climate zone that are produced by the PVWatts model, a PV simulation tool developed by the NREL. [14]

- Scenario 2 uses capacity factors by climate zone based on actual, metered generation data from the CSI load impact studies.

In general, the actual CSI database capacity factors are higher than the modeled PVWatts capacity factors. There could be a number of factors contributing to these differences, but the authors expect that the main difference is due to self-selection on the part of the CSI customers to install PV systems in areas with higher than average insolation within a given climate zone, coupled with the CSI program's performance-based incentive, which pays solar incentives based on a system's metered energy production.

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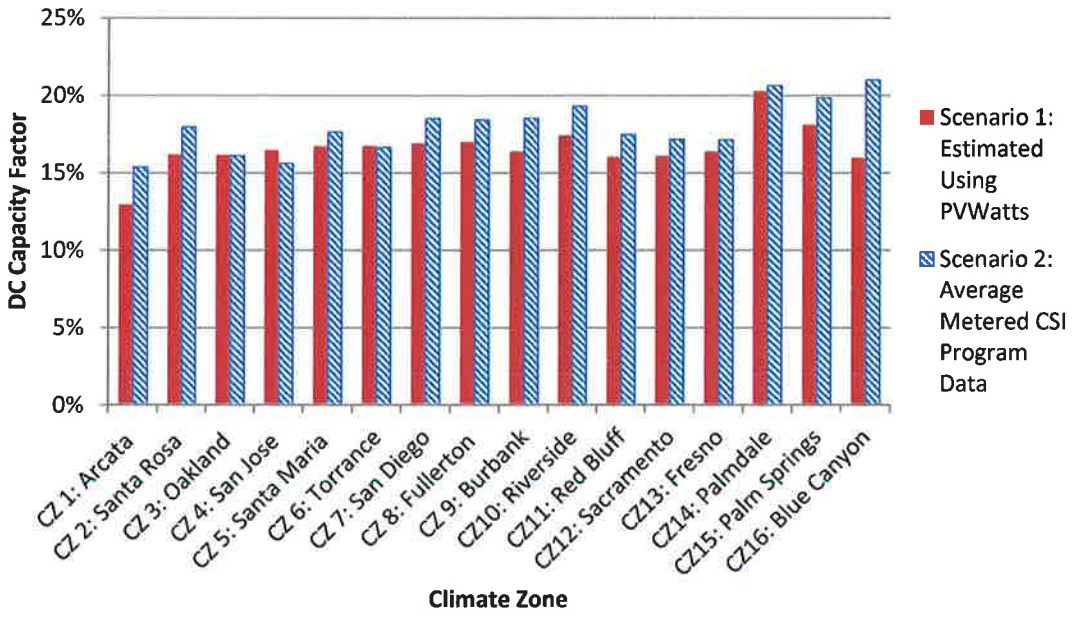
14 Another potential source for capacity factors would be the CECPV model. In general, the CECPV model results in slightly higher capacity factor estimates compared to PVWatts and is closer to measured performance. The PVWatts capacity factors used here are conservative input assumptions for the "more expensive solar" scenario.

Although it is likely that the effects of shading differ between retrofit and newly constructed buildings, the authors have not found any documented evidence to suggest that the capacity factor varies for retrofit versus newly constructed building installations or between residential and commercial installations (for a given system type). Figure 3 shows the capacity factors by climate zone applied in Scenario 1 (PVWatts) and Scenario 2 (average metered CSI generation data).

Figure 3: PV Capacity Factors by Climate Zone

Scenario 1 Uses PVWatts Data, Scenario 2 Is Based on Average Performance of Actual CSI Installed Systems



Source: Energy and Environmental Economics, Inc.

Treatment of Uncertainty Through Two Scenarios

The research team uses two scenarios to reflect the uncertainty in forecasting PV cost-effectiveness. By combining the range of capital costs described in the section "Installed System Cost and Progress Ratios" and the range of capacity factors described in the section "System Performance by Climate Zone," the authors generate the following two scenarios:

1. Scenario 1 reflects a forecast of "more expensive solar" using higher capital costs and lower capacity factors.

2. Scenario 2 reflects a forecast of "less expensive solar" using lower capital costs and higher capacity factors.

These scenarios create reasonable uncertainty bounds on a range of potential PV costs and are summarized in Table 3 below.

Table 3: Assumptions Applied in Scenarios 1 and 2

Scenario	Capital cost assumptions	Capacity factor assumptions
Scenario 1: More expensive solar	Higher capital costs: CSI data based on retrofit installations, adjusted for 80% progress ratio	Lower capacity factors: PVWatts modeled data
Scenario 2: Less expensive solar	Lower capital costs: CSI costs reduced by $1.20/watt to approximate installations on newly constructed buildings, adjusted for 80% progress ratio	Higher capacity factors: actual CSI program metered generation data

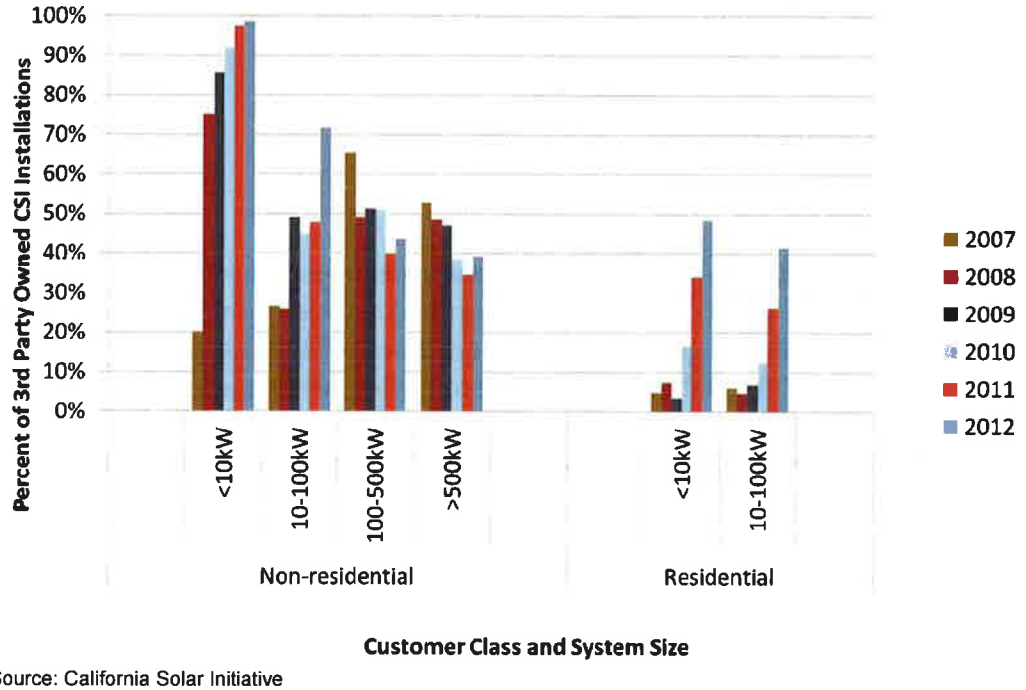
Source: Energy and Environmental Economics, Inc.

Levelized Cost of Energy Produced by PV Systems

System Financing

Several financing options exist for residential and commercial rooftop PV systems. Third-party ownership (power purchase agreement [PPA]) financing is very common among large commercial systems and is rapidly becoming more common for residential systems; we expect this trend to continue. The following figure shows the increasing share of third-party financed residential and non-residential systems participating in CSI since the program began in 2007.

Figure 4: Percentage of Third Party-Financed PV Installations in CSI Database



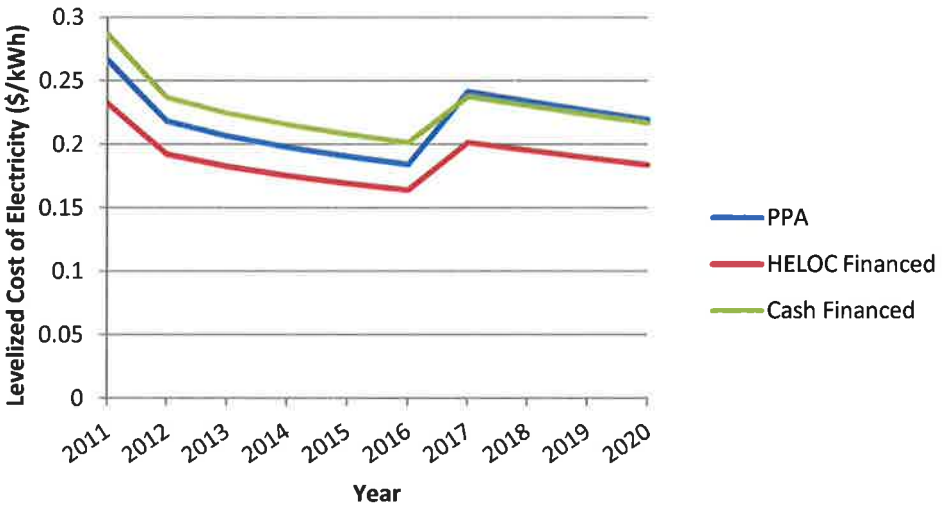
Source: California Solar Initiative

The research team assumes third-party ownership financing in the analysis due to its prevalence in the California market and because it allows straightforward comparison between the cost of commercial and residential systems. To calculate the life cycle or levelized cost of energy (LCOE) using third–party ownership financing, the authors calculate the revenue stream that a third party would need to collect from the customer to receive a return on investment, based on a financial *pro forma,* that is, a standardized financial cost model. The authors assume that PPAs are signed for a 20-year duration, which is the current PV industry standard. The resulting LCOE reflects the underlying assumption that PPA pricing is highly competitive and and that PV leases are priced to generate a 7.7 percent return on capital (10 to 12 percent return on equity); in reality, PPA prices may be higher based on dynamics and competition in the California market.

