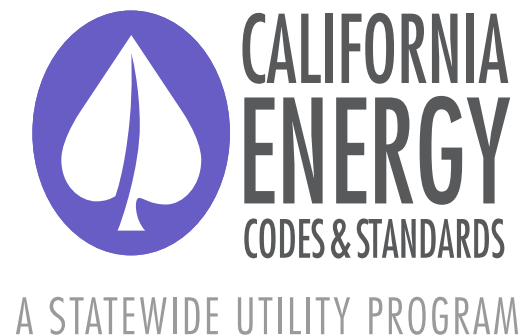


“Reaching Up and Out: Advancing Reach Codes Together”

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

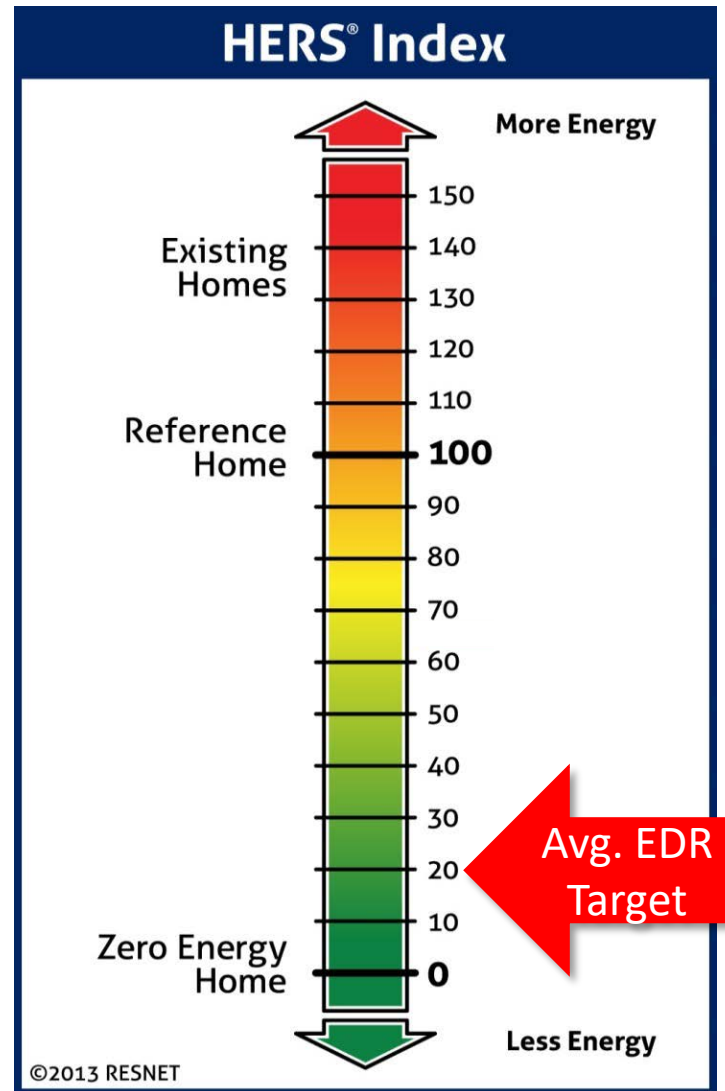
Grid friendly

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



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:

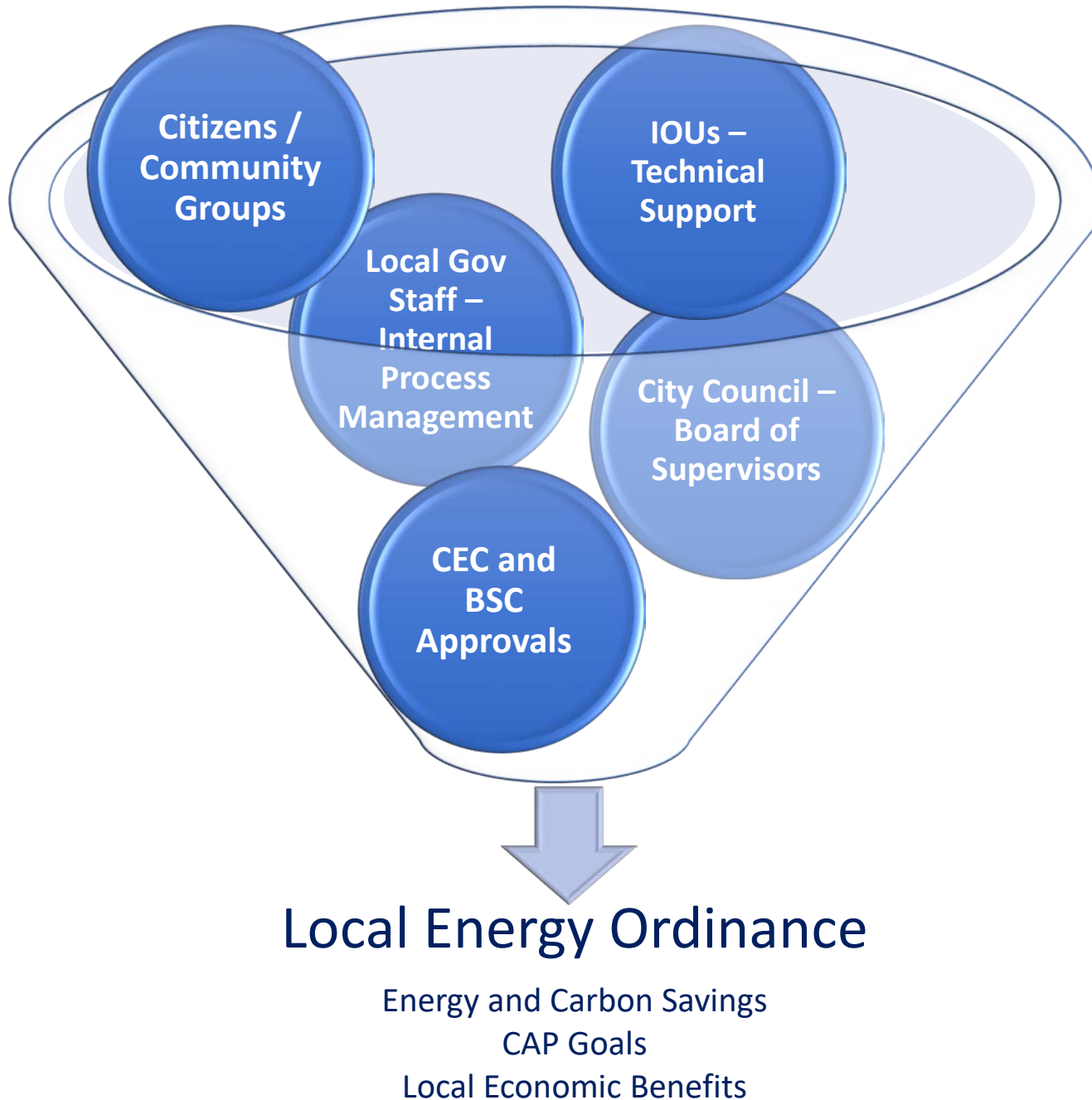
Lighting, indoor and outdoor

HVAC equipment types and efficiencies

Improvements to envelope features

Controls

Working Together...



Contacts

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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.documents.dgs.ca.gov/bsc/Title_24/Guide for Local Amendments of Building Standards 2016-opt.pdf](https://www.documents.dgs.ca.gov/bsc/Title_24/Guide_for_Local_Amendments_of_Building_Standards_2016-opt.pdf)
 - <https://www.youtube.com/watch?v=UEluxr29jYw&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

[OSHPD 1, 2 & 4]

**Mandatory
Energy Efficiency Targets
Title 24 Part 6**

**Voluntary
Energy Efficiency
Title 24 Part 11**



Current 2016 Standards

Appendix A4 Residential Voluntary Measures

- 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”



Current 2016 Standards

Appendix A4 Residential Voluntary Measures

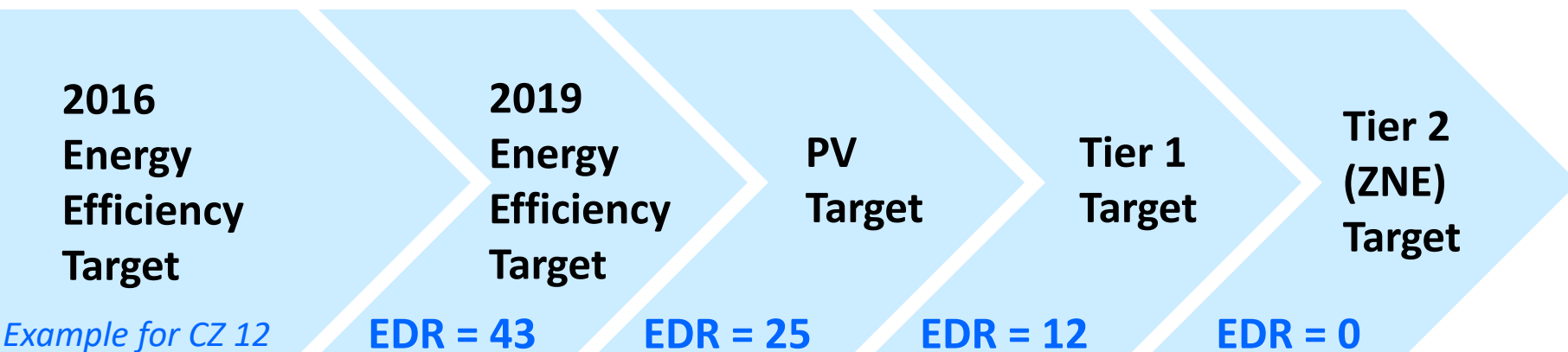
- Section A4.203,
Performance Approach for Additions & Alterations
 - **Tier 1**
 - One mechanical system: 95% of Energy Budget
 - More than one mechanical system: 90% of Energy Budget
 - **Tier 2**
 - One mechanical system: 90% of Energy Budget
 - More than one mechanical system: 85% of Energy Budget



