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California Energy Commission

COMMISSION REPORT

Initial Study/Proposed Negative Declaration for the 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings

California Energy Commission

Edmund G. Brown Jr., Governor

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California Energy Commission

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ABSTRACT

Public Resources Code Sections 25402 was enacted in 1974 as part of the enabling legislation establishing the California Energy Commission and its basic mandates. The statute requires the Energy Commission to adopt, implement, and periodically update energy efficiency standards for both residential and nonresidential buildings to ensure that building construction, system design, and installation achieve energy efficiency and preserve outdoor and indoor environmental quality. The Commission first adopted building standards in 1975. The most recent version was adopted in 2015 and became effective in 2017.

The *Building Energy Efficiency Standards* are aimed at the building components that affect energy use in newly constructed residential and nonresidential buildings, and additions and alterations to existing buildings, including lighting, water heating, and space conditioning systems, process energy occurring in the building, and the building envelope. The standards are fundamentally performance standards requiring buildings to meet specified energy budgets while providing flexibility in selecting the features to meet those energy budgets. The standards also include prescriptive alternatives to the performance standards, as well as mandatory requirements. Compliance with the standards must be demonstrated to the local enforcement agency, a city or county building department or a state agency that has responsibility for assuring compliance with building codes, before a Certificate of Occupancy is issued.

The building standards cover both the construction of new buildings as well as major modifications of existing buildings. They must be cost-effective, based on the life cycle of the building, must include performance and prescriptive compliance approaches, and must be periodically updated to account for technological improvements in efficiency technology. The bulk of the standards (codified in portions of Part 1, Chapter 10, and as Part 6, of Title 24 of the California Code of Regulations) establish a minimum level of building energy efficiency for various types of buildings (e.g., one- or two-story houses, large hotels, commercial office buildings etc.); the standards vary somewhat depending on where, in one of 16 “climate zones” within the state, a building is be constructed. (A building may be designed to a higher efficiency level than required by these standards, resulting in additional energy savings.)

The 2019 Energy Standards focus on three key areas: residential photovoltaic systems, residential and nonresidential ventilation requirements, and nonresidential lighting requirements. In addition, the proposed standards examine several more targeted topics, and include an overall effort to improve clarity and consistency, correct errors, streamline requirements, and make adjustments to provisions in the regulations that were found to have unanticipated impacts.

Energy Commission staff estimates that the implementation of the *2019 Building Energy Efficiency Standards* will reduce statewide annual electricity consumption by about 653 gigawatt-hours per year, and natural gas consumption by 9.8 million therms per year. In addition, there will be a net reduction in the emissions of nitrous oxide by roughly 225,000 pounds per year, sulfur oxides by 590 pounds per year, carbon monoxide by 61,000 pounds per year, and particulate matter by 7,400 pounds per year. Lastly, the standards will reduce statewide greenhouse gas emissions by an amount equivalent in effect to 493 million pounds of carbon dioxide (CO_{2e}) annually.

In addition to air emissions, the Energy Commission also analyzed the potential effects of the proposed building standards revisions on water use (both onsite in new construction and at California power

plants), indoor air pollution, and changes in materials use (including the use of mercury, lead, copper, steel, plastic silicon, gold, aluminum, fiberglass, glass, and wood).

The Energy Commission has found in performing this Initial Study that there is no substantial evidence, in light of the whole record, that the proposed revisions may have a significant adverse effect on the environment.

Keywords: California Energy Commission, California *Building Energy Efficiency Standards*, Title 24, Part 6, *2019 Building Energy Efficiency Standards*, negative declaration, residential, nonresidential, newly constructed, additions and alterations to existing buildings, mandatory, prescriptive, performance, solar, photovoltaic, windows, envelope, insulation, HVAC, building commissioning, process load, commercial refrigeration, data center, kitchen exhaust, dock seal, compressed air, acceptance testing, data collection, cool roof, cooling tower, standards, onsite renewable electricity generation, demand management, gigawatt hours, mega-watt, therms per year, nitrous oxides, sulfur oxides, carbon monoxide, carbon dioxide equivalent, NOx, SOx, CO, PM2.5, CO2e, mercury, lead, copper, steel, plastic, silicon, gold, aluminum, fiber glass, glass, wood, time dependent valuation, TDV

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EXECUTIVE SUMMARY

The California Legislature enacted California Public Resources Code Section 25402 in 1974, establishing the California Energy Commission and its basic mandates. The legislation requires the Energy Commission to adopt, implement, and periodically update energy efficiency standards for both residential and nonresidential buildings.

The *Building Energy Efficiency Standards* (Energy Standards), adopted in 1976, have been updated periodically as directed by statute. In 1975, the Department of Housing and Community Development adopted initial insulation standards, under its State Housing Law authority, that were a precursor to the first generation of the Energy Standards. The Warren-Alquist Act was passed that year with explicit direction to the Energy Commission to adopt and implement the Energy Standards. The Energy Commission's statute granted consolidated energy authority and provided specific direction to the Commission regarding what the Energy Standards are to address, what criteria are to be met in developing these standards, and what implementation tools, aids, and technical assistance are to be provided. The Energy Standards contain energy efficiency requirements for newly constructed buildings, additions to existing buildings, alterations to existing buildings, and, in the case of nonresidential buildings, repairs to existing buildings. The Energy Standards have contained requirements for alterations to existing nonresidential and residential buildings since 1977.

The statute stressed the importance of building design and construction flexibility by requiring the Energy Commission to establish performance standards, in the form of an "energy budget" of the energy consumption per square foot of floor space, and to support the performance standards with compliance software to perform the necessary energy calculations. The Commission establishes specific requirements for input, output, and calculation uniformity, enabling private firms to develop compliance software to be approved by the Commission, as long as the software programs meet the specific requirements in the *Alternative Calculation Method (ACM) Approval Manuals* adopted by regulation in support of the standards. The Commission also provides reference appendices that contain data and other reference information for compliance with the standards.

The Energy Standards addresses the building components that affect energy use in newly constructed residential and nonresidential buildings and additions and alterations to existing buildings, including envelope, lighting, water heating, and space-conditioning systems, and industrial or commercial process energy use occurring in the building. The Energy Standards are fundamentally performance standards requiring buildings to meet specified energy budgets while providing flexibility in selecting the features to meet those energy budgets. The standards also include prescriptive alternatives to the performance standards, as well as mandatory requirements. Compliance with the Energy Standards must be demonstrated to the local enforcement agency, a city or county building department, or a state agency that has responsibility for assuring compliance with building codes before a certificate of occupancy is issued.

The Energy Standards include a basic set of mandatory requirements that apply in all cases. In addition to the mandatory requirements, the performance standards establish energy budgets that depend on climate zone and building type, providing high levels of flexibility for compliance. As an alternative to the performance standards, there are prescriptive requirements that are a "checklist" compliance approach that offers simplicity but less flexibility.

The Energy Commission estimates that the implementation of the *2019 Building Energy Efficiency Standards* (2019 Energy Standards) will reduce statewide annual electricity consumption by about 653 gigawatt-hours per year and natural gas consumption by 9.8 million therms per year. In addition, there will be a net reduction in the emissions of nitrous oxide by roughly 225,000 pounds per year, sulfur oxides by 590 pounds per year, carbon monoxide by 61,000 pounds per year, and particulate matter by 7,400 pounds per year. Lastly, the standards will reduce statewide greenhouse gas emissions by an amount equivalent in effect to 493 million pounds of carbon dioxide (CO_{2e}) annually.

In addition to air emissions, the Energy Commission also analyzed the potential effects of the proposed 2019 Standards revisions on water use (both in new construction and at California power plants), indoor air pollution, and changes in materials use (including the use of mercury, lead, copper, steel, plastic silicon, gold, aluminum, fiberglass, glass, and wood).

The Energy Commission has found in performing this initial study, there is no substantial evidence that the proposed revisions may have a significant adverse effect on the environment.

Summary of Proposed Changes

The 2019 Energy Standards updates are also intended to improve the clarity and organization of these performance-based advanced energy efficiency standards. More detailed information on the proposed changes can be found in Chapter 4.

Environmental Impacts

Potential Increase in Material Uses Is Less Than Significant

Implementing the proposed changes to the Energy Standards may cause increases in material uses. Such material uses include additional electronic equipment, lighting fixtures, heating and air-conditioning equipment, insulation, water-heating equipment, plumbing and wiring, and other building and equipment elements. The Energy Commission has evaluated the proposed changes to the Energy Standards for potential for environmental impacts. The Commission evaluated the proposed 2019 measures for potential increases in material uses for each of the following materials: mercury, lead, copper, steel, plastic, silicon, gold, aluminum, fiberglass, glass, and wood. In doing so, four measures were identified as having potential materials impacts: solar photovoltaic systems that include quantities of glass and silicon, as well as copper wire; efficient cooling towers that use additional steel; insulation measures that may be met by using higher-density fiberglass; and dock seals that use rubber, plastic, or vinyl.

