“Reaching Up and Out: Advancing Reach Codes Together”
SEEC Forum 2018

Chris Kuch, P.E.
Statewide Codes and Standards Reach Code Program
Residential Reach Codes

Are we there yet?
2019 Title 24 Developments

**Prescriptive requirement** to size PV to displace **only** annual site kWh

- Cost-effective
- Grid friendly

Energy Code compliance will be based on an **Energy Design Rating (EDR)** score

- EDR target scores for each climate zone
- EDR target = Energy Efficiency + PV
- Average EDR target score ~20

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**HERS® Index**

- More Energy
- Existing Homes
- Reference Home
- Zero Energy Home
- Less Energy

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**Avg. EDR Target**
What residential options remain in 2020?

**Potential measures to achieve EDR of 0:**

- Triple pane glazing
- HVAC and system types, equipment efficiencies, and distribution systems
- Improved envelope insulation and air tightness
- DHW system types and equipment efficiencies, and distribution systems
- Energy and heat recovery ventilation
A new category of measures...

Grid Harmonization and Grid Interactivity

‘Smart’ controls (e.g. thermostats)

Batteries to maximize PV system on-site electricity usage
  TOU controls to store electricity generated off-peak for use during on-peak (highest cost) periods

Other potential energy storage systems
  Electric Vehicles
  Advanced Water Heating (i.e. Solar Thermal, Heat Pump Water Heaters)

Home Energy Management Systems
Nonresidential Reach Codes
Nonresidential Reach Codes

Preparing for 2030 Zero Net Energy goal for nonresidential new construction

2019 Standards do not include PV or storage in compliance calculations

Reach codes requiring these features must still be cost-effective.

Opportunities remain in several areas:

- Lighting, indoor and outdoor
- HVAC equipment types and efficiencies
- Improvements to envelope features
- Controls
Working Together...

Citizens / Community Groups

Local Gov Staff – Internal Process Management

IOUs – Technical Support

City Council – Board of Supervisors

CEC and BSC Approvals

Local Energy Ordinance

Energy and Carbon Savings
CAP Goals
Local Economic Benefits
Contacts

Chris Kuch, P.E. – Southern California Edison/Statewide Lead
Christopher.Kuch@sce.com

Lindsey Tillisch – Pacific Gas & Electric Company
L2T4@pge.com

Adam Manke – SoCalGas
Amanke@semprautilities.com

Jeremy Reefe – San Diego Gas & Electric
JMReefe@semprautilities.com

Ingrid Neumann – California Energy Commission
Ingrid.Neumann@energy.ca.gov
Reaching Up and Out: Advancing Reach Codes Together

Energy Commission Approval Process

Ingrid Neumann
Building Standards Office Efficiency Division
California Energy Commission

2018 SEEC Forum
Thursday June 21
Local Ordinance Approval Process

- All local energy efficiency standards that meet or exceed the California Building Energy Efficiency Standards (Title 24, Part 6) must be approved by the California Energy Commission.

- All local standards that exceed the California Building Code (plumbing, electric, historic, etc) must be filed with the California Building Standards Commission.
  - [https://www.youtube.com/watch?v=UEIuxr29jYw&feature=youtu.be](https://www.youtube.com/watch?v=UEIuxr29jYw&feature=youtu.be)

- Only those local energy efficiency ordinances that have been approved by the Energy Commission and filed with the Building Standards Commission are legally enforceable.
Local Ordinance Approval Process
Application to the Energy Commission

• A copy of the ordinance.
• A study or analysis showing the expected energy savings and the cost effectiveness of the ordinance.
• The date the ordinance, energy savings and cost-effectiveness study were presented to and adopted by the Council/Board in a Publicly Noticed Meeting.
• A letter to the Executive Director
  • A statement/finding that the ordinance will require buildings to be “designed to save energy when compared to levels permitted by Title 24 Part 6.”
  • Evidence of CEQA compliance.