A common alternative to third-party finance for PV systems is private homeowner purchase of the system using a home equity line of credit (HELOC), or a second mortgage. A HELOC allows the homeowner to borrow the full value of the system cost at a low interest rate, and the loan interest is tax deductible. As a result, purchased systems yield a slightly lower LCOE than third-party owned systems. However, homeowners are continuing to opt for third party-owned PV systems, likely due to reduced hassle and relief of maintenance obligations. In addition, not all homeowners have the ability to qualify for a HELOC or increased borrowing from an existing loan. Figure 5 below compares the levelized cost of solar in Climate Zone 3 under the "less expensive solar" scenario, calculated using three different financing options: third-party ownership with a PPA, private ownership purchased with a HELOC, and private ownership purchased with cash. For this comparison, the authors assume a 20-year financing term and system lifetime for all financing structures.

Figure 5: PV Levelized Cost by System Financing Structure

Climate Zone 3, "Less Expensive Solar" Scenario (Scenario 2)



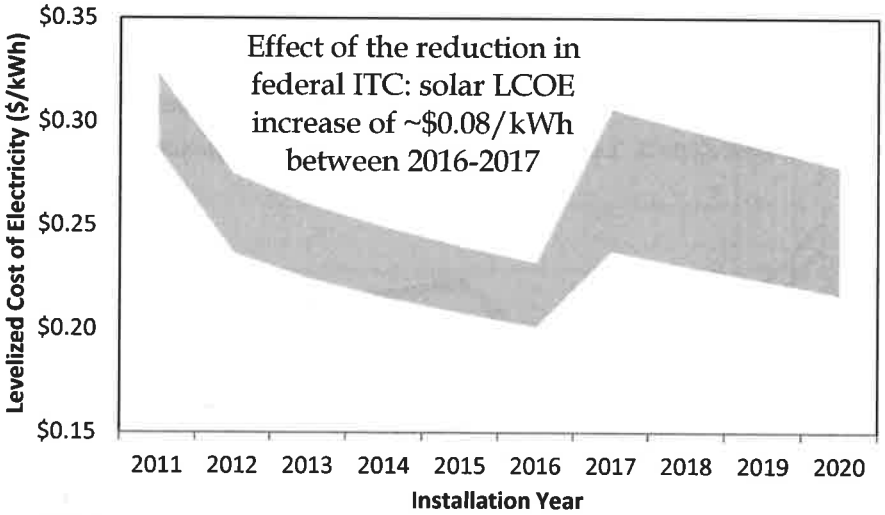
Source: Energy and Environmental Economics, Inc.

Taxes and Incentives

Tax considerations are another important component of the cost of solar electric systems in California. The research team's financial analysis applies state and federal taxes at the relevant rate for residential and commercial customers (see Table 4). The authors also include the federal investment tax credit (ITC) in their modeling, which they assume drops from 30 percent to 10 percent at the start of 2017, consistent with current federal policy. The dramatic effect of the expected change in the federal ITC after 2016 is shown in Figure 6. The LCOE of rooftop PV projects is shown to generally decline between 2011 and 2020 due to expected reductions in the capital cost of PV driven by industry growth; technology improvements; and streamlined manufacturing, marketing, and installation processes. However, the LCOE of solar is expected to increase significantly in 2017 with the reduction in the federal ITC from 30 percent to 10 percent. Figure 6 below shows the forecasted range of the LCOE of solar from 2011 to 2020. The top of the range reflects the Scenario 1 assumptions (more expensive solar), while the bottom of the range reflects Scenario 2 assumptions (less expensive solar).

Figure 6: Effect of the Expected Reduction in the Federal Investment Tax Credit on the Levelized Cost of Electricity From Rooftop PV Projects

2011 – 2020, Climate Zone 3 (Bay Area)



Source: Energy and Environmental Economics, Inc.

California's existing incentive programs, CSI and NSHP, are not included in this analysis. The authors assume that if PV systems are included in the building code, they will not qualify for incentive programs.

Table 4 summarizes the key financing and tax assumptions used in the analysis.

Table 4: Key Financing Assumptions

Financing Term	Input Assumption
After-tax weighted average cost of capital (WACC)	7.7%
Debt interest rate	6.8%
Cost of equity	10.15%, 12.2% after 2016
Debt period	20 years
Federal tax rate	35%
State tax rate	8.84%
Federal tax credit	30%, 10% after 2016
Percent financed with equity	60%, 45% after 2016
California state incentive (CSI or NSHP)	None
Accelerated depreciation (MACRS term)	5 years

Source: Energy and Environmental Economics, Inc.

Resulting Costs

Given the financing, tax, and incentive assumptions detailed above, the resulting levelized costs of electricity produced by PV systems vary by scenario, climate zone, and customer type. These costs range from $0.13/kWh to $0.25/kWh in 2014, as summarized in Table 5 below. This cost range is fairly wide due to the range of solar capacity factors and solar capital costs used in the scenarios. Climate Zones 3 and 10 are selected as examples in Table 5 because they are two highly populated areas of California and they represent the range of PV energy costs across the state. The solar resource in Climate Zone 3, located in the coastal San Francisco Bay Area, is not as good as the rest of the state on average, resulting in higher PV costs. Climate Zone 10 is located in inland Southern California and reflects a relatively plentiful solar resource, leading to lower PV costs.

Table 5: 20-Year Levelized Cost (LCOE) for Rooftop PV in 2014, Examples of Climate Zone 3 and Climate Zone 10 ($/kWh)

	Size	2014		2017		2020	
Climate zones	kW	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
3,10	< 10	$0.20, $0.16	$0.25, $0.23	$0.24, $0.20	$0.31, $0.28	$0.22, $0.18	$0.28, $0.26
3,10	10-100	$0.16, $0.13	$0.21, $0.19	$0.19, $0.15	$0.26, $0.24	$0.17, $0.14	$0.23, $0.21

Source: Energy and Environmental Economics, Inc.

In the next section, the levelized cost of solar by climate zone is compared to the 25-year life-cycle benefits for solar to determine cost-effectiveness.

Benefits: Avoided Cost of Electricity

The benefits of a rooftop PV system to a building owner are the retail electricity bill savings resulting from the system's generation. In this analysis, the bill savings are calculated using two approaches: 1) average consumer savings and 2) market-segmented savings. Each perspective is described in more detail below.

Average Consumer Savings

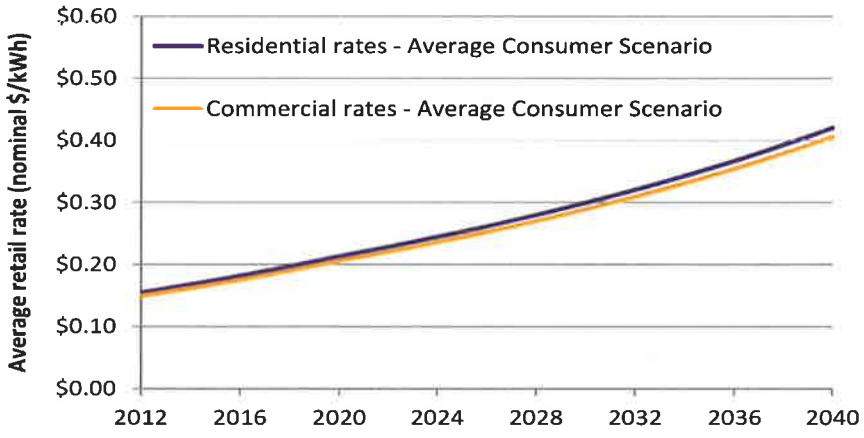
The average consumer savings analysis values energy savings (in the case of energy efficiency) and energy production (in the case of rooftop PV) based on an estimate of cost savings to the average consumer using a forecast of statewide average retail rates. The average consumer savings analysis approach has formed the foundation for the avoided cost of energy calculation underlying the *Building Energy Efficiency Standards* since 2005.[15] In this analysis, the value of electricity generated by PV varies on an hourly basis to reflect the actual costs of producing and delivering electricity to consumers. Specifically, the benefits of rooftop PV include a 25-year life-cycle assessment of PV's avoided energy costs, avoided capacity costs, avoided transmission

15 The average consumer savings analysis is based on the time dependent valuation "base" values developed as part of the Commission's update to the *2013 Building Energy Efficiency Standards*. For more information on this method,
see: http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/

and distribution costs, and avoided greenhouse gas emissions, among other factors. These benefits are calculated based on a simulation of hourly market prices for electricity and depend on factors such as typical hourly temperatures by climate zone and season, a forecast of statewide electricity demand, and the forecasted future supply portfolio of generators. A retail rate adder is applied to these hourly values to bring the average hourly "market" avoided costs of electricity equal to statewide average retail rates in each year of the forecast. The authors use a 25-year PV lifetime in this analysis to represent the current industry-standard PV module warranty duration.