The Energy Commission estimates that the contribution of each energy efficiency measure to the potential increases in material use is a small fraction of the material use in the current market and does not significantly affect the design or construction of the building into which the additional materials are incorporated. In each case, the Commission determined that the existing regulations governing the production, processing, handling, transportation, storage, use, and disposal are adequate to protect the public health and to restrict the potential environmental impacts such that they are less than significant.

Reduction of Water Consumption

Implementing the proposed changes to the Energy Standards is expected to decrease statewide water consumption. These savings come from California power plants because of the overall reduction in electric power demand from the proposed energy efficiency improvements. The Energy Commission estimates that there will be an overall decrease of about 246 million gallons (roughly 755 acre-feet) per year of water

consumption from implementing the proposed changes to the Energy Standards, compared to the "no project" alternative.

Impact to Indoor Air Quality Is Less Than Significant

The Energy Commission is proposing adoption of American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) residential and nonresidential ventilation requirements (ASHRAE Std. 62.1 and 62.2), with modifications that retain current Title 24, Part 6, ventilation requirements, which generally provide higher ventilation rates. It is the opinion of the Commission that there are no potential impacts to the degradation of indoor air quality because of the implementation of these proposed changes.

The Energy Commission also proposes increased filtration requirements for the first air filter(s) installed in central ventilation systems (including residential HVAC systems) to guarantee the ability of the system to accommodate higher-rated air filters. While increased capture of particulate pollutants directly benefits indoor air quality, because the building standards cannot, as a matter of scope, place requirements on future replacement air filters, and because air filters are subject to routine replacement, adopting the proposed regulations apply , at most, only to the life of the initial filter, meaning that the resulting benefits attributable to the regulations are less than significant.

Energy and Emission Benefits

This initial study concludes that the 2019 Energy Standards will not have a significant negative effect on the environment. The initial study proposes no mitigation measures.

The implementation of the 2019 Energy Standards will reduce statewide annual electricity consumption by about 653 gigawatt-hours per year (GWh/yr) and natural gas consumption by 9.8 million therms per year. The potential effect of these energy savings to air quality are a net reduction in the emission of oxides of nitrogen (NO_x) by roughly 225,000 pounds per year, sulfur oxides by 590 pounds per year, carbon monoxide by 61,000 pounds per year, and particulate matter by 7,400 pounds per year. Last, the standards will reduce statewide greenhouse gas emissions by an amount equivalent to 493 million pounds of carbon dioxide (CO_{2e}) annually.

The values described above are the total estimated benefits from implementing the 2019 Energy Standards. The emission estimates associated with the reduction of natural gas use are expected to occur at each building location and are based on the emission factors for residential and commercial space heating and domestic hot water equipment.

On the other hand, the emission estimates associated with the reduction in electricity use (in terms of gigawatt-hours per year) are associated with generation throughout the western United States, western Canada, and Mexico, which is generally coordinated by the Western Electricity Coordinating Council (WECC). California imports about 20 to 40 percent of its electricity from out-of-state sources through the Western Interconnection (western regional electric grid) in any given hour. That electricity is generated by a combination of sources that may include nuclear, hydroelectric, natural gas, coal, and renewable energy power plants. The total estimated emissions reductions described above, including those associated with out-of-state generation, are expected to occur from implementing the 2019 Energy Standards.

The estimated reduction of greenhouse gas emissions, reported as CO_{2e} described above, includes the emission reductions of carbon dioxide (CO_2) as well as other associated greenhouse gas, such as nitrous oxide (N_2O), methane (CH_4), hydrofluoric carbons, halogen-alkenes, and sulfur hexafluoride.

Conclusions

The Energy Commission has analyzed the environmental impacts of the proposed 2019 Energy Standards for residential and nonresidential buildings. The Commission considered air emissions, water savings at California power plants, indoor air pollution, and increased materials use. The initial study concludes that the potential environmental impacts associated with implementing the 2019 Energy Standards are less than significant. A description of all potential impacts is included in this report. Therefore, a negative declaration for the 2019 Energy Standards should be adopted.

CHAPTER 1:
Project History, Description, and Environmental Setting

History and Summary of Basic Statutory Authority for the Energy Commission's Building Standards

In 1974, the California Legislature enacted statutes creating the California Energy Commission and requiring it to, among other things, adopt *Building Energy Efficiency Standards* (Energy Standards). (Statutes 1974, Chapter 276.) The standards must be cost-effective based on the life cycle of the building, must include performance and prescriptive compliance approaches and be periodically updated to account for technological improvements in efficiency technology (Public Resources Code § 25402). Accordingly, the Energy Commission has adopted and periodically updated the Energy Standards (codified in Title 24, portions of Part 1 and in Part 6, of the California Code of Regulations) to ensure that building construction, system design, and installation achieve energy efficiency and preserve outdoor and indoor environmental quality. The standards establish a minimum level of building energy efficiency. A building may be designed to a higher efficiency level, resulting in additional energy savings.

The Energy Standards address the building components that affect energy use in newly constructed residential and nonresidential buildings, and additions and alterations to existing buildings, including lighting, water heating, and space conditioning systems, process energy occurring in the building, and the building envelope. The Energy Standards are fundamentally performance standards requiring buildings to meet specified energy budgets while providing flexibility in selecting the features used to meet those energy budgets. The Energy Standards also include prescriptive alternatives to the performance standards, as well as mandatory requirements. Compliance with the standards must be demonstrated to local enforcement agencies, city or county building departments, or a state agency that has responsibility for assuring compliance with building codes, before a certificate of occupancy is issued.

The Energy Commission must amend the standards periodically to incorporate improvements in energy efficiency technologies, accounting for changes in the cost of fuels and energy-conserving strategies, improved building science research, and better understanding of California building energy performance. As is the case for the original standards, the amendments must be cost-effective. The Commission makes amendments in alignment with statutory direction that building codes be updated on a three-year cycle.

Additional Laws and Policies Affecting the Energy Standards

Public Resources Code Sections 25402 and 25402.1 were enacted in the 1970s as part of the enabling legislation establishing the Energy Commission and its basic mandates. These sections require the Commission to adopt, implement, and periodically update energy efficiency standards for both residential and nonresidential buildings. In addition, Public Resources Code Section 25910 directs the Commission to adopt standards for the minimum amount of additional insulation installed in existing buildings. Senate Bill (SB) 639 (Rosenthal, Chapter 1067, Statutes of 1993) added Section 25402.5, which expressly directs the Commission to consider new and replacement interior and exterior lighting devices when adopting

building standards. Senate Bill 5X (Sher, Chapter 7, Statutes of 2001) added subsection (c) to Section 25402.5 to clarify and expand the Commission's authority to adopt standards for outdoor lighting.

The Global Warming Solutions Act (Assembly Bill [AB] 32, Núñez, Chapter 488, Statutes of 2006) has been the foundation of California's efforts over the past five years to reduce greenhouse gas emissions (GHG). AB 32 requires that by 2020 the state reduce its GHG emissions to the level that existed in 1990. Improving the energy efficiency of existing residential and commercial buildings is the most important activity to reduce greenhouse gas emissions that result from electricity and natural gas use. The Energy Commission's *2017 Integrated Energy Policy Report (IEPR)*, California's biennial energy policy document, concludes that:

- Climate change is the most important environmental and economic challenge of this century.
- Greenhouse gas emissions are the largest contributors to climate change.
- California's ability to slow the rate of greenhouse gas emissions will depend first on energy efficiency.

Similarly, the California *Long Term Energy Efficiency Strategic Plan*[1] (2008), adopted by the California Public Utilities Commission (CPUC), identifies the importance of the Energy Commission's Energy Standards in reaching the state's goal of having new homes be "zero-net-energy" buildings by 2020 and of having commercial buildings attain "zero net energy" by 2030.

Governor Brown's Clean Energy Jobs Plan[2] (2010) combines existing state energy policy with economic recovery and growth goals by focusing on developing renewable energy and energy efficiency technologies and creating more than a half- million green jobs. In building efficiency, the Governor's plan calls for:

- Adopting stronger appliance standards for lighting, consumer electronics, and other products.
- Creating new efficiency standards for new buildings.
- Increasing public education and enforcement so that the gains promised by California's efficiency standards are realized.
- Adopting a plan for achieving "zero-net-energy" homes and businesses.
- Making existing buildings more efficient, especially the half of California homes that were built before the advent of modern building standards.
- Providing information to commercial investors and homebuyers by disclosing building energy consumption prior to building sale.

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) established California's 2030 greenhouse gas reduction target of 40 percent below 1990 levels. To achieve this goal, SB 350 set specific 2030 targets for energy efficiency and renewable electricity, among other actions aimed at reducing greenhouse gas emissions across the energy and transportation sectors. In particular, SB 350 requires the state to double statewide energy efficiency savings in electricity and natural gas end uses by 2030. (Senate Bill 32 [Pavley, Chapter 249, Statutes of 2016], followed by amending the California Global Warming Solutions Act of 2006 to establish a matching emissions limit in California's Cap and Trade Program.)