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)





Proposed 2019 Standards

Appendix A4 **Residential** Voluntary Measures

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

**Mandatory
Energy Efficiency Targets
Title 24 Part 6**

**Voluntary
Energy Efficiency
Title 24 Part 11**



Proposed 2019 Standards

Appendix A4 **Residential** Voluntary Measures

- **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





Proposed 2019 Standards

Appendix A4 Residential Voluntary Measures

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

CZ	Mixed Fuel	All-Electric
1	23	36
2	12	16
3	10	14
4	8	12
5	10	16
6	10	12
7	5	7
8	10	10
9	13	13
10	10	11
11	11	12
12	12	13
13	11	13
14	15	16
15	11	8
16	22	39



Proposed 2019 Standards

Appendix A4 Residential Voluntary Measures

- **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



Proposed 2019 Standards

Appendix A4 Residential Voluntary Measures

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

CZ	Mixed Fuel	All-Electric
1	13	0
2	5	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	5	0
15	0	7
16	14	10



Proposed 2019 Standards

Appendix A4 Residential Voluntary Measures

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

CHAPTER 1 - ADMINISTRATION

CHAPTER 2 - DEFINITIONS

CHAPTER 3 - GREEN BUILDING (Scope)

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[OSHPD 1, 2 & 4]

**Mandatory
Energy Efficiency Targets
Title 24 Part 6**

**Voluntary
Energy Efficiency
Title 24 Part 11**



Current 2016 Standards

Appendix A5 Nonresidential Voluntary Measures

- 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



Proposed 2019 Standards

Appendix A5 **Nonresidential** Voluntary Measures

- 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



Proposed 2019 Standards

Appendix A5 **Nonresidential** Voluntary Measures

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
- Single Family Residential New Construction: PV Plus Heat Pump Water Heating
- 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

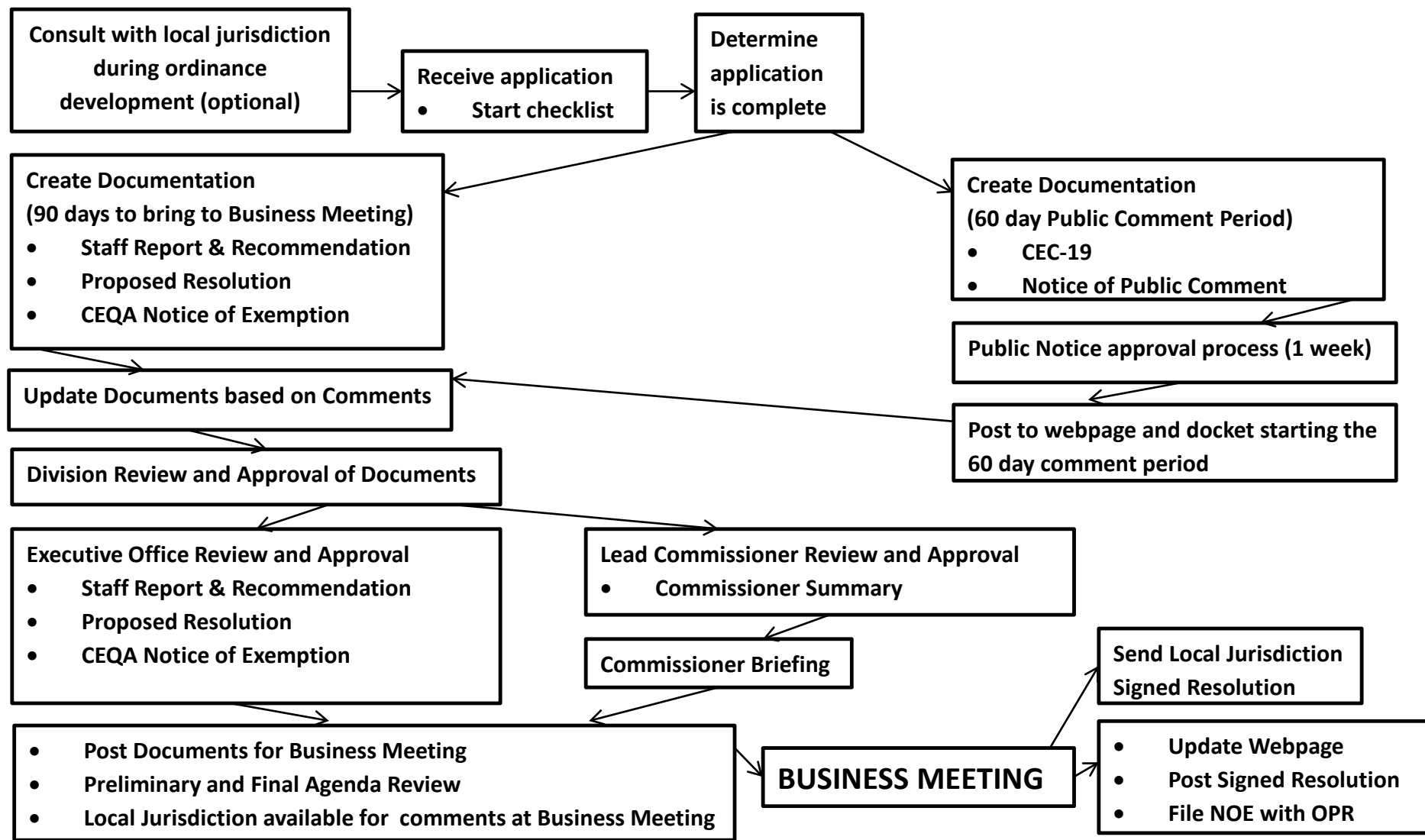
Prescriptive (Single-Measure) Based Ordinances