The retail rate adder escalates each year. From 2012 to 2020, retail rates are assumed to escalate at 2.11 percent per year, in real terms. This is based on a forecast of retail rates under an AB 32-compliant scenario, whereby the electricity sector meets the targets in the California Air Resources Board *Scoping Plan"* and achieves a 33 percent RPS by 2020, increased energy efficiency and other greenhouse gas reduction policy goals. Beyond 2020, retail rates are forecast to escalate at 1.42 percent per year, in real terms. This assumption reflects the assumption that California meets remaining load growth with natural gas generation after 2020. The retail rate escalation factors are calculated using the E3 RES Calculator, which was developed for the California Air Resources Board 33 percent RES proceeding.[16] This is the same retail rate forecast used in the adopted 2013 Title 24 building standard proceeding. Figure 7 below shows the retail rate forecast applied in this analysis, which is equivalent to the annual average benefit of PV generation.

Figure 7: Average Consumer Savings Analysis: Retail Rate Forecast



Source: Energy and Environmental Economics, Inc.

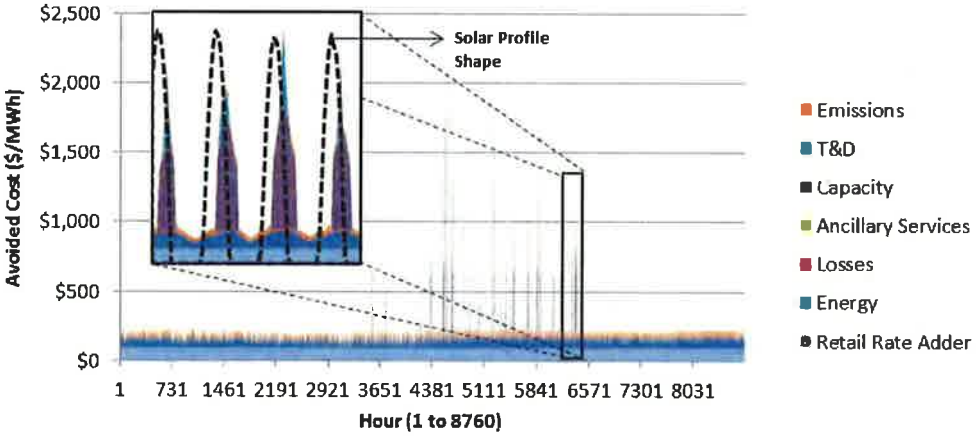
16 The E3 RES Calculator used to develop this rate forecast is available on the ARB website at: http://www.arb.ca.gov/research/econprog/econmodels/econmodels.htm

Using the average consumer approach, energy savings during summer peak hours are valued more highly than energy savings during the off-peak hours of the year. The average consumer savings approach values electricity as if residential and commercial retail customers in California paid their electric bills based on the retail value of electricity production and delivery in each hour of the year. In other words, this approach represents a hypothetical rate where customers would pay retail rates at an hourly price that reflects the underlying marginal cost in each hour, plus an additional amount to collect utility fixed costs.

The hourly value of electricity is correlated with the statewide typical weather files used in compliance software for the *Building Energy Efficiency Standards*. This is important because in California hotter weather tends to be correlated with increased demand on the electrical system, increasing the value of energy savings from energy efficiency and distributed generation during those hours.

The hours of PV output tend to be fairly well correlated with the hours of high electricity demand in California. For example, PV generation can offset a significant share of a house's electricity consumption during summer afternoons, when the cost of producing and delivering electricity is highest. This close link between hourly PV output and the hourly value of electricity is shown in the upper left-hand box in Figure 8 below. Solar PV output tends to peak in the early afternoon, while systemwide peak demand on the California grid tends to occur a little later in the afternoon, often between 4p.m. and 6p.m. In the average consumer analysis, the fact that electricity is valued more highly during hours of peak demand tends to improve the cost-effectiveness of PV.

Figure 8: One Year of Hourly Avoided Costs of Electricity, Average Consumer Scenario
Call-out box shows how the hourly PV generation profile correlates with the hourly value of electricity



Source: Energy and Environmental Economics, Inc.

As shown in the figure above, the hourly value of avoided cost of electricity in the average consumer analysis is made up of a number of components including: the wholesale value of

energy, transmission and distribution losses, ancillary services, capacity costs, transmission and distribution costs, greenhouse gas emissions, and a statewide average retail rate adder. For more details about the method for calculating the hourly avoided cost of electricity for the average consumer savings analysis, see the Energy Commission report *Time Dependent Valuation of Energy for Developing Building Standards.*[17]

The table below describes some of the key input assumptions for the average consumer savings analysis. This analysis reflects a forecast of current and expected market conditions.

Table 6: Average Consumer Savings: Key Input Assumptions

Input	Description
Overview of Scenario:	*Average Consumer avoided cost of electricity is reflective of current state policy and energy trends.*
PV system lifetime	25 years, based on duration of industry-standard PV module warranty.
Retail rate	Statewide average rate for residential and commercial. Based on weighted average of 2008 rates for PG&E, SCE, SDG&E, LADWP and SMUD, derived from the Commission's *2010 Integrated Energy Policy Report* energy demand forecast.
Retail rate escalation	Retail rates escalate at a rate consistent with the E3/ARB 33% RES Calculator impacts: real rate of 2.1%/yr for 2011 – 2020. Beyond 2020, rates are escalated at real rate of 1.4%/year, the rate of the "natural gas only" build-out case from the E3/ARB 33% RES Calculator tool.
CO_2 price	Net present value of 2009 Market Price Reference CO_2 price forecast, which begins at about $14/ton in 2011 and escalates to $57/ton, in real $2010 dollars, by 2040.
CO_2 price policy	Assumes that a CO_2 pricing policy will not further increase rates beyond the retail rate assumptions above (i.e. revenue from CO_2 cap-and-trade market is used to offset any impacts to residential retail rates). However, CO_2 prices do affect the electricity market price shape, increasing the value of on-peak electricity.

17 Report available at: http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/

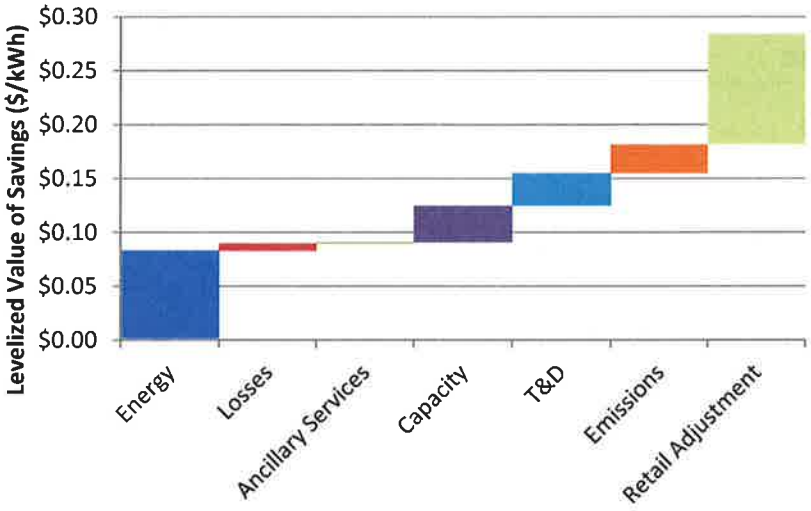
Input	Description
Electricity market price shape	The market price shape of electricity in 2020 is determined by the "High Wind" 33% RES case developed as part of the Commission's "Electricity System Implications of 33 Percent Renewables" Study completed in June 29, 2009. For years between 2008 and 2020, the change in the market price shape is based on an hourly linear extrapolation. No changes to the market price shape are forecast beyond 2020.
Other Policies (AB 32 Scoping Plan, Once-through cooling regulations)	Assumes statewide energy efficiency, rooftop PV and combined heat and power generation by 2020 are consistent with the *AB 32 Scoping Plan* goals and statewide compliance with proposed regulations on once-through cooling of coastal thermal power plants. The impact of these policies is reflected in the market price shape from the "High Wind" 33% RES case developed as part of the Commission's *Electricity System Implications of 33 Percent Renewables* study completed in June 29, 2009.
Real Discount Rate	3% real discount rate, consistent with Building Energy Efficiency Standards assumptions.

Source: Energy and Environmental Economics, Inc.

Using these input assumptions, the analysis shows that on a life-cycle (levelized) basis, the value of PV generation is expected to range from $0.27/kWh - $0.29/kWh for a residential PV system installed in 2014, depending on the climate zone. The example in Figure 9 below shows the components of the overall PV benefits in Climate Zone 3 for a residential system. The total life-cycle benefits of residential rooftop PV in Climate Zone 3 total $0.28/kWh in 2014.

Figure 9: 2014 Life-Cycle Benefits of PV Generation Average Consumer Savings Assumptions

This example uses Climate Zone 3, residential data, nominal levelized $/kWh



Source: Energy and Environmental Economics, Inc.

Market-Segmented Savings

The market-segmented savings analysis calculates the avoided cost of electricity using the current rate structures of California's three largest investor-owned utilities: PG&E, SCE, and SDG&E. By using actual utility rate structures, the market-segmented analysis calculates the value of electricity generated by rooftop PV to different customer classes in California. As in the average consumer analysis, the authors assume a 25-year PV system lifetime. While the average consumer analysis calculates savings to the statewide average residential or commercial customer, the market-segmented savings analysis provides for a more disaggregated look at utility bill savings based on a typical residential or commercial building's annual electricity consumption. The research team's analysis focuses exclusively on single-family residential consumers and does not apply to multifamily residential buildings. The table below shows the primary utility retail rates used in the market-segmented analysis.