[1] Available at http://www.cpuc.ca.gov/General.aspx?id=4125

[2] Available at https://www.gov.ca.gov/wp-content/uploads/2017/09/Clean_Energy_Plan.pdf

Finally, the Energy Commission's *2017 IEPR* includes an energy efficiency chapter that emphasizes the energy policy goals for the state's residential and nonresidential buildings. It articulates how the Energy Standards, including the "reach standards" in Part 11, will be updated periodically to attain the aggressive levels of energy efficiency required to make energy-efficient buildings cost-effective for consumers.

Environmental Setting

The Energy Standards are a set of regulations that require energy-efficient designs, features, equipment, and practices in new construction occurring within California. As these regulations apply statewide, the environmental setting of this update to the Energy Standards is the entire state of California.

California consumes roughly 290,000 gigawatt-hours (GWh) of electricity annual basis,[3] and the primary sources of electricity generation remain the burning of natural gas and coal. In addition, natural gas is consumed on-site in buildings for space heating, water heating, and other uses such as cooking. About one-third of the energy consumed in California is consumed by buildings, either via consumption of electricity or burning of natural gas.

As California's population grows, every year hundreds of thousands of new buildings are constructed, added on to, or remodeled, adding onto this energy use. The Energy Commission's Forecasting unit estimates 117,000 new single-family homes and 48,000 new low-rise multifamily dwellings will be built in 2020, along with 176 million square feet of new nonresidential buildings.

The Energy Standards make buildings more efficient, resulting in reduced consumption of natural gas and electricity. These reductions, in turn, result in lower emissions from natural gas combustion at the building site and lower emissions from the generation of electricity that powers buildings.

The proposed project is a regular, triennial update to the Energy Standards. Updating the Energy Standards to require greater efficiencies will reduce the emissions of harmful air pollutants that threaten public health. Because the Energy Standards will reduce fuel consumption, they will also reduce greenhouse gas emissions that contribute directly to global warming. The Energy Standards also target the reduction of "peak" electricity use. Since "peak" electricity use relies heavily on generation from less efficient power plants, and peak periods coincide with hot, summer periods when air pollution is at its worst, reducing electricity peak loads will benefit air quality.

Proposed Project

The proposed project is a triennial update to the standards found within California's Building Standards Code. The proposed updates to the Energy Standards will ensure more efficient use of natural gas, electricity and water in newly constructed buildings, as well as in additions and alterations to existing buildings. These updates are described in Chapter 4.

Method

The potential environmental impacts of specific, proposed increases in the efficiency requirements of the Standards are analyzed and documented in the Codes and Standards Enhancement (CASE) reports submitted to the Energy Commission and available here: http://www.energy.ca.gov/title24/2019standards/.

3 http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html.

Staff has relied on these measure-based analyses in determining the potential environmental impacts of the proposed standards relating to materials use.

To determine the cumulative effect of the proposed standards on energy production, the Commission's public domain building modeling software[4] was used to model prototype buildings with a set of assumptions matching the 2016 Standards, then again with the proposed changes for the 2019 Standards, to estimate the expected natural gas and electricity savings. Annual time-dependent valuation (TDV) energy savings were derived by applying hourly multipliers (which depend on the hour of the day and season of the year and account for the energy used to generate, transmit, and distribute electricity and the energy used to distribute natural gas) to the expected natural gas and electricity savings, then summing these TDV energy values for all hours of the year. These values were then multiplied by the estimated amount of new construction within the State. More information can be found in the economic and fiscal impact statement (Form 399) prepared for this rulemaking.[5]

4 California Building Energy Code Compliance (CBECC) software for residential and commercial buildings (CBECC-Res and CBECC-Com). More information on this software is available at http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html.
5 Available at http://www.energy.ca.gov/title24/2019standards/.

CHAPTER 2:
List of Agencies That Will Use or Comment on This Initial Study

The California Energy Commission is the lead agency for this rulemaking. Following adoption by the Commission, the standards must be reviewed and approved by the California Building Standards Commission, which will have access to this initial study and all other documents related to the rulemaking. There will be no responsible agencies other than the California Building Standards Commission. The Commission will make the initial study, and all other documents in the proceeding, available to all potentially interested federal, state, and local agencies, and those agencies will be invited to comment.

CHAPTER 3:
List of Permits and Other Approvals Required to Implement the Project

No permits are applicable for this project. The Energy Commission and the California Building Standards Commission are the only agencies that must approve changes to the Energy Standards.

CHAPTER 4:
Descriptions of 2019 Proposed Changes to Building Energy Efficiency Standards

Overview

The 2019 Energy Standards focus on three key areas: residential photovoltaic systems, residential and nonresidential ventilation requirements, and nonresidential lighting requirements. In addition, the proposed standards examine several more targeted topics and include an effort to improve clarity and consistency, correct errors, streamline requirements, and make adjustments to provisions in the regulations that were found to have unanticipated impacts. The complete list of topics addressed by the proposed 2019 Energy Standards update, as excerpted from the notice of proposed action,[6] follows:

The proposed changes to the Energy Standards affecting residential construction are as follows:

- Adding new prescriptive requirements for installing solar photovoltaic systems in newly constructed residential buildings, and specifying use of an energy design rating in the performance approach to compliance to support solar photovoltaic requirements. In addition, Joint Appendices 11 and 12 have been added to support solar photovoltaic and battery storage systems installed to comply with Part 6.
- For ventilation:
    - References to ASHRAE 62.2 have been updated to incorporate the current version by reference. The current version moves high-rise multifamily buildings from 62.1 to 62.2, which is a significant change from prior versions.
    - Amendments to the current version of ASHRAE 62.2 are proposed as found to be appropriate to ensure efficiency and indoor air quality.
    - Increasing air filter filtration requirements to a Minimum Efficiency Reporting Value (MERV) of 13, necessary for filtering out the smallest category of potentially harmful particulates. This change includes requiring that certain return grills accommodate a 2" filter depth.
    - Extending air filtration requirements to apply to supply-only ventilation systems and the supply side of balanced ventilation systems.
    - Changes to multifamily ventilation include specifying that dwelling units may either use balanced ventilation or verify leakage rates with a blower door test.
    - Extending HERS requirements to include verifying HVI certification of kitchen range hoods.
    - Updating HERS procedures specified in the Residential Appendix where needed to support the changes in Part 6.

6 Available at http://www.energy.ca.gov/title24/2019standards/.

- For attics, increasing the prescriptive R-value for below roof deck insulation from R-13 to R-19.
- For walls, increasing prescriptive R-value requirements from R19 fill and R5 continuous insulation to R21 fill with R5 continuous insulation, reflecting an overall decrease in the performance U-factor for the assembly from 0.051 to 0.048.
- For fenestration:
    - Updating the definitions of "door" and "glazed door" to match National Fenestration Rating Council (NFRC) definitions. This lowers the threshold for a door to be considered a glazed door from 50 percent glazing to 25 percent glazing.
    - Updating the prescriptive U-factor for windows from 0.32 to 0.30, and updating the prescriptive solar heat gain coefficient (SHGC) required in Climate Zones 2 and 5-15 from 0.25 to 0.23.
    - Adding QII to the prescriptive requirements for newly constructed buildings.
- For lighting, JA8 has been revised to align testing requirements with current federal, state, and ENERGY STAR® test procedures. In addition, path lights, step lights, and lighting inside drawers, cabinetry, and closets other than walk-in closets have new options for compliance.
- For water heating:
    - The specifications for compact distribution have been revised.
    - New specifications for drain-water heat recovery have been added.
    - An option for prescriptive compliance using a heat pump water heater has been added.
- For furnaces, updating minimum fan efficacy requirements to 45 cfm[7] per watt.
- Adding addition and alteration requirements that are specific to creating Accessory Dwelling Units.

Nonresidential

The proposed changes to the nonresidential sections of the Energy Standards include prescriptive options reflecting updates to building technologies and best practices, and include:

- Extending the scope of Part 6 to healthcare facilities and incorporating several exceptions to ensure appropriate application of efficiency standards.
- For ventilation:
    - Updating references to ASHRAE 62.1 to incorporate the current version by reference.
    - Updating filtration requirements to a minimum MERV 13, necessary for filtering the smallest category of potentially harmful particulates.
    - Updating equipment efficiency requirements for cooling towers and adding new efficiency requirements for adiabatic condensers.

[7] Cubic Feet per Minute.

- Adding airflow requirements specific to small–duct, high-velocity (SHDV) systems. This resolves an issue of flow rates for standard ducting being applied to SHDV systems.