- 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

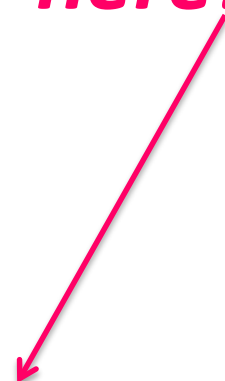




Local Energy Ordinances Exceeding the 2016 Standards

Local Jurisdiction	Date Approved	Type
Brisbane, City of	12-Jul-17	Cool Roof, Solar PV
Davis, City of	13-Dec-17	Efficiency, Solar PV
Fremont, City of	12-Jul-17	Solar PV
	27-Apr-17	Lighting
Healdsburg, City of	12-Jul-17	Efficiency
Lancaster, City of	11-Oct-17	Solar PV
Marin County	8-Mar-17	Efficiency
Mill Valley	27-Apr-17	Efficiency
Novato, City of	27-Apr-17	Efficiency
Palo Alto, City of	14-Sep-16	Efficiency, Solar PV
Portola Valley, Town of	12-Jul-17	Efficiency
San Francisco, City of	9-Nov-16	Solar PV or Solar Thermal
San Mateo, City of	14-Sep-16	Cool Roofs, Solar
Santa Monica, City of	8-Mar-17	Efficiency
	8-Mar-17	Solar PV
Local Jurisdiction	Date Available	Type
Alameda County	8-May-18	Solar
Chula Vista, City of	8-May-18	Outdoor Lighting
Marin County	22-Mar-18	Efficiency

***Your
name
here!***



Questions?

2016 Building Energy Efficiency Standards

<http://www.energy.ca.gov/title24/2016standards/index.html>

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**](mailto:Ingrid.Neumann@energy.ca.gov)

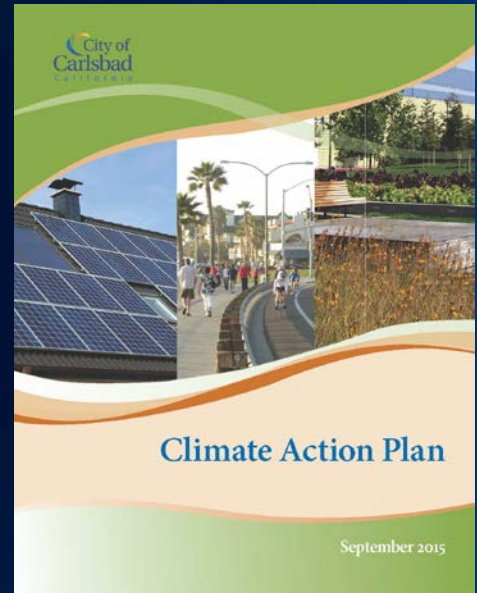
916-651-1461

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



Energy Savings Rebates



*Solar, Appliances
and More*



[Find Rebates Now](#)



