

**DOCKETED**

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<b>Document Title:</b>	City of Hayward - 2019 Overview of cost effectiveness studies
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## OVERVIEW OF SUPPORTING COST EFFECTIVENESS STUDIES

### REFERENCE STUDIES:

1. Title: 2019 Cost-effectiveness Study: Low-Rise Residential New Construction  
Prepared For: Kelly Cunningham, Codes and Standards Program, Pacific Gas and Electric Company  
Prepared By: Frontier Energy, Inc., Misti Bruceri & Associates, LLC  
Last Modified: August 1, 2019
2. Title: 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study  
Prepared For: Christopher Kuch, Codes and Standards Program, Southern California Edison Company  
Prepared By: TRC, EnergySoft  
Last Modified: July 25, 2019

## PROPOSED REQUIREMENTS

### SUMMARY

#### ALL CONSTRUCTION MANDATORY

All new construction, additions, or alterations must comply with the following mandatory requirements:

- Water heating: 240V/30A circuit, condensate drain, location/design that includes air source and footprint
- Clothes Drying: 240V/40A circuit
- Cooking: 240V/50A circuit
- Space air conditioning: Heat pump operation capability and/or 240V/30A circuit if only space-heating provided

For new construction, compliance documentation prepared by a Certified Energy Analyst receives a performance credit.

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RESIDENTIAL PERFORMANCE AND PRESCRIPTIVE

Performance Path Requirements	Prescriptive Path Requirements	Reference Study
<b>Single and Two-family New Construction</b>		
<p>1. <b>All Electric.</b> Demonstrate that the proposed home will be all electric, OR</p>	<p><b>Build All Electric</b> and Meet 2019 Title 24 Part 6.</p>	<p>Refer to Reference Study 1: 2019 Cost-effectiveness Study: Low-Rise Residential New Construction</p>
<p>2. <b>Mixed Fuel Building.</b> Proposed Design Building shall be at least 10 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building, OR</p>	<p><b>Mixed Fuel Building</b></p> <ul style="list-style-type: none"> <li>a. Low leakage ducts in conditioned space per 2019 Reference Appendices RA3.1.4.1.3 and RA3.1.4.3.8.</li> <li>b. Install R-10 perimeter slab insulation at a depth of 16-inches.</li> <li>c. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.</li> <li>d. Maximum central fan integrated ventilation system efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3.</li> <li>e. Either 1) 5 kWh battery OR 2) A solar water heating system with a minimum solar savings fraction of 0.20.</li> </ul>	
<p>3. <b>Electrically Heated Mixed-Fuel Building (electric space and water heating, gas cooking and/or clothes drying).</b> Proposed Design Building shall be at least 2 EDR points less than the Energy Efficiency Design Rating calculated for the Standard Design Building, OR</p>	<p><b>Electrically Heated Mixed-Fuel Building</b></p> <ul style="list-style-type: none"> <li>a. Low leakage ducts in conditioned space per 2019 Reference Appendices RA3.1.4.1.3 and RA3.1.4.3.8.</li> <li>b. Install R-10 perimeter slab insulation at a depth of 16-inches.</li> <li>c. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.</li> <li>d. Maximum fan efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3.</li> </ul>	

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<b>Multifamily New Construction 3 stories or less</b>		
<p>1. <b>All Electric.</b> Demonstrate that the proposed building will be all-electric, OR</p>	<p><b>Build All Electric</b> and Meet 2019 Title 24 Part 6.</p>	
<p>2. <b>Mixed Fuel Buildings.</b> Proposed Design Building shall be at least 10 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building, OR</p>	<p><b>Mixed Fuel Building</b>            a. Install R-10 perimeter slab insulation at a depth of 16-inches.            b. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.            c. Maximum central fan integrated ventilation system efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3.            d. Either 1) 2.75 kWh battery per dwelling unit OR 2) A solar water heating system with a minimum solar savings fraction of 0.20.</p>	<p>Refer to Reference Study 1: Title: 2019 Cost-effectiveness Study: Low-Rise Residential New Construction</p>
<p>3. <b>Electrically Heated Mixed-Fuel Building (electric space and water heating, gas cooking and/or clothes drying).</b> Proposed Design Building be no greater than the Energy Efficiency Design Rating calculated for the Standard Design Building.</p>	<p><b>Electrically Heated Mixed-Fuel Building</b> and Meet 2019 Title 24 Part 6.</p>	
<p><b>Low Rise Residential Additions or Alterations</b></p>		

NONRESIDENTIAL PERFORMANCE AND PRESCRIPTIVE

Performance Path Requirements	Prescriptive Path Requirements		Reference Study
<b>Nonresidential New Construction – Office or Retail Occupancies</b>			
<p><b>All Electric.</b> Demonstrate that the proposed building will be all electric</p>	<p><b>Build All Electric and Meet 2019 Title 24 Part 6.</b></p>		
<p><b>Mixed Fuel Buildings, All Occupancies Except Office and Mercantile.</b> Demonstrate that the energy use of the proposed building is 10% more efficient than the 2019 State Energy Code.</p>	<p><b>Mixed Fuel Buildings, All Occupancies Except Office and Mercantile, as applicable:</b></p> <ul style="list-style-type: none"> <li>a. Install fenestration with a solar heat gain coefficient either i) no less than 0.45 in hotels/motels/high-rise multifamily, or ii) no greater than 0.22 in all other space types.</li> <li>b. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.</li> <li>c. Include economizers and staged fan control in air handlers with a mechanical cooling capacity <math>\geq 33,000</math> Btu/h</li> <li>d. Reduce the lighting power density (Watts/ft<sup>2</sup>) by ten percent (10%) from that required from Table 140.6-C.</li> <li>e. In common areas, improve lighting:                             <ul style="list-style-type: none"> <li>1) Control to daylight dimming plus off per Section 140.6(a)2H</li> <li>2) Perform Institutional Tuning per Section 140.6(a)2J</li> </ul> </li> <li>f. Install one drain water heat recovery device per every three guest rooms that is field verified as specified in the Reference Appendix RA3.6.9.</li> </ul>		<p>Refer to Reference Study 2: 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study</p>

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<p><b>Mixed Fuel Buildings, Office and Mercantile Occupancies.</b>          Demonstrate that the energy use of the proposed building is 15% more efficient than the 2019 State Energy Code</p>	<p><b>Mixed Fuel Buildings, Office and Mercantile Occupancies, as applicable:</b></p> <ul style="list-style-type: none"> <li>a. Install fenestration with a solar heat gain coefficient no greater than 0.22.</li> <li>b. Limit the fenestration area on east-facing and west-facing walls to one-half of the average amount of north-facing and south-facing fenestration.</li> <li>c. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.</li> <li>d. Include economizers and staged fan control in air handlers with a mechanical cooling capacity <math>\geq 33,000</math> Btu/h</li> <li>e. Reduce the lighting power density (Watts/ft<sup>2</sup>) by ten percent (10%) from that required from Table 140.6-C.</li> <li>f. Improve lighting:             <ul style="list-style-type: none"> <li>1) Control to daylight dimming plus off per Section 140.6(a)2H</li> <li>2) Install Occupant Sensing Controls in Large Open Plan Offices per Section 140.6(a)2I</li> <li>3) Perform Institutional Tuning per Section 140.6(a)2J</li> </ul> </li> </ul>	
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