- For lighting:
  - Updating prescriptive indoor and outdoor lighting power allowance values to assume the use of LED lighting, and added new power adjustment factors for several daylighting devices.
  - Reducing wattage thresholds for exceptions to outdoor lighting controls to account for lower-wattage LED fixtures.
  - Updating the procedure for determining installed lighting power to allow the efficiency of installed lamps to be considered, and to create a more comprehensive framework for evaluating modular lighting (including track lighting).
  - Adding occupancy sensing requirements for restrooms.
  - Merging and standardizing the prescriptive alteration requirements for lighting controls and limiting the projects that can proceed without determining the square footage of the affected spaces.
- Adding requirements for laboratory fume hoods to use efficient fans and incorporate automatic sash closure.
- Updating requirements in several areas to maintain alignment with ASHRAE 90.1:
  - Fan system power requirements.
  - Equipment efficiency requirements.
  - Transfer air for exhaust air makeup.
  - Demand control ventilation requirements for classrooms.
  - Occupant sensor ventilation control requirements (with amended set points).
  - Waterside economizer requirements (with amended minimum efficiency requirements).

Energy Standards Cleanup

The proposed changes to the Energy Standards also include changes throughout the regulations to clarify, simplify, and streamline the existing language and requirements. The most significant of these changes are the following:

- Acceptance Test Training and Certification – The changes to Title 24 Part 1, Section 10-103.1 and10-103.2 add requirements for ATTCPs to disclose when an ATT or ATE is decertified, and to include in their application the conditions and procedures that applies to testers seeking to regain certification. Smaller changes have also been made to standardize the content of amendment applications and to adjust the on-site audit requirements that apply to mechanical ATTCPs.
- Lighting – Sections 130.0, 130.1, 130.2, and 150.0(k) have been rewritten for clarity, in addition to the changes noted previously. A new Section 130.1(f) has been added to clarify the expected interactions of the lighting controls required by Section 130.1.
- Alternative Calculation Method Approval Manual – The changes to the Alternative Calculation Method manual adopted as appendices to the Energy Standards permit the use of other simulation engines that produce results identical to the Energy Commission's CBECC software.
- Pipe Insulation – Requirements for pipe insulation have been harmonized with the Plumbing Code, an ambiguity regarding insulation of heat pump lines has been corrected, and the requirements for protecting insulation have been standardized between residential and nonresidential piping.
- Demand Responsive Controls – Requirements throughout Part 6 for demand responsive thermostats and lighting controls have been consolidated into one location in Part 6.
- Joint Appendix 1 – Definitions that are redundant with the definitions in Part 6 have been removed.
- Joint Appendix 2 – This appendix has been amended to allow use of GIS software tools in determining climate zone, and to move the zip code list into a document that can be updated between code revisions.
- Joint Appendix 5 – This appendix has been rewritten for clarity.
- Joint Appendix 7 – This appendix has been augmented to more clearly specify the requirements applicable to data registries and external data sources and to do so at a greater level of detail.
- Residential and Nonresidential Appendices – The sections relating to Third Party Quality Control Programs (TPQCPs) have been revised for clarity.

CHAPTER 5:
Estimated Environmental Impacts

The Energy Commission has evaluated the proposed changes to the Energy Standards for their potential for environmental impacts, as described in the Methodology section of Chapter 1.

While the Energy Standards relate to new construction, they do not cause new construction to occur within the state: the Energy Standards do not regulate where or when construction occurs, but rather apply to how new buildings and other types of new construction are designed and built. The environmental impacts of the proposed changes are thus limited to the anticipated benefits of reduced energy consumption, and any increase in material use necessary to comply with the updated Energy Standards.

Estimated Increased Materials Use

The Energy Standards establish a minimum level of technically feasible and cost-effective energy efficiency measures that are to be incorporated into new construction in California. Examples include mandatory requirements for minimum levels of insulation in exterior walls, for installation of energy-efficient lights and automatic lighting controls, for sealing of HVAC ducts, and for third-party verification of installation of certain building systems. In addition to mandatory requirements, the Energy Standards offer a prescriptive and a performance-based compliance path, allowing builders to either incorporate additional measures directly from a list of known, effective options or model the overall performance of their building designs. The performance option provides freedom to designers and builders, provided their building performs at or above the level achievable through the prescriptive options applicable to the building, and is used for the vast majority of new construction within California. Thus, it is important to understand that there is not a direct correlation between materials use and energy efficiency; there are many paths toward creating a more efficient building, some of which may use more materials, and some of which may use less.

The Energy Standards establish the minimum level of efficiency expected in new construction. Builders may, and often do, incorporate measures that go beyond these baseline requirements, as many efficiency-improving measures, such as light-emitting diode (LED) lighting, are desirable/marketable components of a modern building. Builders may also seek to achieve a specific status for the building, such as the Leadership in Energy and Environmental Design (LEED) certification, which includes requirements that go far beyond minimum code requirements. Thus, some percentage of buildings will be built at or above the levels being proposed for the updated Energy Standards, regardless of whether the Energy Standards are adopted, reducing (to a small extent) the impacts that can be attributed directly to the proposed update (in other words, that would not have occurred but for this project).

As the proposed updates to the Energy Standards build upon existing law, the impacts are limited to the marginal differences between existing and proposed efficiency standards. Only a few categories of proposed amendments would have any potential for causing a physical change in the environment due to increased use of materials in the construction of the building: residential solar photovoltaic requirements, residential insulation requirements, nonresidential cooling tower efficiency requirements, and nonresidential dock sealing requirements. The remaining amendments are either administrative or relate to features and performance targets that are independent of the size of the equipment or the amount of materials used for manufacturing or construction. In either case, they do not add new requirements to install additional or larger components that would represent additional materials costs, or require changes

in building design or construction practice that would cause a marginal physical change in the environment (compared to new construction complying with the existing code).

The increase in materials use anticipated for the proposed measures noted above is as follows:

- Solar PV – Complying with this measure involves installing a solar photovoltaic system of a prescriptive minimum size in all newly constructed low-rise residential buildings permitted on or after January 1, 2020. This includes installation of photovoltaic panels, inverters, and necessary wiring.
- Residential Envelope – Complying with this measure involves ensuring that buildings with 6-inch deep exterior walls possess improved thermal properties compared to buildings complying with the current Energy Standards. The prescriptive R-values resulting from the increased U-factor are equivalent to the use of moderate-performing batt insulation products sized for 2x6 construction (5½" thick R-20 products), and low-density (that is, open-cell) polyurethane spray foam insulation products filling a 5½" wall cavity.[8] The increase does not apply to 2x4 construction and is primarily to align the standard applicable to 2x6 construction to current industry-standard products and practices.
- Nonresidential Cooling Towers – Complying with this measure involves ensuring that cooling towers achieve efficiency targets; for cooling towers, efficiency improves as size increases. Minimally compliant cooling towers would, on average, require an additional 2,000 pounds of steel compared to the lowest efficiency cooling towers currently offered for sale and installation in California.[9]
- Nonresidential Dock Seals – Complying with this measure involves installing air seals (that is, weather stripping) for nonresidential dock-style doors (that is, roll-up doors) that are installed between conditioned and unconditioned spaces. This will require installation of a small amount of plastic, vinyl, and/or rubber for each door.

In addition to these measures, the scope of Part 6 is being increased to include I-occupancy buildings (such as healthcare facilities). Staff finds that common design practices for healthcare facilities, including adherence to model codes and the other parts of Title 24, creates buildings that already substantively comply with applicable Part 6 requirements. Inclusion in the scope of Part 6 is therefore expected to have a *de minimis* effect on the design and construction of such buildings, and no marginal physical changes in the environment compared to current practice.

Insulation

For residential buildings where 6-inch studs and fiberglass batt insulation are used, standard R-19 batt insulation is (by industry convention) 6¼" thick; compressing it into a 5½" wall cavity lowers the associated R-value by roughly 1 point (to an equivalent R-18), requiring installation of continuous insulation, use of thicker gypsum board or plywood, or other additional materials to comply with current R-19 insulation requirements. Industry standard 5½" thick batt products begin at R-20 and forego the need to install additional products or thicker wall materials to achieve either the current R-19 standard or the proposed standard. Thus, while the density (and therefore total mass) of the batt insulation will increase, where used, the increase in fiberglass will be accompanied by a decrease in other building

8 Presuming an R-value of 3.7 per inch of thickness.
9 From the CASE report.

materials, including wood, gypsum, and synthetic house wrap materials. In buildings where 5½" thick batt products were already being used as a match to the wall cavity depth, this increase in minimum prescriptive R-value would result in no change to either insulation installation practice or to the resulting building.

For buildings where 6-inch studs and spray foam insulation is used, a 1-point increase in R-value from R-19 is a 5 percent increase in application thickness, and, therefore, potentially a 5 percent increase in materials use given that spray foam R-value is linearly related to the thickness. However, current industry practice is to fill the wall cavity with spray foam, and a 5½" depth of low-density spray foam insulation already exceeds R-19 by at least 1 point.[10] Thus, in practice, the increase in minimum required amount is not anticipated to result in any physical change to spray foam insulation installation or in the resulting insulated building.

In both cases, the change in standard requires only that the existing wall cavity be filled using an appropriate insulation product. As this is already common practice, the increase in wall assembly U-factor and resultant insulation R-value does not cause a change in building design, industry practice, or the types of materials used. This update does not cause a physical change in the environment or a potential for a significant environmental impact.