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

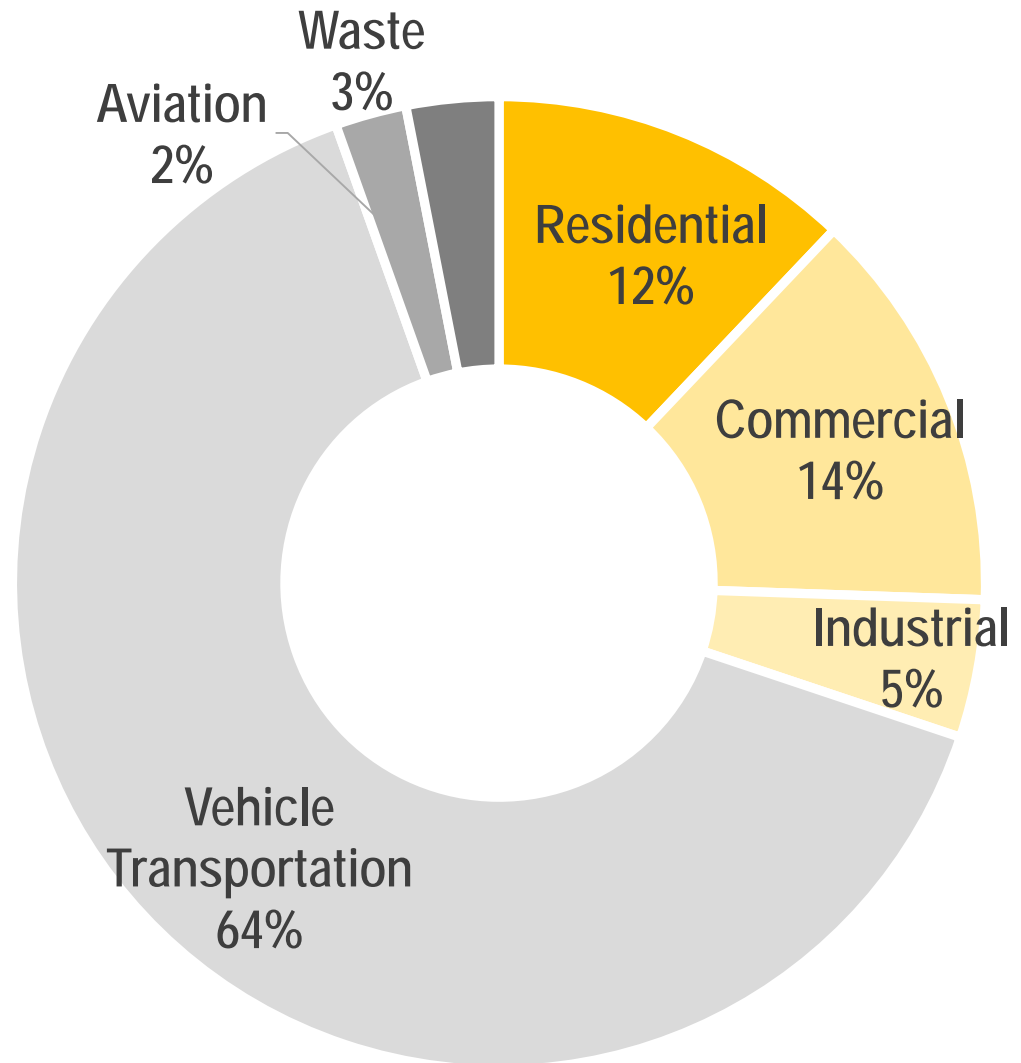
Santa Monica Zero Net Energy Reach Code

Garrett Wong, Sr. Sustainability Analyst, Climate & Energy

2018 SEEC Forum

Building energy is responsible for 31% of Santa Monica's greenhouse gas emissions

Emissions by Source (2015)



Energy Code Timeline

Santa Monica
Mandatory Solar
Requirement
Expires 12/31/16

2016



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

MAY 2017



State-wide
Zero Net Energy
Requirement
(Commercial)

2030

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 $\leq 33\%$ 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

$\text{TDV Proposed} / \text{TDV Reference} \times 100 = \text{kTDV} / \text{sf-yr}$

- 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*

Santa Monica Energy Efficiency Reach Code

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.