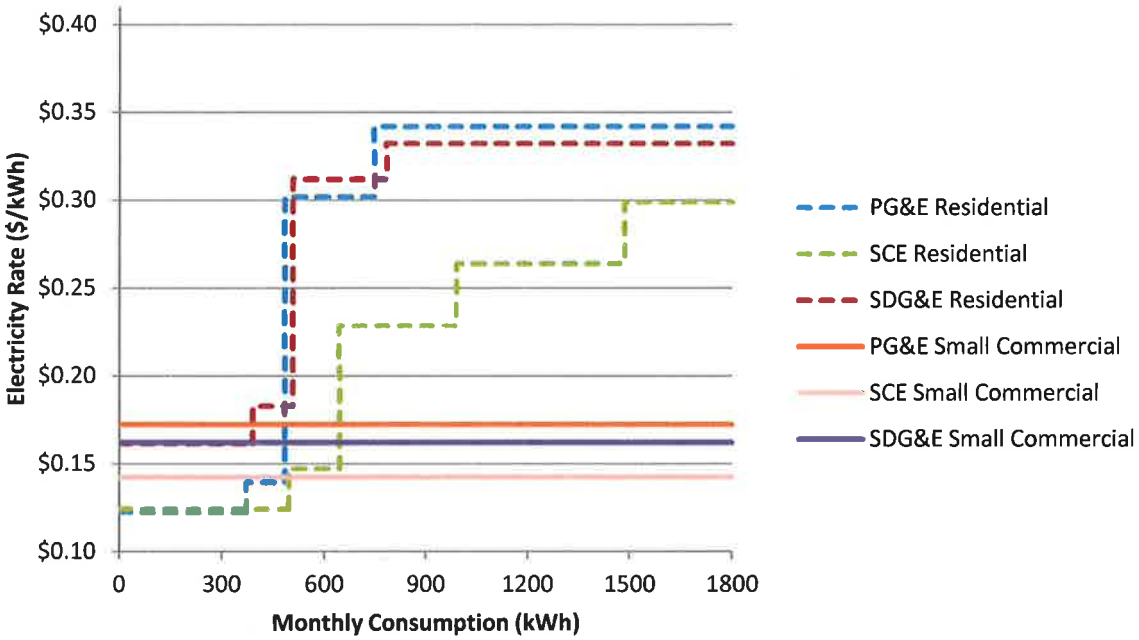
Table 7: Investor-Owned Utility Retail Rates Used in the Market-Segmented Analysis

	Residential	Small Commercial	Large Commercial
PG&E	E-1 (tiered)	A-1 (flat, seasonal)	A10S (time of use)
SCE	D (tiered)	GS-1 (flat, seasonal)	GS-2 (time of use)
SDG&E	DR (tiered)	A (flat, seasonal)	A6 (time of use)

Source: Energy and Environmental Economics, Inc.

Figure 10 illustrates the difference between the residential tiered rate structures that are common for residential customers in California and the small commercial rate structures. The chart does not include the large commercial rates, which are time-of-use (TOU) rates. These 2011 retail rates are assumed to escalate at the same annual rate as in the average consumer retail rate forecast.

Figure 10: 2011 Residential and Commercial Retail Rates ($/kWh, 2011)



Note: Baseline kWh allocation for Tier I rates varies by climate zone, not shown in figure above. Rates shown are for standard electric customers.

Source: Energy and Environmental Economics, Inc.

The market-segmented bill savings calculations are developed based on two hourly load shapes: (1) customer gross load without PV and (2) customer net load after PV is installed. The analysis applies billing determinants for each hourly load shape (including energy charges, demand charges, and other rate charges) and calculates monthly bills, including the effect of net metering rules in California. The process of calculating bills was performed using E3's bill calculation tool and summarized billing determinants developed as part of the analysis performed for the California Public Utilities Commission under the California Solar Initiative (CSI) cost-effectiveness evaluation[18].

Under California's NEM rules, any bill credits from excess PV production in one month are applied against the following month's bill. The authors also consider effects pursuant to Assembly Bill 920 (Huffman, Chapter 376, Statutes of 2009), under which customers receive compensation for any net-surplus energy carryover at the end of the 12-month billing period. A more detailed discussion of NEM effects may be found in the CPUC's NEM cost-effectiveness

18 See note 12

report.[19] The table below summarizes the key input assumptions applied in the market-segmented analysis.

Table 8: Market-Segmented Savings: Electricity Input Assumptions

Input	Description
Overview of Scenario:	*Market-Segmented analysis reflects the expected bill savings resulting from installing PV on a typical residential or commercial building in investor-owned utility service territories.*
PV system lifetime	25 years, based on duration of industry-standard PV module warranty.
Retail rates used	Uses 2011 residential and commercial rates for PG&E (E-1, A-1, A10S), SCE (D, GS-1, GS-2) and SDG&E (DR, A, A6)
Retail rate escalation	Retail rate escalated at a rate consistent with the E3/CARB 33% RES Calculator impacts: real rate of 2.1%/yr for 2011 – 2020. Beyond 2020, rates are escalated at real rate of 1.4%/year, the rate of the "natural gas only" build-out case from the E3/CARB 33% RES Calculator tool.
Bill savings calculation	Bill calculations performed in E3 tool developed for California Public Utilities Commission under the NEM Cost-Effectiveness Evaluation. Uses two hourly load shapes: (1) customer gross load in the absence of PV and (2) customer net load after PV is installed.
CO_2 price policy	Assumes that a CO_2 pricing policy will not further increase rates beyond the retail rate assumptions above (i.e. future CO_2 value is used to offset any impacts to residential retail rates).
Electricity market price shape	Not applicable. Retail rate structures are used.
Other policies (AB 32 Scoping Plan, Once-through cooling regulations)	Assumes statewide energy efficiency, rooftop PV and combined heat and power generation by 2020 are consistent with the AB 32 Scoping Plan goals and state compliance with proposed regulations on once-through cooling of coastal thermal power plants.

19 Energy and Environmental Economics, Inc.. January 2010. *Net-Energy Metering (NEM) Cost-Effectiveness Evaluation.*, Available at: http://www.ethree.com/documents/CSI/Final_NEM-C-E_Evaluation_with_CPUC_Intro.pdf.

Input	Description
Real discount rate	Residential: 3.43%, reflective of a low interest rate mortgage-style cost of borrowing Nonresidential: 6.13%, reflective of the commercial cost of borrowing

CHAPTER 3:
Results

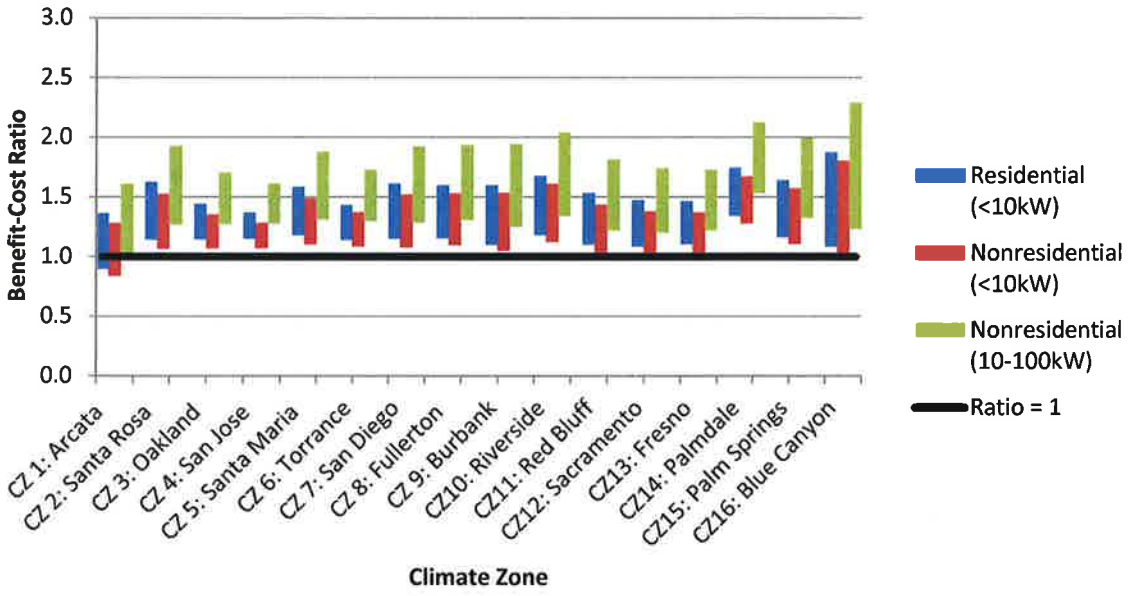
The cost-effectiveness of rooftop PV for newly constructed buildings is forecasted for 2014, 2017, and 2020. Cost-effectiveness results are shown using both Scenario 1 and Scenario 2 capital cost and solar capacity factor assumptions for both the average consumer analysis and the market-segmented analysis.

Average Consumer Results

The benefit-cost ratio is a way to summarize the results of the cost-effectiveness analysis and is calculated by dividing the benefits (levelized bill savings) by the cost (levelized cost of solar electricity). If the value of the benefit-cost ratio is greater than one with a reasonable level of certainty, then PV is determined to be cost-effective.