Solar Photovoltaic Systems

Current standards require that newly constructed residential buildings be designed with a "solar-ready zone" that ensures an appropriate area of the roof of a building is available for installation of a photovoltaic system. Photovoltaic systems, in turn, are designed for installation onto existing buildings within the footprint of the existing roof of the building and make use of this solar-ready area after construction.

Because an area of the roof is already designed and reserved for this purpose, the new requirements to install a photovoltaic system as a part of the original construction of the building does not require redesign of the building nor increase the associated size or footprint compared to a building complying with existing standards. The marginal materials cost of the requirement is therefore limited to the solar photovoltaic equipment itself, meaning the panels, the inverter(s), and the wiring between the panels and inverter.

The specific minimum size of the system is based on the size of the building and number of dwellings and can vary between 2 and 7 kilowatts output per dwelling, which would require between 6 and 20 350 watt (W) panels. A typical solar panel is 65" by 39" and includes a glass layer, a silicon layer, and an aluminum frame or mount. Typical configurations also require an inverter to convert the direct current (DC) output of the panels to alternating current (AC) that is usable within the home, and copper wire of sufficient gauge to carry the panel output to the inverter. The typical lifespan for solar panels is 25-30 years, while a typical inverter lifespan is 15 years.[11]

Neither the materials nor the installation creates a marginal physical change in the environment (that is, beyond the construction of the building to which they are attached). They are installed within the existing footprint of the building and are composed of materials that are commonly found within residential buildings (aluminum, glass, copper wiring, electronics) or are nontoxic and inert (silicon). The inclusion of

10 Presuming an R-value of 3.7 per inch of thickness.
11 Jordan, Dirk C., et al. February 7, 2016. *Compendium of Photovoltaic Degradation Rates*. Available at http://onlinelibrary.wiley.com/doi/10.1002/pip.2744/full.

a solar photovoltaic system in a new low-rise residential building does not create a potential for a significant impact on the environment.

Cooling Towers

Increasing the size of a cooling tower increases both the weight in steel of the tower itself and the weight of the water pumped through the tower during operation. The total weight increase expected for using cooling towers compliant with the proposed standards is between 7,500 and 9,000 pounds, which is likely to require consideration in the structural design or configuration of the building and cost an additional $2,000 to accommodate. This is already included in the estimated increase in steel use stated in the CASE report. Because these changes can be accommodated in the building design without changing the footprint of the building and can be accommodated via incorporation of a small amount of additional structural steel, staff does not find that inclusion of this weight increase into a nonresidential building using a cooling tower creates a potential for a significant impact on the environment.

Dock Seals

The relatively small amount of material required to weatherize a rolling door combined with the limited number of such doors in a typical building and the common use of rubber, vinyl and plastic in buildings leads staff to conclude that the inclusion of dock seals in a nonresidential building does not represent a marginal physical change in the environment nor have the potential for a significant impact on the environment.

Savings in Water Consumption

Estimated Onsite Water Savings

The proposed changes are expected to result in modest but less-than-significant impacts to onsite water use in buildings. These savings are the result of hot water piping design requirements in residential buildings (that is, compact distribution) and updated efficiency requirements for waterside economizers in nonresidential buildings. The combined impact of these measures, as specified in the CASE reports, is expected to be a savings of 17 million gallons of water (or 52 acre-feet[12] of water) annually. (For context, annual urban water use is typically measured in millions of acre-feet.)

Estimated Statewide Power Plant Water Savings

Implementing the proposed changes to the Energy Standards will result in electricity saving of about 653 gigawatt-hours per year. These savings will result in water savings at power plants that use evaporative water-cooling as their main source of heat rejection to the environment. By using available power plant data for the electricity grid in the western United States to the predicted electricity savings, Energy Commission staff estimated the water savings at California power plants. Water savings of an amount commensurate with these electricity savings is expected to result from the proposed changes to the Energy Standards.

California Power Plant Water Consumption

Electricity generators in California submit data to the Energy Commission through the Quarterly Fuel and Energy Report data collections. These collections include electricity generation and water use (for

[12] An acre-foot is a volume equal to the volume of a sheet of water one acre (0.405 hectare) in area and one foot (30.48 cm) in depth, and is equal to 43,560 cubic feet (1233.5 cu m) of water.

electricity generation) at power plants. By using these data, the Commission estimates that modern combined-cycle power plants[13] use an average of 522 gallons of water per megawatt-hour (MWh) of electricity generation per year.[14, 15] This is the average (weighted by the electricity generation at each power plant) of all existing combined-cycle power plants greater than 20 MW in capacity within California.

Electricity generation in California is supplied by a complex system that requires a constant balance among electricity generators (power plants), delivery facilities, and energy consumers. This balance takes into consideration dispatch restrictions, the Renewables Portfolio Standard requirements, electricity generation imported from outside California and transmission and distribution losses. Thus, a megawatt-hour of electricity saved by the standards will not translate into a megawatt-hour of generation avoided strictly in California combined-cycle power plants. Considering this balance, the Energy Commission estimates that 377 gallons of water would be saved at power plants in California for each megawatt-hour of electricity saved through energy efficiency measures.

Estimated Statewide Power Plant Water Savings

The Energy Commission expects a savings of roughly 246 million gallons of water (755 acre-feet) per year from the electricity generation avoided at California power plants as a result of implementing the proposed changes, compared to the no-project alternative.

Indoor Air Quality

The Energy Commission is proposing adoption of ASHRAE residential and nonresidential ventilation requirements (ASHRAE Std. 62.1 and 62.2), with modifications that retain current Title 24, Part 6, ventilation requirements, which generally provide higher ventilation rates. It is the Commission's opinion that there are no potential impacts to the degradation of indoor air quality because of implementing these proposed changes.

The Energy Commission also proposes increased filtration requirements (in other words, MERV ratings) for the first air filter(s) installed in central ventilation systems (including residential HVAC systems) to guarantee the ability of the system to accommodate higher-rated air filters. The Commission is specifically proposing to increase the required MERV rating for air filters from 6 for residential and 8 for nonresidential to 13 in both residential and nonresidential buildings. This change would increase the capture rate of PM10 particulate pollutants suspended in air drawn through the filter from 35 percent to 90 percent and would begin capturing PM2.5 particulate pollutants at a rate of 85 percent. (An air filter with a MERV rating of 6 does not capture fine particulates.)

While the increased capture of PM10 and PM2.5 pollutants directly benefits indoor air quality, because the building standards cannot place requirements on future replacement air filters, and because air filters are subject to routine replacement, the adoption of the proposed regulations cannot be predicted to have benefits to indoor air quality or reductions to indoor particulate pollutants beyond, at most, the life of the

13 A combined-cycle power plant is a power plant that uses a primary mover that requires cooling to generate electricity, such as a combustion turbine, and a heat recovery system, such as a heat recovery steam generator, to use that rejected heat to create steam for a steam turbine. In other words, a combined-cycle power plant combines a combustion turbine and a steam turbine to produce electricity.

14 NREL Technical Report, *A Review of Operational Water Consumption and Withdrawal Factors for Electricity Generating Technologies*, March 2011. Available at https://www.nrel.gov/docs/fy11osti/50900.pdf.

15 California Energy Commission., "*Criteria Air Emissions and Water Use Factors for Gas and Electricity Efficiency Savings for the 2013 California Building Energy Efficiency Standards*" March 2012. Available at: http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/General/2013_Initial_Study_Air_and_Water_Emission_Factors.pdf.

initial filter. Attempting to do so would be speculative, as well as risk inappropriately attributing the voluntary actions of future building operators or tenants to a state action that does not apply to them. The indoor air quality benefits attributable to the regulations are, therefore, less than significant, owing to the limited duration of the initial air filters proposed to be required for newly constructed buildings.

CHAPTER 6:
Energy and Environmental Benefits

The Energy Commission evaluated each proposed change to the building energy efficiency standards for energy and environmental benefits. The following discusses the overall potential energy emission benefits of the proposed changes to the Energy Standards for each sector and specific measure that may not otherwise be characterized or is of special interest.

Energy Savings

Nonresidential, High-Rise Residential, and Hotels/Motels

The projected annual savings from the nonresidential sector, including high-rise residential and hotels and motels, under the proposed 2019 Energy Standards is about 4.9 million therms of natural gas and 622 GWh of electricity. The majority of the annual electricity savings, 486 GWh, are attributable to reductions in lighting power allowances, which apply to newly constructed buildings and additions and alterations to existing buildings.

Low-Rise Residential Buildings

The implementation of the proposed 2019 Energy Standards for low-rise residential buildings, including low-rise multifamily buildings, is expected to result in a reduction of electricity use of roughly 31.5 GWh and natural gas use of about 4.9 million therms.

Environmental Benefits

Electricity Generation

Reducing natural gas and electricity use is expected to result in emission reductions in buildings and at power plants in California and other western states. The estimated cumulative reductions in annual power plant emissions that would result from implementing the proposed 2019 Energy Standards, based on improvements in energy efficiency, are 130,000 pounds of NO_X and 373 million pounds of CO_{2e}. Reductions in power plant emissions of other criteria pollutants are estimated be negligible, per current eGRID calculations of California power plant emissions.[16.]