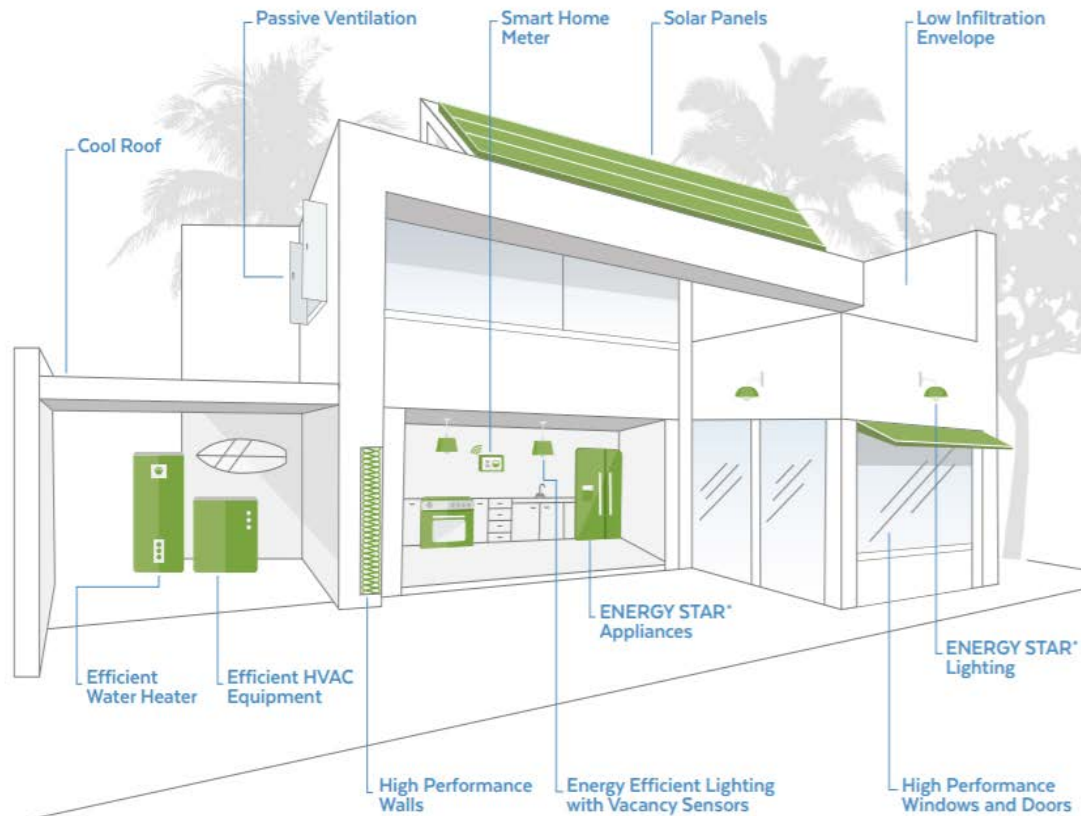
All new high-rise residential buildings, non-residential buildings, hotels and motels shall be designed to **use ten percent (10%) less energy** than the allowed energy budget established by the 2016 California Energy Code.

Building Type	Solar Requirement	Energy Code Requirement
Single Family Home	1.5 watts/sq.ft.	Zero Net Energy: 15% better than 2016 Energy Code + EDR: 0
Low-Rise Multi-Family	2 watts/sq.ft.	Zero Net Energy: 15% better than 2016 Energy Code + EDR: 0
High-Rise Multi-Family	2 watts/sq.ft.	10% better than 2016 Energy Code
Non-Res/ Industrial/ Institutional	2 watts/sq.ft.	10% better than 2016 Energy Code