Figure 11 below shows the benefit-cost ratio for PV using the average consumer analysis for 2014. The bottom of the bars represents the results for Scenario 1 (higher cost solar); the top of the bars represents the results for Scenario 2 (lower cost solar). As can be seen, solar is generally cost-effective for both scenarios for residential customers and nonresidential customers installing systems with capacity between 10-100 kW. The notable exception to these results is Climate Zone 1, where the relatively weak solar resource means that PV is not cost-effective for any customers under Scenario 1. For nonresidential customers with system capacity below 10 kW, PV is cost-effective under Scenario 2 but is generally not cost-effective under Scenario 1. This is because the benefits of solar are smaller for nonresidential customers who pay lower average electricity rates, and the cost of solar installations smaller than 10 kW is higher per kW than the cost of larger systems.

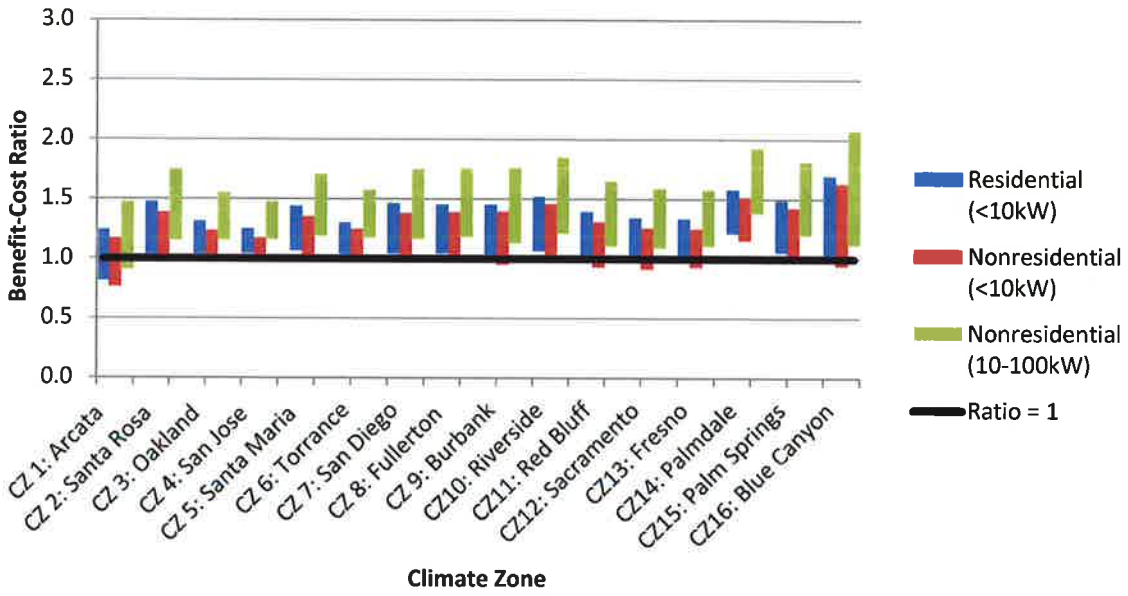
Figure 11: Average Consumer Cost-Effectiveness Results, 2014



Source: Energy and Environmental Economics, Inc.

Forecasting PV costs farther into the future, 2017 is expected to be the first year in which the federal investment tax credit (ITC) for PV will decrease from 30 percent to 10 percent. This means that while the capital costs of solar are expected to fall over time, the overall cost-effectiveness of PV declines slightly in 2017.

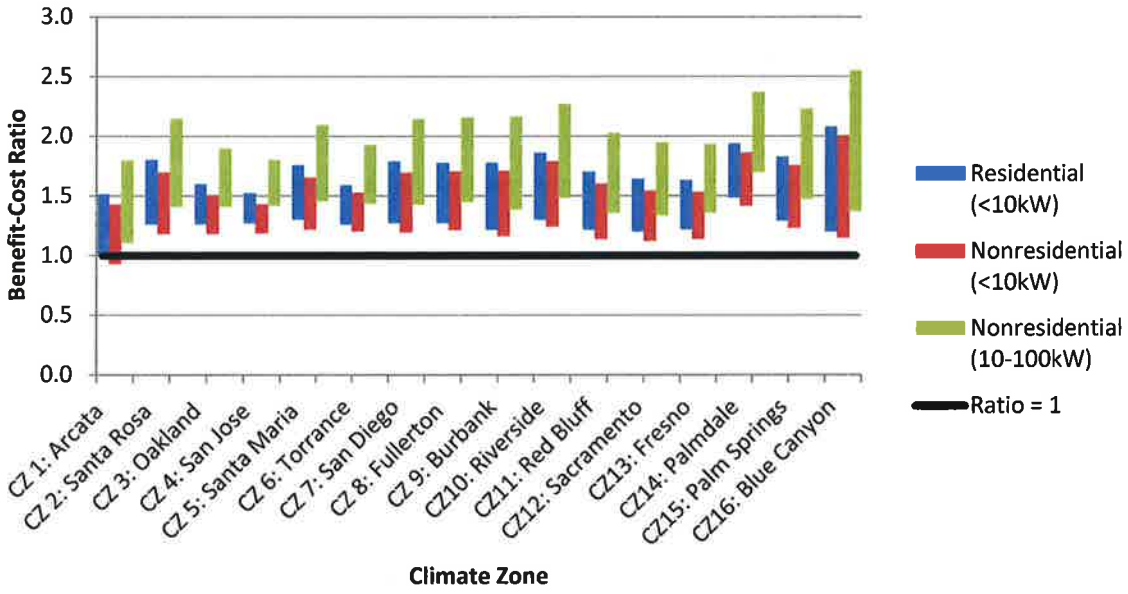
Figure 12: Average Consumer Cost-Effectiveness Results, 2017



Source: Energy and Environmental Economics, Inc.

By 2020, PV is expected to be more cost-effective than in 2014 due largely to the expected decrease in the installed capital cost of solar through continued technology development and learning. However, the lower ITC in 2020, at 10 percent, also reduces the cost-effectiveness of solar. Overall, by 2020, PV is expected to be cost-effective under Scenario 1 assumptions in all climate zones except for Climate Zone 1. Under Scenario 2 assumptions, PV is expected to be solidly cost-effective by 2020 in all climate zones.

Figure 13: Average Consumer Cost-Effectiveness Results, 2020



Source: Energy and Environmental Economics, Inc.

The results for 2020 are summarized in Table 9 below.

Table 9: Summary of Average Consumer Analysis Results, 2020

	Scenario 1: More expensive solar	Scenario 2: Less expensive solar
Residential *(<10 kW solar system)*	**Sometimes.** Solar is cost-effective in all climate zones except CZ1.	**Yes.** Solar is cost-effective in all climate zones.
Small commercial *(<10 kW solar system)*	**Sometimes.** Solar is cost-effective in all climate zones except CZ1.	**Yes.** Solar is cost-effective in all climate zones.
Large commercial *(10 – 100 kW solar system)*	**Yes.** Solar is cost-effective in all climate zones.	**Yes.** Solar is cost-effective in all climate zones.

Source: Energy and Environmental Economics, Inc.

Market-Segmented Results

The market-segmented analysis results vary between large and small residential and commercial customers because electricity rate structures are different for these different customer classes. Furthermore, the market-segmented savings of a given residential customer

depends on how much electricity per month is consumed, due to the "inclining block" or tiered residential rate structure of most California utilities.

To select appropriate utility rates to use in the bill savings calculation in each climate zone, the authors assign each zone to one of California's three investor-owned utilities: PG&E, SCE, or SDG&E. The table below shows the assignment for each climate zone.

Table 10: Utility Assignment by Climate Zone

Climate Zone	Utility	Climate Zone	Utility
1: Arcata	PG&E	9. Burbank	SCE
2: Santa Rosa	PG&E	10. Riverside	SCE
3: Oakland	PG&E	11. Red Bluff	PG&E
4: San Jose	PG&E	12: Stockton	PG&E
5: Santa Maria	PG&E	13: Fresno	PG&E
6: Torrance	SCE	14: Palmdale	SCE
7: San Diego	SDG&E	15: Palm Springs	SCE
8: Fullerton	SCE	16: Blue Canyon	SCE

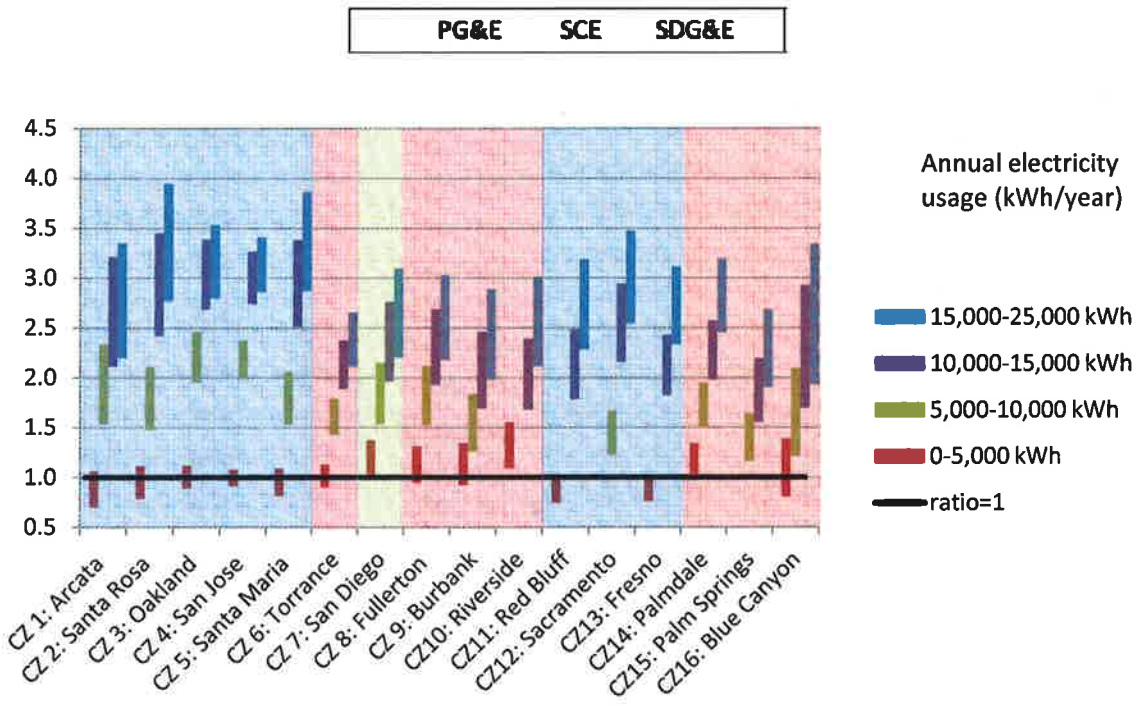
Source: Energy and Environmental Economics, Inc.