Title 24 Section 10-106
Public Resource Code 25402.1 & 21080.4 & 21153
Local Energy Ordinances Requiring Approval

- Green Building Standard that includes mandatory energy efficiency requirements that meet or exceed the statewide Standard (Title 24 Part 6 2013).
- Using Non-Governmental Certification Programs that meet or exceed the statewide Standard (GPR, LEED, etc.).
- Adopting CALGreen Tier I or II (voluntary Energy Provisions in A4 or A5).
- Early Adoption of Energy Standards (Title 24 Part 6 2019)
- Adoption of stricter energy budgets (% below current mandatory)
- Renewal or Updating Existing Ordinance
California Green Building Standards

CHAPTER 1 - ADMINISTRATION
CHAPTER 2 - DEFINITIONS
CHAPTER 3 - GREEN BUILDING (Scope)
CHAPTER 4 - RESIDENTIAL MANDATORY MEASURES
CHAPTER 5 - NONRESIDENTIAL MANDATORY MEASURES
CHAPTER 6 - REFERENCED ORGANIZATIONS AND STANDARDS
CHAPTER 7 - INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS
CHAPTER 8 - COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL
APPENDIX A4 - RESIDENTIAL VOLUNTARY MEASURES
APPENDIX A5 - NONRESIDENTIAL VOLUNTARY MEASURES
APPENDIX A6.1 - VOLUNTARY STANDARDS FOR HEALTH FACILITIES

Mandatory
Energy Efficiency Targets
Title 24 Part 6

Voluntary
Energy Efficiency
Title 24 Part 11
Section A4.203, **Performance Approach for Newly Constructed**

- **Prerequisites**
  - Energy Design Rating
  - Quality Insulation Installation

- **Tier 1**
  - 85% of Energy Budget

- **Tier 2**
  - 70% of Energy Budget

- **Tier 3**
  - EDR Zero “ZNE”
Section A4.203, 
Performance Approach for Additions & Alterations

➢ Tier 1
  • One mechanical system: 95% of Energy Budget
  • More than one mechanical system: 90% of Energy Budget

➢ Tier 2
  • One mechanical system: 90% of Energy Budget
  • More than one mechanical system: 85% of Energy Budget
### Proposed 2019 Standards

Appendix A4 **Residential** Voluntary Measures

- **Section A4.203,** Performance Approach for Newly Constructed
  - based on **target Energy Design Rating (EDR) scores**
  (no longer “Percent better than” mandatory Part 6)

<table>
<thead>
<tr>
<th>2016 Energy Efficiency Target</th>
<th>2019 Energy Efficiency Target</th>
<th>PV Target</th>
<th>Tier 1 Target</th>
<th>Tier 2 (ZNE) Target</th>
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<tbody>
<tr>
<td>EDR = 43</td>
<td>EDR = 25</td>
<td>EDR = 12</td>
<td>EDR = 0</td>
<td></td>
</tr>
</tbody>
</table>

*Example for CZ 12*
Section A4.203, Performance Approach for Newly Constructed

- based on **target EDR scores**
  (no longer “Percent better than” mandatory Part 6)
• **A4.203.1.3.1 Tier 1.**

  ➢ meet or be less than a target Energy Design Rating (EDR), based on climate zone.

  ➢ Measures considered:
  
  • energy efficiency measures (e.g. triple pane windows)
  • Demand Management
  • on-site battery or thermal storage
A4.203.1.3.1 Tier 1

Modeled using:

- PV oversizing factors of 1.0 for mixed fuel and 1.1 for all-electric
- TOU battery controls

<table>
<thead>
<tr>
<th>CZ</th>
<th>Mixed Fuel</th>
<th>All-Electric</th>
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<tbody>
<tr>
<td>1</td>
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<td>16</td>
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</table>
• A4.203.1.3.2 Tier 2.

- meet or be less than a target Energy Design Rating (EDR), based on climate zone.