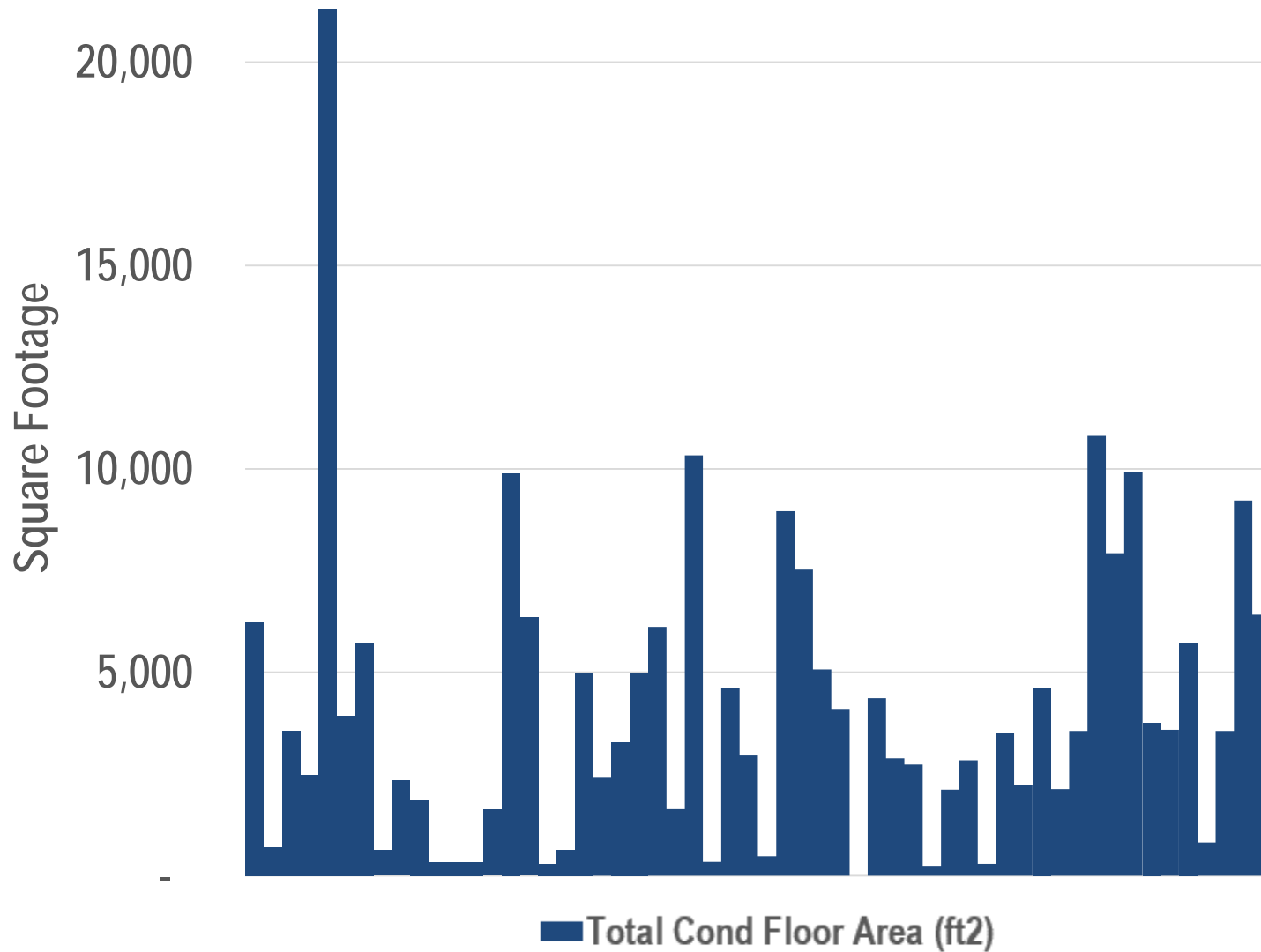
Putting the Code to Work

- **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

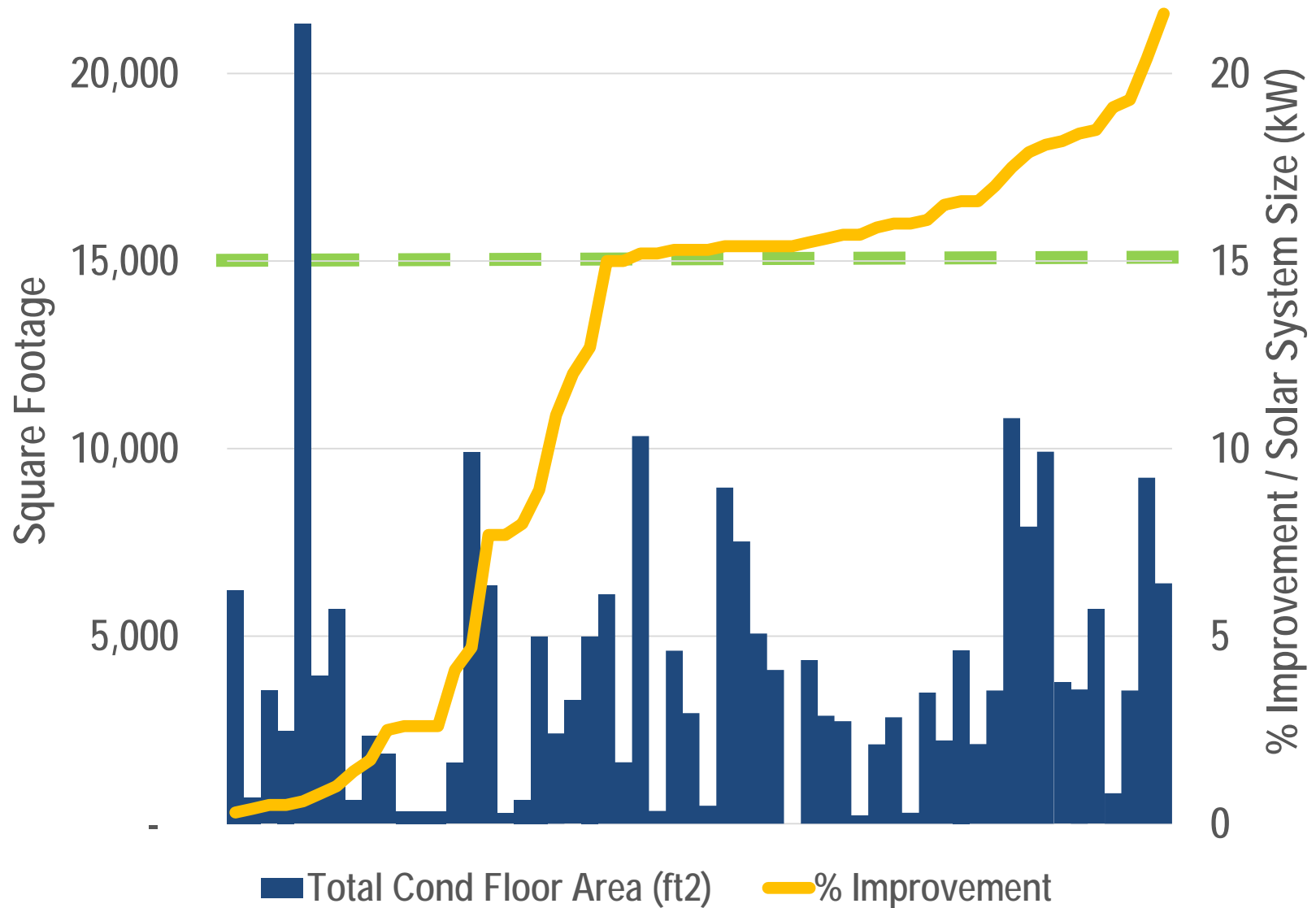
Santa Monica Residential Zero Net Energy Guide for New Construction