Residential Market-Segmented Results

The residential market-segmented cost-effectiveness results show dramatic differences based on a building's annual electricity consumption. This is due to California's utilities' tiered electricity rate structures. Tiered rate structures protect lower-income consumers and those who consume lesser amounts of electricity from higher electric rates. Tiered rates also make energy efficiency and rooftop PV more cost-effective for customers with higher electricity usage. The rates selected for this analysis represent single-family customers only. The results are not indicative of the cost-effectiveness of installing rooftop PV on multifamily residences.

In Figure 14 below, the benefit-cost ratios of PV systems are shown by climate zone and by a building's annual electricity consumption. A benefit-cost ratio above one determines that PV systems are cost-effective. As before, the bottom of the bars represents Scenario 1 (higher cost solar) assumptions and the top of the bars represents Scenario 2 (lower cost solar) assumptions.

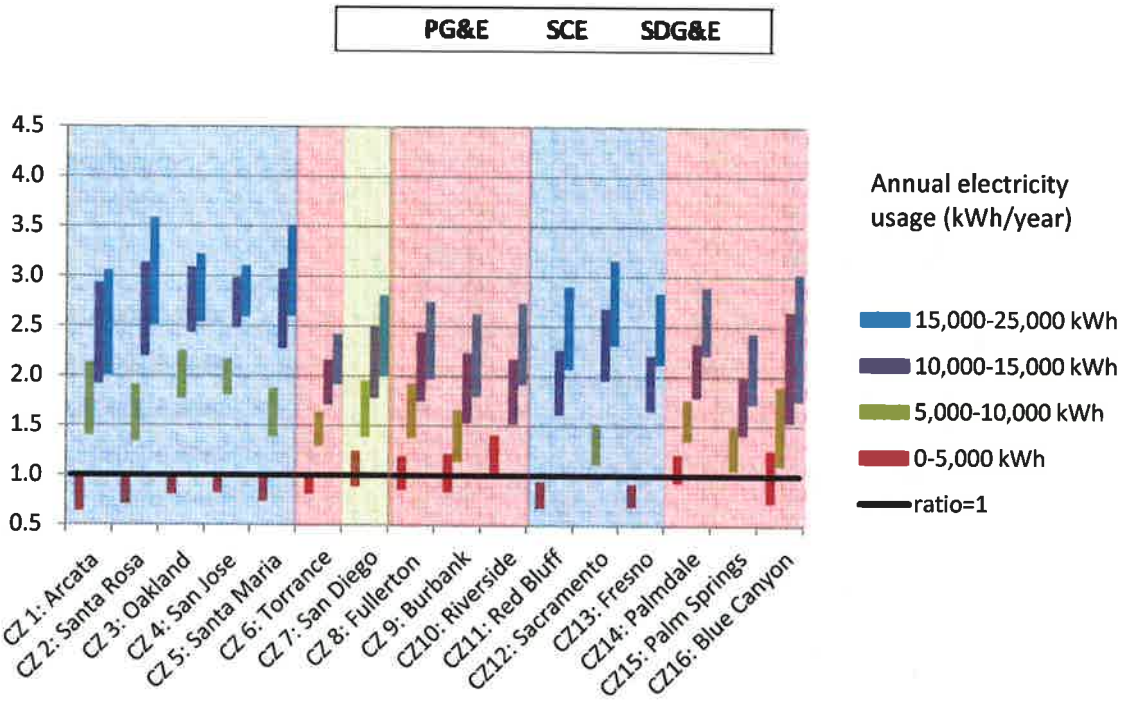
Figure 14: Residential Market-Segmented Results Based on a Building's Annual Electricity Consumption, 2014



Source: Energy and Environmental Economics, Inc.

PV is expected to be slightly less cost-effective in 2017 due to the reduction of the federal ITC at the end of 2016.

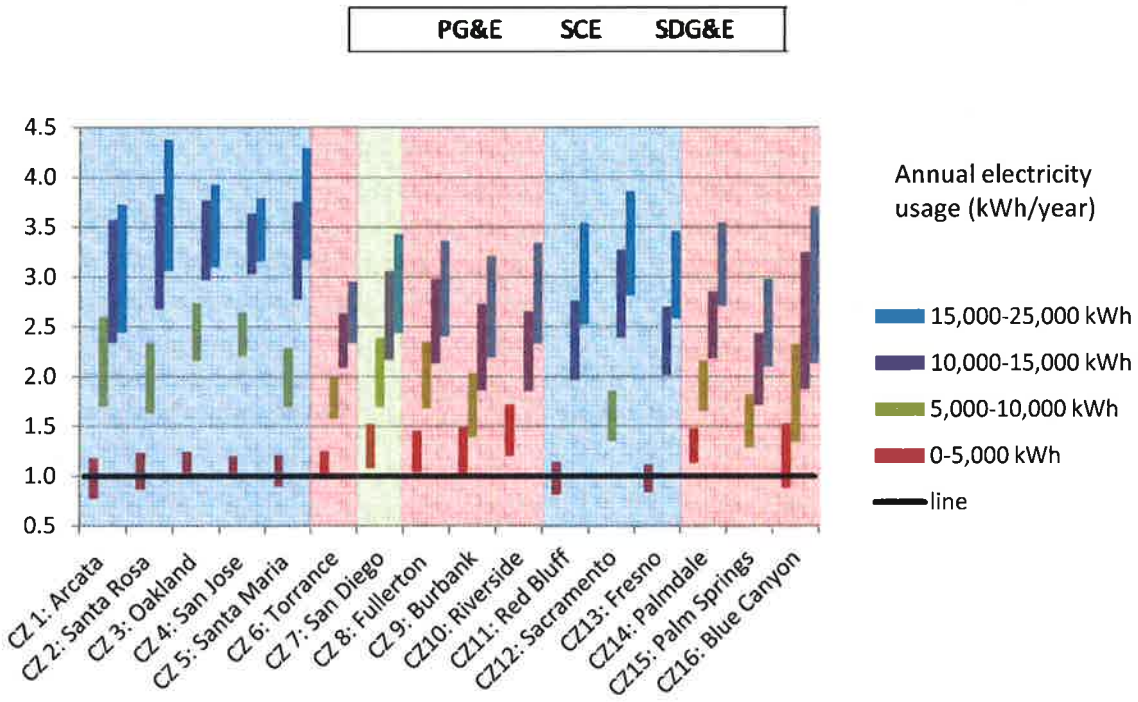
Figure 15: Residential Market-Segmented Results Based on a Building's Annual Electricity Consumption, 2017



Source: Energy and Environmental Economics, Inc.

By 2020, PV is expected to be slightly more cost-effective than in 2014, due to expected reductions in the capital cost of solar which counteract the reduction in the federal ITC.

Figure 16: Residential Market-Segmented Results Based on a Building's Annual Electricity Consumption, 2020



Source: Energy and Environmental Economics, Inc.

The cost-effectiveness results of the 2020 residential market-segmented analysis are summarized in the table below.

Table 11: Summary of Residential Market-Segmented Cost-Effectiveness Results, 2020

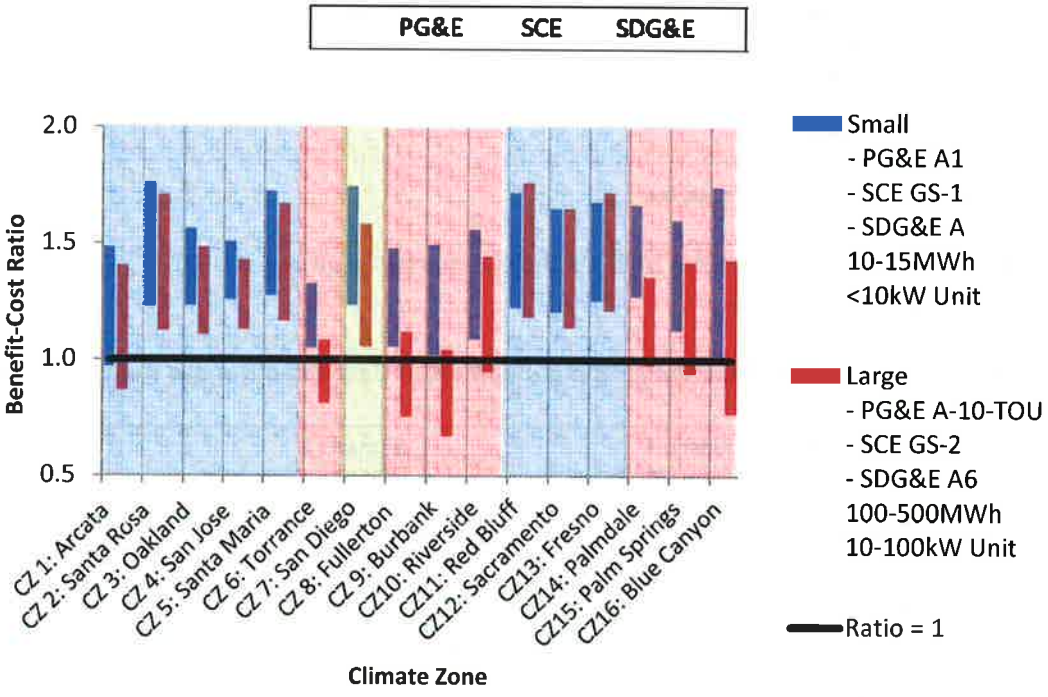
Customer class	Scenario 1 More expensive solar	Scenario 2 Less expensive solar
Residential, >5,000 kWh/year electric consumption	**Yes.** Cost-effective	**Yes.** Cost-effective
Residential, <5,000 kWh/year electricity consumption	**No.** Not cost-effective	**Yes.** Cost-effective

Source: Energy and Environmental Economics, Inc.