Installations of solar photovoltaic (PV) systems in new low-rise residential buildings are expected to offset demand for electricity from California's electricity grid and, therefore, use of natural gas in meeting that demand. Because output of solar PV systems is variable and may not occur coincident with electricity use within the building (which is also variable and depends on occupant behavior), the physical reduction in power plant natural gas use attributable to the installation of these systems includes several uncertainties. As such, while this requirement can be reasonably expected to reduce emissions by power plants by some amount, staff is conservatively not attributing a specific further reduction in power plant criteria pollutant or greenhouse gas emissions to this requirement.

16 The eGRID calculations of power plant emissions include the effects of mandatory CO, NO_x, and SO_x scrubbers and particulate capture systems that prevent pollutants generated during combustion from being emitted. For this reason, the 2019 Energy Standards are not estimated to have a physical effect on power plant emissions of CO, SO_x or particulate pollutants, and are estimated to have a smaller effect on NO_x emissions than would be calculated based solely on the efficient combustion of natural gas.

On-Site Natural Gas Consumption

The estimated cumulative reductions in emissions stemming from on-site natural gas use are based on U.S. EPA emissions factors[17] in pounds of pollutant per million standard cubic feet of natural gas fired. Where multiple emissions factors were available, the most conservative (in terms of least amount of emissions avoided) was selected, as follows:

Table 1 – Natural Gas Emissions Factors

NO_x (residential)	NO_x (nonresidential)	CO (residential)	CO (nonresidential)	SO_x (total)	PM (total)	CO_2 (total)
94	100	40	84	0.6	7.6	120,000

Using these emissions factors (and noting that one therm equals 100 cubic feet of natural gas) results in the following estimated cumulative emissions reductions, stated to two significant digits:

Table 2 – Natural Gas Emissions Totals

NO_x	CO	SO_x	PM	CO_2
95,000 pounds	61,000 pounds	590 pounds	7,400 pounds	120 million pounds

17 https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf.

CHAPTER 7:
Cumulative Effects

Materials

Photovoltaic Systems

The installation of solar photovoltaic systems is required for new low-rise residential buildings. The measure does not apply to nonresidential, high-rise residential, or hotel-motel buildings, nor does it apply to additions or alterations to existing buildings. California's low-rise residential building stock increases by roughly 2 percent per year, meaning that in any given year, roughly 98 percent of low-rise residential buildings are existing building stock. Solar installers market aggressively to this much larger existing building market. The Energy Commission forecasts that demand for solar panels for existing buildings is 6 to 10 times the demand that would potentially occur if solar panels were required on all newly constructed homes.[18] In addition, many new housing developments do and will include or offer solar photovoltaic systems for their new homes, meaning that some fraction of California's new home market will be equipped with solar photovoltaic systems even without the update to the Energy Standards. Conversely, several exceptions to the solar photovoltaic requirements are included within the proposed code. Thus, adoption of the proposed requirement would be expected to increase California demand for solar photovoltaic equipment by no more than 10-15 percent.

In addition to demand occurring within California, there is robust worldwide demand for solar photovoltaic systems that sustain a manufacturing level above the quantity demanded by California and the fraction of that demand attributable to the proposed standards. In the context of the global market for photovoltaic systems, California's total demand for solar photovoltaics is vastly outstripped by growth in demand from other parts of the globe: 76.6 GW of solar was installed and connected to the grid in 2016, nearly half of which (34.5 GW) was installed in China. In that same period, California installed roughly 5 GW of solar photovoltaics inclusive of all residential, commercial, and utility-scale installations. The Energy Commission anticipates demand for solar panels specifically for new home construction under the proposed Energy Standards at 200-400 MW annually, two to three orders of magnitude below the globally accelerating growth in demand from other sources.[19]

For these reasons, the requirements for installation of solar photovoltaic systems on all new low-rise residential buildings is expected to have a muted impact on the overall demand for the production of solar photovoltaic equipment. This impact does not rise to the level of creating a significant environmental impact based on the marginal increase in demand caused by the proposed standards.

18 *California Energy Demand 2016-2026, Revised Electricity Forecast, Volume I: Statewide Electricity Demand and Energy Efficiency*, California Energy Commission, January 2016, CEC-200-2016-001-V1. Available at https://efiling.energy.ca.gov/getdocument.aspx?tn=207439.
19 *Global Market Outlook for Solar Power / 2017 – 2021*, SolarPower Europe, 2017. Available at https://irishsolarenergy.org/news-docs/GMO_2017.pdf.

Insulation Materials

The increase in prescriptive R-value requirements is not anticipated to result in a cumulative impact on the environment as it is not anticipated to create cumulative marginal increases in demand for insulation products compared to current industry design and practice. For the fraction of homes that use 2x6 studs for exterior walls, industry practice is already to fill the wall cavity with appropriate insulation products or materials. Where R-19 batt insulation was previously used, additional materials to raise the R-value were already required to offset the one R-value loss of compressing the material into the wall cavity. In all other cases, the proposed new U-factor (and precalculated R-value) was already achieved via the use of products designed to fit or fill a 5½" thick wall cavity. As this is expected to rarely require any change in common practices for these buildings, staff does not find a cumulative effect arising from the updated requirement nor a risk of a cumulative impact on the environment.

Cooling Towers

The total annual increase in steel consumption due to the new cooling tower measure is estimated to be 169,000 pounds annually, which is found to be below a level of significance. For 2016, annual domestic steel production reached 80 million metric tons, and imports reached 30 million metric tons, per the U.S. Geological Survey, Mineral Commodity Summaries for 2017[20]. In this context, the addition of fewer than 100 tons of demand is a change of less than 0.000001 percent. Furthermore, some fraction of the buildings that select cooling towers already select highly efficient cooling towers that meet or exceed the proposed efficiency standard, further reducing the expected cumulative impact of this measure. Staff, therefore, finds that this increase in steel use is de minimis in aggregate and does not cause any cumulative physical change in the environment.

Dock Seals

The small amount of material required to weatherize a rolling door combined with the limited number of such doors and the large size of associated materials markets leads staff to conclude that the material impact on the demand for, and production of, rubber, vinyl, and plastic is de minimis in aggregate and does not cause any cumulative physical change in the environment.

Energy

The proposed changes were selected with full consideration of the life-cycle cost analysis requirement of the Warren-Alquist Act. In response to this mandate, the 2019 Energy Standards include measures that will "ensure the maximum feasible reductions in wasteful, uneconomic, inefficient, or unnecessary consumption of electricity" as required by the statute. Efficiency improvements in the 2019 Energy Standards will affect 117,000 new single-family homes, 48,000 new low-rise multifamily dwellings, and 176 million square feet of new nonresidential construction in the first year (2020).

The estimated cumulative energy savings of implementing the proposed 2019 Standards, as stated in the CASE reports for the proposed amendments to the Energy Standards, are 653 gigawatt-hours per year (GWh/yr). Natural gas consumption will be cut by 9.8 million therms, divided evenly between residential and nonresidential uses.

[20] Available at https://minerals.usgs.gov/minerals/pubs/mcs/

Emissions

The emissions reductions described in Chapter 6 are the cumulative results of avoided energy demand and generation. There is no way of mapping by air basin or climate zone the exact impact of emission reductions from reduced electric generation because electricity transmission and distribution do not correspond to air basins or climate zones. Similarly, predicting the distribution of future new construction in air basins or climate zones with sufficient precision to confidently allocate fractions of the estimated statewide reductions in on-site emissions is highly speculative and not likely to show an environmental impact that differs significantly from the general statewide impact. Therefore, the cumulative environmental impacts of the proposed 2019 Energy Standards are best understood as a general statewide reduction in the emissions of criteria pollutants and greenhouse gases, consistent with the benefits described in Chapter 6. The total statewide reductions in criteria pollutants and greenhouse gases are as follows:

Table 3 – Emissions Totals

NO_x	CO	SO_x	PM	CO_2
225,000 pounds	61,000 pounds	590 pounds	7,400 pounds	493 million pounds

CHAPTER 8:
Energy Commission Recommendations

The analysis provided for the proposed changes to the *Building Energy Efficiency Standards* concludes that there will be no significant impact on the environment. A negative declaration is proposed to be adopted for the *2019 Building Energy Efficiency Standards*.

CHAPTER 9:
Initial Study Preparers

This initial study was prepared by Peter Strait of the Efficiency Division's Building Standards Office, with contributions from Galen Lemei of the Office of the Chief Counsel.