- Paths considered:
  - electrifying space and water heating
  - advanced electric battery controls
  - modest oversizing of the photovoltaic system
A4.203.1.3.2 Tier 2

Modeled using:

• PV oversizing factors up to 1.4 for mixed fuel
• PV sized to offset annual kWh for all-electric
• TOU battery controls

<table>
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<tr>
<td>16</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>
Required Prerequisites:

• A4.203.1.1.2 Quality Insulation Installation (QII)

AND Choose ONE of the Prerequisites below:

• A4.203.1.2.1 Roof deck insulation, or ducts in conditioned space
• A4.203.1.2.2 High Performance Walls (HPW)
• A4.203.1.2.3 HERS-Verified Compact Hot Water Distribution System (CHWDS-H) with Drain Water Heat Recovery (DWHR-H)
California Green Building Standards

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Mandatory
Energy Efficiency Targets
Title 24 Part 6

Voluntary
Energy Efficiency
Title 24 Part 11
Section A5.203, Performance Approach

Prerequisites

• Outdoor Lighting – 90% of Std.
• Service Water Heating in Restaurants

Tier 1

• Indoor Lighting OR Mechanical: 95% of Energy Budget
• Indoor Lighting AND Mechanical: 90% of Energy Budget

Tier 2

• Indoor Lighting OR Mechanical: 90% of Energy Budget
• Indoor Lighting AND Mechanical: 85% of Energy Budget
• Section A5.203, Performance Approach
  ➢ Retain the “Percent better than” mandatory language
  ➢ Target Percentages continue to vary depending on whether lighting and/or mechanical systems are included
Choose **ONE** of the following Prerequisites for **Tier 1** and **TWO** for **Tier 2**:

- A5.203.1.1.1 *Outdoor lighting*
- A5.203.1.1.2 *Service water heating in restaurants*
- A5.203.1.1.3 *Warehouse Dock Seal Doors*
- A5.203.1.1.4 *Daylight Redirecting Devices*
- A5.203.1.1.5 *Exhaust Air Heat Recovery*
- A5.203.1.1.6 *Triple Bottom Line Analysis*
Cost Effectiveness Studies Currently Available

Performance Based Ordinances

- Low-Rise Residential New Construction CALGreen - Voluntary Tiers 1 and 2
- Low-Rise Residential New Construction CALGreen Tier 3
- Low-Rise Residential New Construction: All-Electric Design, CALGreen - Voluntary Tiers 1 and 2
- Low-Rise Residential New Construction Zero Net Energy (“Code-ZNE”) and Nonresidential Tier 1 (Santa Monica, Climate Zone 6)
- Nonresidential New Construction (CalGreen Tier 1)
Cost Effectiveness Studies Currently Available

Prescriptive (Single-Measure) Based Ordinances

- Photovoltaics (PV) System (California Energy Commission Model Solar Ordinance)
- Outdoor Lighting (Nonresidential New Construction and Retrofits)
- Cool Roofs (Residential and Nonresidential New Construction and Retrofits)
- Existing Low-Rise Residential Cost-Effectiveness Study - Substantial Remodels (Climate Zone 11 only)
Local Ordinance Approval Process
Energy Commission Approval Timeline

Consult with local jurisdiction during ordinance development (optional)

Receive application
- Start checklist

Determine application is complete

Create Documentation
(90 days to bring to Business Meeting)
- Staff Report & Recommendation
- Proposed Resolution
- CEQA Notice of Exemption

Create Documentation
(60 day Public Comment Period)
- CEC-19
- Notice of Public Comment

Public Notice approval process (1 week)

Post to webpage and docket starting the 60 day comment period

Update Documents based on Comments

Division Review and Approval of Documents

Executive Office Review and Approval
- Staff Report & Recommendation
- Proposed Resolution
- CEQA Notice of Exemption

Lead Commissioner Review and Approval
- Commissioner Summary

Commissioner Briefing

Send Local Jurisdiction Signed Resolution
- Update Webpage
- Post Signed Resolution
- File NOE with OPR

BUSINESS MEETING
- Post Documents for Business Meeting
- Preliminary and Final Agenda Review
- Local Jurisdiction available for comments at Business Meeting
### Local Energy Ordinances Exceeding the 2016 Standards