Commercial Market-Segmented Results

The commercial market-segmented results show that PV is expected to be less cost-effective as compared to installations on residential buildings. This is because, in California, commercial retail rates usually are lower than the upper tiers of residential rates. Commercial retail rate structures also vary more by utility than the residential rates do, making it difficult to generalize the cost-effectiveness results across climate zones. Figure 17 shows that solar is expected to be cost-effective for large commercial customers only under Scenario 2 (low-cost solar) and only in certain climate zones. The differences between climate zones are driven by both the natural solar resource and the applicable utility rate in that region. The results for climate zones in SCE's territory are notably less cost-effective, due to lower bill reductions driven by a combination of rate structure and rate levels for SCE's large commercial customers relative to the other utilities. For small commercial customers, Figure 17 shows that PV is cost-effective under Scenario 2 for all climate zones but is only cost-effective under Scenario 1 in a few climate zones.

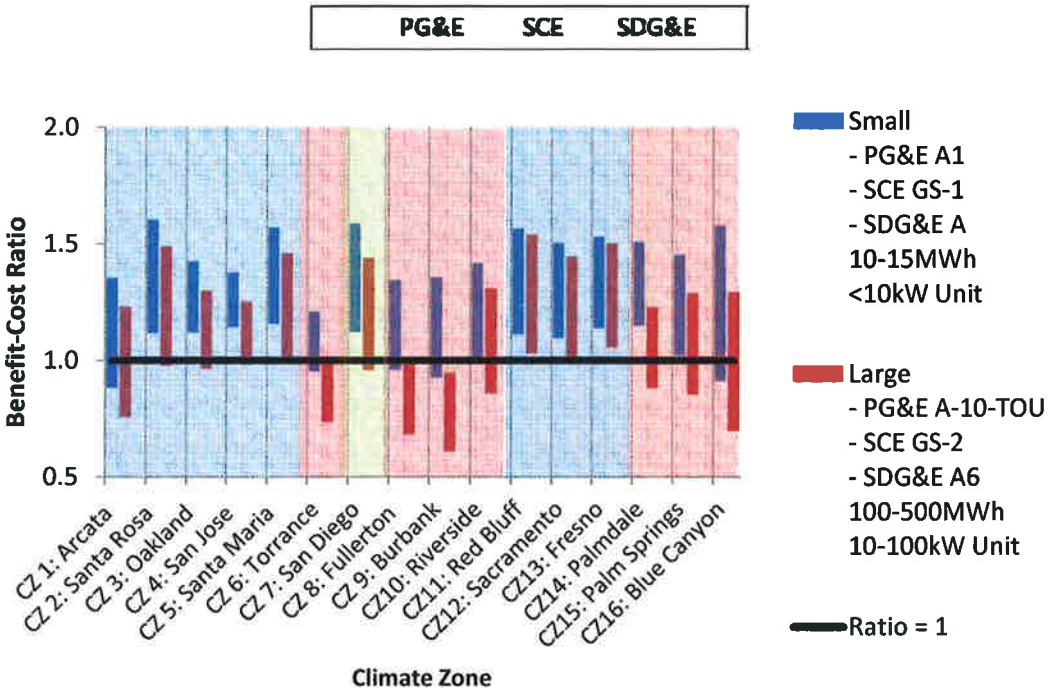
Figure 17: Commercial Market-Segmented Results, 2014



Source: Energy and Environmental Economics, Inc.

By 2017, PV is expected to be less cost-effective due to the reduction in the federal ITC in 2016.

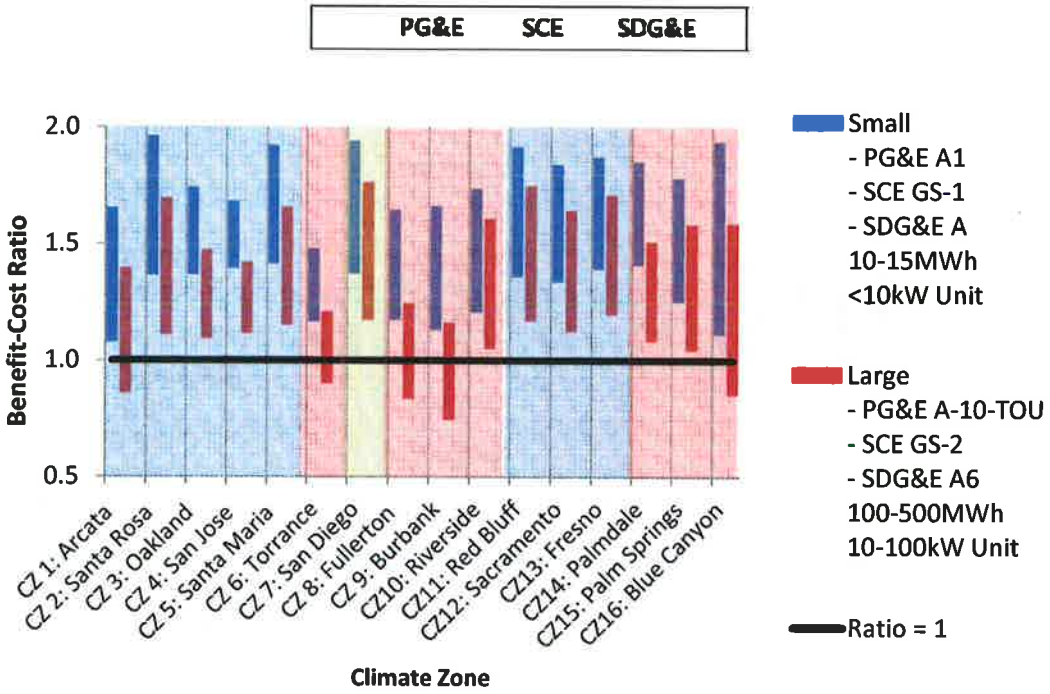
Figure 18: Commercial Market-Segmented Results, 2017



Source: Energy and Environmental Economics, Inc.

By 2020, PV is expected to be more cost-effective than in 2014 due to forecast reductions in the capital cost of rooftop PV for newly constructed buildings.

Figure 19: Commercial Market-Segmented Results, 2020



Source: Energy and Environmental Economics, Inc.

The cost-effectiveness results of the 2020 commercial market-segmented savings analysis are summarized in the table below.

Table 12: Summary of Commercial Market-Segmented Cost-Effectiveness Results, 2020

Customer class	Scenario 1 More expensive solar	Scenario 2 Less expensive solar
Medium to large commercial, 100 – 500 MWh/year	**Sometimes.** Solar is marginally cost-effective, depending on the utility service territory and climate zone.	**Yes.** Solar is cost-effective.
Small commercial, 10-15 MWh/year	**Yes.** Solar is cost-effective.	**Yes.** Solar is cost-effective.

Source: Energy and Environmental Economics, Inc.

CHAPTER 4:
Summary of Results

Evaluating the cost-effectiveness of PV is a complex task, involving multiple uncertain variables. The authors have applied what they consider to be the best publicly available, unbiased assumptions about the future costs of PV. The conclusions in this report are based, in part, on the following key assumptions, which have a strong influence on the cost-effectiveness results:

- Increase in retail electricity rates, at 2.11 percent per year through 2020 and at 1.46 percent per year thereafter, in real terms.
- In the market-segmented analysis, existing utility retail rate structures (TOU rates and tiered rates) are maintained.
- Rooftop PV installations in the building standards are assumed to ***not*** qualify for state CSI and NSHP incentives but do qualify for the federal ITC.

Other key input assumptions that have a greater effect on the long-term, 2017 and 2020, results include:

- Steadily falling capital costs for PV through 2020 due to industry economies of scale and the effect of "learning by doing" on installer costs.
- Current net-energy metering rules remain applicable to all new PV installations.
- Maintenance of the federal investment tax credit for PV at 30 percent through 2016 and at 10 percent after 2016.

Any major changes to these assumptions could alter the cost-effectiveness of PV. The market-segmented results are especially sensitive to the structure of California utility rates and NEM rules, since they use utility bill savings to determine PV benefits and customer bill savings are very sensitive to rate structure under existing NEM policy. If the structure of utility rates is changed, for example by reducing energy-based charges and increasing demand-based and/or service charges, utility bill savings achieved installing PV could drop significantly. Similarly, if NEM were replaced with a different policy, for example, a flat compensation rate per kWh of distributed generation, the cost-effectiveness of solar may decrease. In this report's cost-effectiveness projections, the research team assumes that utility rates and the NEM program will not change other than the overall forecasted rate level increase.