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Proposed 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, California Energy Commission (2019 Standards), Sacramento, California, January 2018. Available at http://www.energy.ca.gov/title24/2019standards/

California Statewide Codes and Standards Enhancement (CASE) Program, CASE Initiative Final Reports, 2017. The CASE reports supporting the 2017 rulemaking proceeding include 23 documents on specific proposed measures and amendments proposed for incorporation into the 2019 Standards. The titles of the reports are as follows:

#	Report Name	Report Number
	Residential	
1	High Performance Walls	2019-RES-ENV1-F
2	High Performance Attic (HPA)	2019-RES-ENV2-F
3	Residential High Performance Windows and Doors	2019-RES-ENV3-F
4	Quality Insulation Installation (QII)	2019-RES-ENV4-F
5	Residential Indoor Air Quality	2019-RES-IAQ-F
6	Residential Quality HVAC	2019-RES-HVAC1-F
7	Compact Hot Water Distribution	2019-RES-DHW1-F
8	Drain Water Heat Recovery	2019-RES-DHW2-F
	Nonresidential	
9	Outdoor Lighting Power Allowances	2019-NR-LIGHT1-F
10	Indoor Lighting Power Densities	2019-NR-LIGHT2-F
11	Nonresidential Outdoor Lighting Controls	2019-NR-LIGHT3-F
12	Nonresidential Indoor Lighting Controls (Alignment with ASHRAE 90.1)	2019-NR-LIGHT4-F
13	Nonresidential Advanced Daylighting Design	2019-NR-LIGHT5-F
14	Nonresidential Indoor Lighting Alterations	2019-NR-LIGHT6-F
15	Nonresidential Ventilation & Indoor Air Quality (IAQ)	2019-NR-ASHRAE62.1-F
16	Proposals Based on ASHRAE 90.1	2019-NR-ASHRAE90.1-F
17	Prescriptive Efficiency Requirements for Cooling Towers	2019-NR-MECH1-F
18	Economizer Fault Detection and Diagnostics (FDD) for Built-Up Air Handlers	2019-NR-MECH2-F
19	Variable Exhaust Flow Control	2019-NR-MECH3-F
20	High Efficiency Fume Hoods in Laboratory Spaces	2019-NR-MECH4-F
21	Dock Seals	2019-NR-MECH5-F
22	Adiabatic Condensers for Refrigerated Warehouses and Commercial Refrigeration	2019-NR-MECH6-F
23	Demand Response Cleanup (Including Changes to Space Conditioning, Lighting, Energy Management, Power Distribution, and Solar Ready Sections)	2019-ALL-DR-F

All of the documents relied upon for the 2019 rulemaking proceeding, including the above CASE Reports, are available at: http://www.energy.ca.gov/title24/2019standards/.

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(OSHA Aluminum) United States Department of Labor, Occupational Safety and Health Administration, Occupational Safety and Health Guideline for Aluminum, .Available at http://www.agriculturedefensecoalition.org/sites/default/files/file/aluminum_6/6H_1_2012_U.S._Department_of_Labor_Occupational_Safety_Health_Guideline_for_Aluminum_June_2_2012.pdf

(USEPA AP42) United States Environmental Protection Agency, AP-42 Compilation of Air Pollution Emission Factors, January 1995 (updated June 5, 2017). *Uncontrolled Residential Furnaces* and *Controlled - Flue Gas Recirculation Large Wall-Fired Boilers* as defined by Chapter 1 External Combustion Sources, Section 1.4 Natural Gas Combustion, Table 1.4-1; other factors as specified in Table 1.4-2. Available at https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors. Excerpted emissions factors follow:

Emission Factors	**Units**	**NOx**	**SOx**	**CO**	**PM2.5**	**CO2e**
Natural Gas	lbs/10^6scf	94 / 100	0.6	40 / 84	7.6	120,000

USEPA Emissions & Generation Resource Integrated Database (eGRID) 2014, Revised Release (v2) February 27, 2017. Available at https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid. Excerpted emissions information from the eGRID summary tables follows:

Annual Greenhouse Gases

eGRID subregion acronym	eGRID subregion name	Total output emission rates				Fossil fuel output emission rate	Non-baseload output emission rates			
		CO_2 (lb/MWh)	CH_4 (lb/GWh)	N_2O (lb/GWh)	CO2e (lb/MWh)	CO_2 (lb/MWh)	CO_2 (lb/MWh)	CH_4 (lb/GWh)	N_2O (lb/GWh)	CO_2e (lb/MWh)
CAMX	WECC California	568.6	33.1	4	570.5	866.6	913.9	35.5	4.2	915.8

Annual Criteria Pollutants

eGRID subregion acronym	eGRID subregion name	Total output emission rates			Fossil fuel output emission rate			Non-baseload output emission rates		
		Annual NO_x (lb/MWh)	Ozone Season NO_x (lb/MWh)	SO_2 (lb/MWh)	Annual NO_x (lb/MWh)	Ozone Season NO_x (lb/MWh)	SO_2 (lb/MWh)	Annual NO_x (lb/MWh)	Ozone Season NO_x (lb/MWh)	SO_2 (lb/MWh)
CAMX	WECC	0.2	0.2	0	0.2	0.2	0	0.2	0.2	0.1

	California									

(USGS Steel) U.S. Geological Survey, Mineral Commodity Summaries, January 2017. Available at https://minerals.usgs.gov/minerals/pubs/commodity/iron_&_steel/

Additional documents reviewed by staff, but ultimately not cited within this report, are as follows:

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(USEPA PVC) USEPA Multimedia Enforcement, Compliance and Enforcement. http://www.epa.gov/compliance/civil/multimedia/index.html

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GLOSSARY

Alternative Calculation Method (ACM)	ACMs are defined in the 2016 Standards as "compliance software, or alternative component packages, or exceptional methods approved by the Commission under Section 10-109."
Alternative Component Packages	An alternative component package is one of the sets of prescriptive requirements contained in Section 150.1 which a building may meet to achieve compliance with the standards. These are often referred to as the "prescriptive packages" or "packages."
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers.
ASTM	American Society for Testing and Materials.
BEES	See Building Energy Efficiency Standards
Btu/hr (Btuh)	British thermal unit per hour. One Btu equals the amount of heat needed to raise the temperature of one pound of water 1 degree Fahrenheit. Used for measuring heating and cooling equipment output.
Building Energy Efficiency Standards (Standards)	The California Building Energy Efficiency Standards, or Energy Code, as set forth in the California Code of Regulations, Title 24, Part 6.
Climate zone	The Energy Commission established 16 climate zones that represent a geographic area for which an energy budget is established.
Cool roof	A roof that reflects significantly more solar energy than a traditional roof and therefore keeps the building's interior

	cooler. Cool roofs are usually light-colored and applied as a tile product (residential) or coating (nonresidential). An alliance called the Cool Roof Rating Council has been formed to establish criteria and rating systems for cool roofs.
CO	Carbon monoxide (CO): A colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels. CO is regulated as a criteria air pollutant under the Clean Air Act, 42 U.S.C., Section 7401 et seq.
CO_2	Carbon dioxide, a gas by-product of combustion that is known to behave as a greenhouse gas in the Earth's atmosphere.
Demand control ventilation	Demand control ventilation is the ability to adjust the amount of ventilation air provided to a space based on the extent of occupancy (as measured by CO_2 sensors). For example, an assembly building that is occupied intermittently would use demand controls to change the ventilation rates based on the number of people in the space, thereby saving substantial energy when the space is sparsely occupied. Occupancy sensors, air quality sensors, or other devices may be used to accomplish this.
EER (Energy Efficiency Ratio)	The ratio of cooling capacity of an air-conditioning unit in Btus per hour to the total electrical input in watts under specified test conditions. Compare to SEER.
Emittance	The property of emitting radiation; possessed by all materials.
Energy Budget	Energy budget is defined in the 2016 Standards as "the maximum amount of time-dependent valuation (TDV) energy that a proposed building, or portion of a building, can be designed to consume, calculated with the approved procedures specified in Part 6."

Fenestration product	Fenestration product is defined in the 2016 Standards as "any transparent or translucent material plus any sash, frame, mullions and dividers, in the facade of a building, including, but not limited to, windows, sliding glass doors, French doors, skylights, curtain walls, dynamic glazing, garden windows and glass block."
Gigawatt-hour (GWh)	One thousand megawatt-hours, one million kilowatt-hours, or one billion watt-hours of electrical energy.
Glazing	Transparent or translucent material (typically glass or plastic) used for admitting light.
Heating, ventilating, and air conditioning (HVAC)	The mechanical heating, ventilating and air-conditioning system of the building is also known as the HVAC system. The standards use measures of equipment efficiency defined according to the type of HVAC equipment installed.
Kilowatt (kW)	One thousand watts of power. A kilowatt is a measure of demand, or how many thousand watts are being drawn at any instant.
Kilowatt-hour (kWh)	One thousand watt-hours (watts of energy provided or expended for the duration of one hour) of energy.
Lighting power density (LPD)	A measure of the amount of light in a room. For this document, LPD represents the amount of watts used to produce light per square foot that can be installed for a specific task.
Low-rise residential	Any building of the residential occupancy group R (as defined in the Uniform Building Code), excluding all hotels, all motels and apartment buildings, with four or more habitable stories.
Megawatt (MW)	One million watts of power. A megawatt is a measure of

	demand or how many million watts are being drawn at any instant (see also kilowatt).
MBtu	One million Btus of energy.
NFRC	The National Fenestration Rating Council, a national organization of manufacturers of fenestration products, glazing and related materials, utilities, state energy offices, laboratories, homebuilders, architects and public interest groups. This organization is responsible for rating the U-factors and solar heat gain coefficient of manufactured fenestration product lines (i.e., windows, skylights, and glazed doors) that must be used in compliance calculations. In California, all manufactured fenestration products must be labeled with NFRC-rated values or with approved default U-factors.
NO_x	Oxides of nitrogen, usually NO and NO_2, that are chief components of air pollution and produced by the combustion of fossil fuels.
Outdoor or outside air	Outdoor air is defined in the 2016 Standards as "air taken from outdoors and not previously circulated in the building."
Proposed design	The proposed building designs that must comply with the standards before receiving a building permit.
PM2.5	Solid particulate matter that is 2.5 microns in size or smaller. Usually considered pollutants, particulates are released from combustion in exhaust gases at fossil fuel plants and from mobile and other fugitive particle sources.
SEER (Seasonal Energy Efficiency Ratio)	The total cooling output of a central air-conditioning system in Btus during the normal usage period for cooling divided by the total electrical input in watt-hours during the same period, as determined using specific test procedures.