<table>
<thead>
<tr>
<th>Local Jurisdiction</th>
<th>Date Approved</th>
<th>Type</th>
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<tbody>
<tr>
<td>Brisbane, City of</td>
<td>12-Jul-17</td>
<td>Cool Roof, Solar PV</td>
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<tr>
<td>Davis, City of</td>
<td>13-Dec-17</td>
<td>Efficiency, Solar PV</td>
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<td>Fremont, City of</td>
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<td>Solar PV</td>
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<td>27-Apr-17</td>
<td>Lighting</td>
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<td>Healdsburg, City of</td>
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<td>Lancaster, City of</td>
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<td>Marin County</td>
<td>8-Mar-17</td>
<td>Efficiency</td>
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<td>Mill Valley</td>
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<td>Efficiency</td>
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<td>Novato, City of</td>
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<td>Palo Alto, City of</td>
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<td>Efficiency, Solar PV</td>
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<td>Portola Valley, Town of</td>
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<td>Efficiency</td>
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<td>San Francisco, City of</td>
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<td>Cool Roofs, Solar</td>
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<th>Local Jurisdiction</th>
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<td>Alameda County</td>
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<td>Solar</td>
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<td>Chula Vista, City of</td>
<td>8-May-18</td>
<td>Outdoor Lighting</td>
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<tr>
<td>Marin County</td>
<td>22-Mar-18</td>
<td>Efficiency</td>
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Questions?

2016 Building Energy Efficiency Standards

Local Ordinances
Exceeding the 2016 Building Energy Efficiency Standards
http://www.energy.ca.gov/title24/2016standards/ordinances/

Building Energy Efficiency Standards 2019 Update
http://www.energy.ca.gov/title24/2019standards/

Contact Information
Ingrid.Neumann@energy.ca.gov
916-651-1461
City of Carlsbad
Climate Action Plan – Energy Efficiency Ordinances

SEEC Forum
June 21, 2018
Climate Action Plan

• Approved with General Plan Update and Program EIR on Sept. 22, 2015
• Serves as CEQA tiering document
• 15 Measures with 41 Actions
• Annual monitoring and reporting
CAP Strategy Areas

- Energy efficiency
- Renewable energy
- Transportation
- Water
- Public outreach and education
CAP Ordinances

- Energy efficiency
- Renewable energy
- Alternative water heating
- Natural lighting and ventilation
- Electric vehicle charging infrastructure
- Transportation Demand Management
Energy Efficiency Goals and Requirement

- Single and multi-family residential
  - 50 percent reduction in 30 percent of dwelling units by 2035
- Non-residential
  - 40 percent reduction in 30 percent of commercial square footage
- Adopt ordinances requiring major renovations to include energy efficiency measures
EE Ordinance Scope of Work

- High-level summary and examples of ordinances from other jurisdictions
- Potential parameters for ordinance applicability, requirements and energy efficiency measures
- Ordinance development and CEC cost-effectiveness processing
- Design public outreach and education program
• Climate zone 7
• Residential – 20 to 25% in each decade from 1970’s through 2000’s
• Nonresidential – 85% from 1980 - 2010
Energy Efficiency Ordinances

• Residential
  – Require home energy audit for major renovations
  – Require energy efficiency measures for homes not meeting a minimum efficiency standard
  – Limit cost of energy efficiency measures to a percentage of total building permit valuation

• Non-residential
  – Require CALGreen Tier 1 Energy Efficiency Standards or other prescriptive measures for all new construction and major renovations
Project Partners
Key Takeaways

- Look statewide but keep it local
- Maximize opportunity for education
- Plan for cost-effectiveness study
Thank you!

mike.grim@carlsbadca.gov
Santa Monica
Zero Net Energy
Reach Code

Garrett Wong, Sr. Sustainability Analyst, Climate & Energy

2018 SEEC Forum
Building energy is responsible for 31% of Santa Monica’s greenhouse gas emissions.
Energy Code Timeline

- **Santa Monica Mandatory Solar Requirement**
  - Expires 12/31/16

- **Santa Monica Mandatory Solar Requirement & Energy Reach Code**
  - Effective May 1, 2017

- **State-wide Zero Net Energy Requirement (Commercial)**

- **2016**

- **2017**
  - **2016 CAL Green & California Energy Code requires solar**
    - Effective 1/1/17

- **2020**
  - **State-wide Zero Net Energy Requirement (Single Family)**
2012 Solar Ready