Given the key assumptions above, the cost-effectiveness results for each of the two analysis approaches are shown in the following tables.

Average Consumer

Table 13 summarizes the results of the average consumer savings analysis for 2014, 2017 and 2020. The results are divided by PV cost scenario (lower cost or higher cost solar) and customer type (residential, small commercial, and large commercial).

Table 13: Average Consumer Savings Results

PV Cost Scenario	Consumer Type	2014	2017	2020
More expensive	Residential (<10 kW PV system)	Sometimes. Cost-effective in all climate zones except zone 1.	No. Not cost-effective in most climate zones.	Sometimes. Cost-effective in all climate zones except zone 1.
	Small commercial (<10 kW PV system)	Sometimes. Marginally cost-effective, depending on climate zone.	No. Not cost-effective in most climate zones.	Sometimes. Cost-effective in all climate zones except zone 1.
	Large commercial (10-100 kW PV system)	Sometimes. Cost-effective in all climate zones except zone 1.	Sometimes. Cost-effective in all climate zones except zone 1.	Yes. Cost-effective in all climate zones.
Less expensive	Residential (<10 kW PV system)	Yes. Cost-effective in all climate zones.	Yes. Cost-effective in all climate zones.	Yes. Cost-effective in all climate zones.
	Small commercial (<10 kW PV system)	Yes. Cost-effective in all climate zones.	Yes. Cost-effective in all climate zones.	Yes. Cost-effective in all climate zones.
	Large commercial (10-100 kW PV system)	Yes. Cost-effective in all climate zones.	Yes. Cost-effective in all climate zones.	Yes. Cost-effective in all climate zones.

Source: Energy and Environmental Economics, Inc.

In the "more expensive solar" scenario, average consumer savings results vary between the different sectors examined because the average retail rate is higher for residential than non-residential consumers, increasing the savings potential for residential consumers, while the cost of solar is less expensive per watt for commercial consumers who have adequate energy usage to install a system larger than 10 kW. In the "less expensive solar" scenario, PV is cost-effective for all customer types in 2020.

Market-Segmented

Residential

Table 14 shows the results of the residential market-segmented savings analysis for 2014, 2017, and 2020. The results are divided by PV cost scenario (lower cost or higher cost solar) and customer size (annual consumption less than 5,000 kWh, annual consumption greater than 5,000 kWh). These results are representative of single-family residential consumers only.

Table 14: Residential Market-Segmented Savings Results

PV Cost Scenario	Consumer Type	2014	2017	2020
More expensive Solar	Residential, <5,000 kWh/year electric consumption	No. Not cost-effective.	No. Not cost-effective.	No. Not cost-effective.
	Residential , >5,000 kWh/year electric consumption	Yes. Cost-effective.	Yes. Cost-effective.	Yes. Cost-effective.
Less expensive Solar	Residential, <5,000 kWh/year electric consumption	Sometimes. Marginally cost-effective.	Sometimes. Marginally cost-effective.	Yes. Cost-effective.
	Residential , >5,000 kWh/year electric consumption	Yes. Cost-effective.	Yes. Cost-effective.	Yes. Cost-effective.

Source: Energy and Environmental Economics, Inc.

The market-segmented results highlight the importance of rate structure in determining whether solar is cost-effective. The average consumer analysis projects that PV will be cost-effective for all residential customers in 2020, based on statewide average electricity rates. The market-segmented results show that with California's current tiered residential rates, a customer's annual energy consumption is an important consideration in measuring the cost-effectiveness of solar. This result is particularly relevant for new residential construction, where energy efficiency standards are likely to result in lower annual electricity usage before the addition of a PV installation.

Commercial

Table 15 shows the results of the commercial market-segmented savings analysis for 2014, 2017, and 2020. The results are arranged by PV cost scenario (lower cost or higher cost solar) and customer size (annual consumption 10,000-15,000 kWh, annual consumption greater than 100,000-500,000 kWh).

Table 15: Commercial Market-Segmented Savings Results

PV Cost Scenario	Consumer Type	2014	2017	2020
More Expensive Solar	Small commercial, 10,000-15,000 kWh/year electric consumption	Sometimes. Cost-effectiveness depends on climate zone and utility service territory.	Sometimes. Cost-effectiveness depends on climate zone and utility service territory.	Yes. Cost-effective.
	Large commercial, 100,000-500,000 kWh/year electric consumption	Sometimes. Cost-effectiveness depends on climate zone and utility service territory.	No. Not cost-effective.	Sometimes. Cost-effectiveness depends on climate zone and utility service territory.
Less Expensive Solar	Small commercial, 10,000-15,000 kWh/year electric consumption	Yes. Cost-effective.	Yes. Cost-effective.	Yes. Cost-effective.
	Large commercial, 100,000-500,000 kWh/year electric consumption	Yes. Cost-effective.	Sometimes. Cost-effectiveness depends on climate zone and utility service territory.	Yes. Cost-effective.

Source: Energy and Environmental Economics, Inc.

Comparing the average consumer and market-segmented results for the commercial sector also demonstrates the effect of utility rates on solar's cost-effectiveness. In the average consumer analysis, the benefit of solar is based on average retail rates for all commercial consumers statewide. As a result, solar looks more cost-effective for large commercial consumers, who can purchase larger PV systems at a lower cost per watt. In the market-segmented analysis, it becomes apparent that large commercial customers actually pay retail rates that are less conducive to solar cost-effectiveness than the rates paid by small commercial customers, so that solar is less cost-effective for large customers than small despite the lower cost to install PV.

ACRONYMS

Acronym	Definition
ACM	Alternative Calculation Method
ARB	California Air Resources Board
Energy Commission	California Energy Commission
CO_2	Carbon dioxide
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
DC	Direct current
GHG	Greenhouse gas
ITC	Investment tax credit
kW	Kilowatt
kWh	Kilowatt-hour
LADWP	Los Angeles Department of Water & Power
LCOE	Levelized cost of energy
NREL	National Renewable Energy Laboratory
NSHP	New Solar Homes Partnership
PG&E	Pacific Gas and Electric
PPA	Power purchase agreement
PV	Photovoltaic
RES	Renewable Electricity Standard
RPS	Renewables Portfolio Standard

Acronym	Definition
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
SMUD	Sacramento Municipal Utility District
TDV	Time dependent valuation
TOU	Time of use

COPY

Notice of Exemption

To: ____ Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

From: Planning Department
City of Lancaster
44933 North Fern Avenue
Lancaster, CA 93534

__X__ County Clerk
County of Los Angeles
Environmental Filings
12400 E. Imperial Hwy, Rm 2001
Norwalk, CA 90650

(Date received for filing)

Project Title: Mandatory Requirements for the Implementation of Solar Energy Systems

Project Location - General: City of Lancaster, County of Los Angeles, State of California

Project Location - Specific: City-wide

Project Description: Amend Lancaster Municipal Code Section 15.28.020 to adopt mandatory requirements for the implementation of solar energy systems, providing standards and procedures for builders of new dwelling units to install solar energy systems in an effort to achieve energy savings and greater usage of alternative energy.

Name of Public Agency Approving Project: City of Lancaster

Name of Person or Agency Carrying Out Project: City of Lancaster

Exempt Status: (*check one*)

	Ministerial (Sec. 21080(b)(1); 15268):
	Declared Emergency (Sec. 21080(b)(3); 15269(a)):
	Emergency Project (Sec. 21080(b)(4); 15269(b)(c)):
	Categorical Exemption. State type and section number:
	Statutory Exemptions. State type and section number:
X	Other: Sec. 15061(b)(3); 15308

Reasons why project is exempt: The proposed ordinance is intended to preserve and enhance the environment of the City of Lancaster and is not subject to the California Environmental Quality Act pursuant to Section 15061(b)(3) of the CEQA Guidelines, because there is no possibility that the ordinance may have a significant negative impact on the environment and is exempt from the requirements of CEQA pursuant to Section 15308 of the CEQA Guidelines, which exempts actions taken by regulatory agencies for the enhancement and protection of the environment.

Lead Agency
Contact Person: Chuen Ng **Area Code/Telephone:** (661) 723-6100

Chuen Ng — Associate Planner — October 23, 2013
Signature — Title — Date

Date received for filing at OPR:

Revised 2009

COPY

CITY OF LANCASTER
Planning Department
44933 North Fern Avenue
Lancaster, CA 93534
(661) 723-6100

October 31, 2013

LETTER OF TRANSMITTAL

TO: L.A. County Clerk
Environmental Filings
12400 E. Imperial Highway, Room 2001
Norwalk, California 90650

ATTENTION: Ms. L. Arterberry (562) 462-2057

SUBJECT: Notice of Exemption for Mandatory Requirements for the Implementation of Solar Energy Systems

REMARKS: Enclosed please find a check for $75.00 to file the enclosed Notice of Exemption for Mandatory Requirements for the Implementation of Solar Energy Systems in the City of Lancaster, California.

Pursuant to Sections 21092.3 and 21152 of the Public Resources Code, please post this notice within 24 hours of receipt.

We are submitting one original notice; please return the copy for our files indicating the document filed date. A self-addressed stamped envelope is enclosed for your convenience.

Sincerely,

Marion Coleman
Secretary II

Enclosures