Solar heat gain coefficient (SHGC)	SHGC is defined in the 2016 Standards as “the ratio of the solar heat gain entering the space through the fenestration area to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation, which is then reradiated, conducted, or convected into the space.”
Thermostatic expansion valve (TXV)	A refrigerant metering valve that controls the flow of liquid refrigerant entering the evaporator in response to the superheat of the gas leaving it. The basic function of this valve is to keep the evaporator active without permitting liquid to be returned through the suction line to the compressor. TXVs compensate for common installation problems caused by incorrect refrigerant charge and incorrect airflow.
Time-dependent valuation (TDV)	A method of valuing electricity and other building energy sources differently according to the time of day and season of electricity demand; for example, the cost of electricity in California rises at peak demand times in hot weather due to a much larger need to power air conditioning. TDV energy includes energy used at the building site as well as that consumed in producing and delivering energy to the site, including but not limited to generation, transmission, and distribution losses.
U-factor (formerly U-value)	U-factor is defined in the 2016 Standards as “the overall coefficient of thermal transmittance of a fenestration, wall, floor, or roof/ceiling component, in Btu/(hr x ft² x °F), including air film resistance at both surfaces.”
Ventilation air	Ventilation air is that portion of supply air which comes from outside plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.
Watt (W)	A unit of measure of electric power at a point in time, as capacity or demand.

APPENDIX A:
California Environmental Quality Act Checklist

Project title:	*2019 Energy Efficiency Standards for Residential and Nonresidential Buildings*
Lead agency name and address	California Energy Commission 1516 Ninth Street Sacramento, California 95814
Contact person and phone number:	Peter Strait, Efficiency Division, (916) 654-2817
Project Description	The Energy Commission is proposing changes to the energy efficiency standards for residential and nonresidential buildings as mandated by the Warren-Alquist Act. A summarized list of the proposed changes is included in the executive summary of this initial study.
Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)	The California Building Standards Commission must approve the changes.

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "potentially significant impact" as indicated by the checklist on the following pages.

	I. Aesthetics		II. Agriculture Resources		III. Air Quality
	IV. Biological Resources		V. Cultural Resources		VI. Geology /Soils
	VII. Energy		VIII. Hazards & Hazardous Materials		IX. Hydrology / Water Quality
	X. Land Use/ Planning		XI. Mineral Resources		XII. Natural Resources
	XIII. Noise		XIV. Population/ Housing		XV. Public Services
	XVI. Recreation		XVII. Transportation/ Traffic		XVIII. Utilities/ Service Systems
	XIX. Mandatory Findings of Significance				

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
I. **AESTHETICS --** Would the project:				
a) Have a substantial adverse effect on a scenic vista?				X
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c) Substantially degrade the existing visual character or quality of the site and its surroundings?				X
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on aesthetics.				
II. **AGRICULTURE RESOURCES** -- In determining whether impacts to agricultural resources are significant environmental benefits, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on agricultural resources.				
III. AIR QUALITY -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				X
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				X
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative				X

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
thresholds for ozone precursors)?				
d) Expose sensitive receptors to substantial pollutant concentrations?				X
e) Create objectionable odors affecting a substantial number of people?				X
The building standards may result in reduced power plant operation (in California and the Western United States) and reduce natural gas consumption and may therefore result in reduced emissions. Staff expects that overall, California will experience a net environmental benefit and net reductions of emissions resulting from the proposed 2019 Standards. Commission staff has therefore determined that the proposed 2019 Standards will have no adverse impacts on air quality.				
IV. **BIOLOGICAL RESOURCES** -- Would the project**:**				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				X
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?				X
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				X
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				X
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on biological resources.				
V. **CULTURAL RESOURCES** -- Would the project:				
a) Cause a substantial adverse change in the				

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
significance of a historical resource as defined in §15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?				X
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d) Disturb any human remains, including those interred outside of formal cemeteries?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on cultural resources.				
VI. **GEOLOGY AND SOILS** -- Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				X
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?				X
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on geology and soils.				
VII. **ENERGY --** Would the project:				
a) Use exceptional amounts of fuel or energy?				X

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Increase demand upon existing sources of energy, or require the development of new sources of energy?				X
The objective of the 2019 Standards is to reduce energy use in California. Staff has determined that the proposed standards will save energy statewide.				
VIII. **HAZARDS AND HAZARDOUS MATERIALS** -- Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				X
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				X
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wild land fires, including where wild lands are adjacent to urbanized areas or where residences are intermixed with wild lands?				X
Commission staff deems that the proposed 2019 Standards will have no potentially significant effects on hazards and hazardous materials.				
IX. **HYDROLOGY AND WATER QUALITY** -- Would the project:				
a) Violate any water quality standards or waste discharge requirements?				X

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?				X
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?				X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j) Inundation by seiche, tsunami, or mudflow?				X
Commission staff has determined that the proposed 2019 Standards may reduce the amount of water used and thus will have no impacts on hydrology and water quality.				
X. **LAND USE AND PLANNING** -- Would the project:				
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but				X

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on land use and planning.				
XI. **MINERAL RESOURCES** -- Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X
Commission staff has determined that the proposed 2019 Standards will have less than significant impacts on mineral resources.				
XII. **NATURAL RESOURCES** -- Would the project result in:				
a) Significant increase in the rate of use of any natural resources?				X
b) Significant depletion of any non-renewable natural resource?				X
Commission staff has determined that the proposed 2019 Standards will have less than significant impacts on natural resources.				
XIII. **NOISE** -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				X
b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?				X
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f) For a project within the vicinity of a private airstrip, would the project expose				X

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
people residing or working in the project area to excessive noise levels?				
Commission staff has determined that the proposed 2019 Standards will have insignificant impacts on noise.				
XIV. **POPULATION AND HOUSING** -- Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on population and housing.				
XV. **PUBLIC SERVICES** -- Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				X
Fire protection?				X
Police protection?				X
Schools?				X
Parks?				X
Other public facilities?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on public services.				
XVI. **RECREATION** -- Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on recreation.				

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XVII. **TRANSPORTATION AND TRAFFIC** -- Would the project:				
a) Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				X
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Result in inadequate parking capacity?				X
g) Conflict with adopted policies plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on transportation and traffic.				
XVIII. **UTILITIES AND SERVICE SYSTEMS** -- Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental benefits?				X
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental benefits?				X
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the				

Issues	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers' existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs?				X
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X
Commission staff has determined that the proposed 2019 Standards will have no impacts on utilities and service systems.				
XIX. **MANDATORY FINDINGS OF SIGNIFICANCE**				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				X
c) Does the project have environmental benefits that will cause substantial adverse effects on human beings, either directly or indirectly?				X
Improvements in the energy efficiency of residential and nonresidential buildings will have less than significant impacts to the concerns listed in this matrix. The 2019 Building Standards may result in **reduced** power plant operation and **reduced** natural gas consumption in California and the Western States with associated potential reductions in emissions. Staff has considered the effects on materials use, and other issues and deemed them insignificant.				

DETERMINATION:
On the basis of this evaluation:

X	I find that the proposed project WILL NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Drew Bohan
Executive Director
California Energy Commission

Date

APPENDIX B:
Proposed Text of Negative Declaration

Under the California Environmental Quality Act (CEQA), the Energy Commission approves the initial study analyzing the environmental impacts of the 2019 Standards.

Based on the initial study, the Energy Commission finds that:

(1) There is no substantial evidence, in light of the whole record, that adopting the 2019 Building Energy Efficiency Standards, in Parts 1 and 6 of Title 24 of the California Code of Regulations, will have a significant effect on the environment.

(2) The initial study reflects the Energy Commission's independent judgment and analysis.

The Energy Commission therefore also adopts a negative declaration for the proposed 2019 Standards based on the approved initial study.