Requirements
• Single family – 250 ft² of roof space
• All other buildings – 30% of roof area

Roof Specifications
• Flat OR south-facing with ≤ 33% roof slope
• Unshaded
• Free from obstructions
• In contiguous areas of no less than 100 square feet
• Including required clearances for firefighting & life-safety access

2016 Solar Required

Requirements
• Single family – 1.5 W / total sq ft
• All other buildings – 2 W / building footprint

Alternative Compliance
• PV system or other RE that will offset 75%-100% of TDV energy budget
• Demonstrate TDV energy budget is reduced by the same wattage (energy efficiency)

Exceptions
• Waived if infeasible
• Where there may be conflicts
Developing the Reach Code

- CPUC funded pilot administered by SCE
- TRC Solutions conducted cost effectiveness study
- Challenges with timing, Council approval vs. CPUC approval
Time Dependent Value

- Values hourly cost to customers, utility grid and society
- Creates common denominator between electricity, natural gas and propane
  - Electricity values change by the hour for each hour of the year
  - Natural gas and propane values change by month
- Provides a higher ‘value’ for energy used/saved during summer peak periods
- On average, TDV-sized PV system is smaller than a PV system sized to offset actual/calculated site energy use
Energy Design Rating

TDV Proposed / TDV Reference x 100 = kTDV / sf-yr

• Similar to 2015 IECC and 2014 RESNET
• 0-100 score represents the performance of a building meeting

Zero or less represents high levels of energy efficiency and/or renewable generation to “zero out” its TDV energy use
Chapter 8.36 Energy Code

*Low-rise residential.* All new low-rise residential buildings shall be designed to use fifteen percent (15%) less energy than the allowed energy budget established by the 2016 California Energy Code, and achieve an Energy Design Rating of Zero.

*High-rise residential, non-residential, hotels and motels.* All new high-rise residential buildings, non-residential buildings, hotels and motels shall be designed to use ten percent (10%) less energy than the allowed energy budget established by the 2016 California Energy Code.
<table>
<thead>
<tr>
<th>Building Type</th>
<th>Solar Requirement</th>
<th>Energy Code Requirement</th>
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<tbody>
<tr>
<td>Single Family Home</td>
<td>1.5 watts/sq.ft.</td>
<td>Zero Net Energy: 15% better than 2016 Energy Code + EDR: 0</td>
</tr>
<tr>
<td>Low-Rise Multi-Family</td>
<td>2 watts/sq.ft.</td>
<td>Zero Net Energy: 15% better than 2016 Energy Code + EDR: 0</td>
</tr>
<tr>
<td>High-Rise Multi-Family</td>
<td>2 watts/sq.ft.</td>
<td>10% better than 2016 Energy Code</td>
</tr>
<tr>
<td>Non-Res/ Industrial/ Institutional</td>
<td>2 watts/sq.ft.</td>
<td>10% better than 2016 Energy Code</td>
</tr>
</tbody>
</table>
Putting the Code to Work

• Outreach
  – Public presentations, notices in local industry distributions
  – ZNE New Construction Guide

• Training
  – Energy Code Ace + SCE for planners and inspectors

• Energy Code Coach
  – Office hours available for contractors & architects
Santa Monica Residential Zero Net Energy Guide for New Construction
Lessons Learned

• Early collaboration with Planning and Building & Safety
• Consider alternative projects, i.e. pre-fab
• Establish tracking systems early
• Be prepared to be flexible
• Outreach, engage and educate!
Thank you!

Garrett Wong, Sr. Sustainability Analyst, Climate & Energy
garrett.wong@smgov.net
www.LocalEnergyCodes.com

- Model Language, Templates, Resources, Studies
- Linked to CEC, LGC, BayREN, SCREN, plus additional resources
Interactive Map of Adopted Ordinances
What’s on the horizon for reach codes?

• Research version of compliance software is available
• Reach Codes program will begin analysis shortly
  • Goal is to complete several studies identifying viable options before Standards effective date.
Thank You

Lindsey Tillisch
Program Manager, Codes and Standards Program

L2T4@pge.com