| **DOCKETED** |
|-----------------|-----------------|
| **Docket Number:** | 19-BSTD-06 |
| **Project Title:** | Local Ordinances Exceeding the 2019 Energy Code |
| **TN #:** | 233820-5 |
| **Document Title:** | Overview of the 2019 Supporting Cost Effectiveness Studies |
| **Description:** | Full text of an Overview of the 2019 Residential and Nonresidential Local Ordinance Supporting Studies |
| **Filer:** | Danuta Drozdowicz |
| **Organization:** | California Energy Commission |
| **Submitter Role:** | Commission Staff |
| **Submission Date:** | 7/9/2020 10:41:51 AM |
| **Docketed Date:** | 7/9/2020 |
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
   Last Modified: July 17, 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.
# RESIDENTIAL PERFORMANCE AND PRESCRIPTIVE

<table>
<thead>
<tr>
<th>Performance Path Requirements</th>
<th>Prescriptive Path Requirements</th>
<th>Reference Study</th>
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<tbody>
<tr>
<td><strong>Single and Two-family New Construction</strong></td>
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<tr>
<td>1. <strong>All Electric.</strong> Demonstrate that the proposed home will be all electric, OR</td>
<td><strong>Build All Electric</strong> and Meet 2019 Title 24 Part 6.</td>
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</tbody>
</table>
| 2. **Mixed Fuel Building.** Proposed Design Building shall be at least 10 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building, OR | **Mixed Fuel Building**  
   a. Low leakage ducts in conditioned space per 2019 Reference Appendices RA3.1.4.1.3 and RA3.1.4.3.8.  
   b. Install R-10 perimeter slab insulation at a depth of 16-inches.  
   c. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.  
   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.  
   e. Either 1) 5 kWh battery OR 2) A solar water heating system with a minimum solar savings fraction of 0.20. | **Refer to Reference Study 1: 2019 Cost-effectiveness Study: Low-Rise Residential New Construction** |
| 3. **Electrically Heated Mixed-Fuel Building** (electric space and water heating, gas cooking and/or clothes drying). Proposed Design Building shall be at least 2 EDR points less than the Energy Efficiency Design Rating calculated for the Standard Design Building, OR | **Electrically Heated Mixed-Fuel Building**  
   a. Low leakage ducts in conditioned space per 2019 Reference Appendices RA3.1.4.1.3 and RA3.1.4.3.8.  
   b. Install R-10 perimeter slab insulation at a depth of 16-inches.  
   c. Compact hot water distribution per 2019 Reference Appendices RA4.4.6.  
   d. Maximum fan efficacy of 0.35 Watts/cfm and verification by a HERS rater according to 2019 Reference Appendices RA3.3. | |

**Multifamily New Construction 3 stories or less**
1. **All Electric.** Demonstrate that the proposed building will be all-electric, OR **Build All Electric** and Meet 2019 Title 24 Part 6.

2. **Mixed Fuel Buildings.** Proposed Design Building shall be at least 10 EDR points less than the Total Energy Design Rating calculated for the Standard Design Building, OR

   - **Mixed Fuel Building**
     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.

   Refer to Reference Study 1: Title: 2019 Cost-effectiveness Study: Low-Rise Residential New Construction

3. **Electrically Heated Mixed-Fuel Building (electric space and water heating, gas cooking and/or clothes drying).** Proposed Design Building be no greater than the Energy Efficiency Design Rating calculated for the Standard Design Building.


Low Rise Residential Additions or Alterations

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**NONRESIDENTIAL PERFORMANCE AND PRESCRIPTIVE**

<table>
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<tr>
<th>Performance Path Requirements</th>
<th>Prescriptive Path Requirements</th>
<th>Reference Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All Electric.</strong> Demonstrate that the proposed</td>
<td><strong>Build All Electric</strong> and Meet 2019 Title 24 Part 6.</td>
<td>Refer to Reference Study 2: 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study</td>
</tr>
</tbody>
</table>

**Nonresidential New Construction – Office or Retail Occupancies**
Mixed Fuel Buildings, All Occupancies Except Office and Mercantile, as applicable:

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.

b. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.

c. Include economizers and staged fan control in air handlers with a mechanical cooling capacity $\geq$ 33,000 Btu/h

d. Reduce the lighting power density (Watts/ft²) by ten percent (10%) from that required from Table 140.6-C.

e. In common areas, improve lighting:
   1) Control to daylight dimming plus off per Section 140.6(a)2H
   2) Perform Institutional Tuning per Section 140.6(a)2I

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.

Mixed Fuel Buildings, Office and Mercantile Occupancies, as applicable:

a. Install fenestration with a solar heat gain coefficient no greater than 0.22.

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.

c. Design Variable Air Volume (VAV) box minimum airflows to be equal to the zone ventilation minimums.

d. Include economizers and staged fan control in air handlers with a mechanical cooling capacity $\geq$ 33,000 Btu/h

e. Reduce the lighting power density (Watts/ft²) by ten percent (10%) from that required from Table 140.6-C.

f. Improve lighting:
   1) Control to daylight dimming plus off per Section 140.6(a)2H
   2) Install Occupant Sensing Controls in Large Open Plan Offices per Section 140.6(a)2I
<table>
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<tr>
<th>3) Perform Institutional Tuning per Section 140.6(a)2J</th>
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