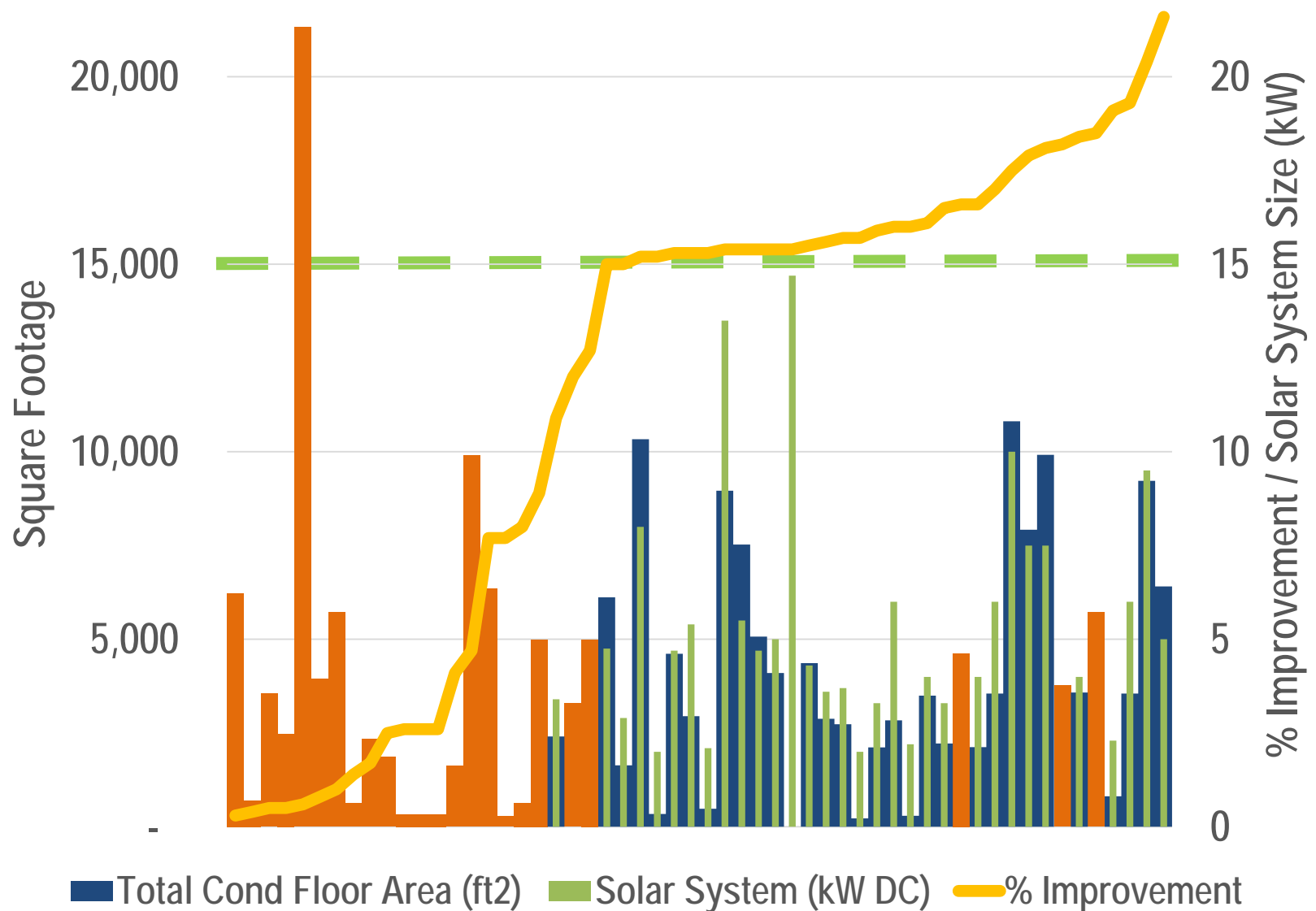
Square Footage / EE Performance / Solar System



Square Footage / EE Performance / Solar System



Square Footage / EE Performance / Solar System



Lessons Learned

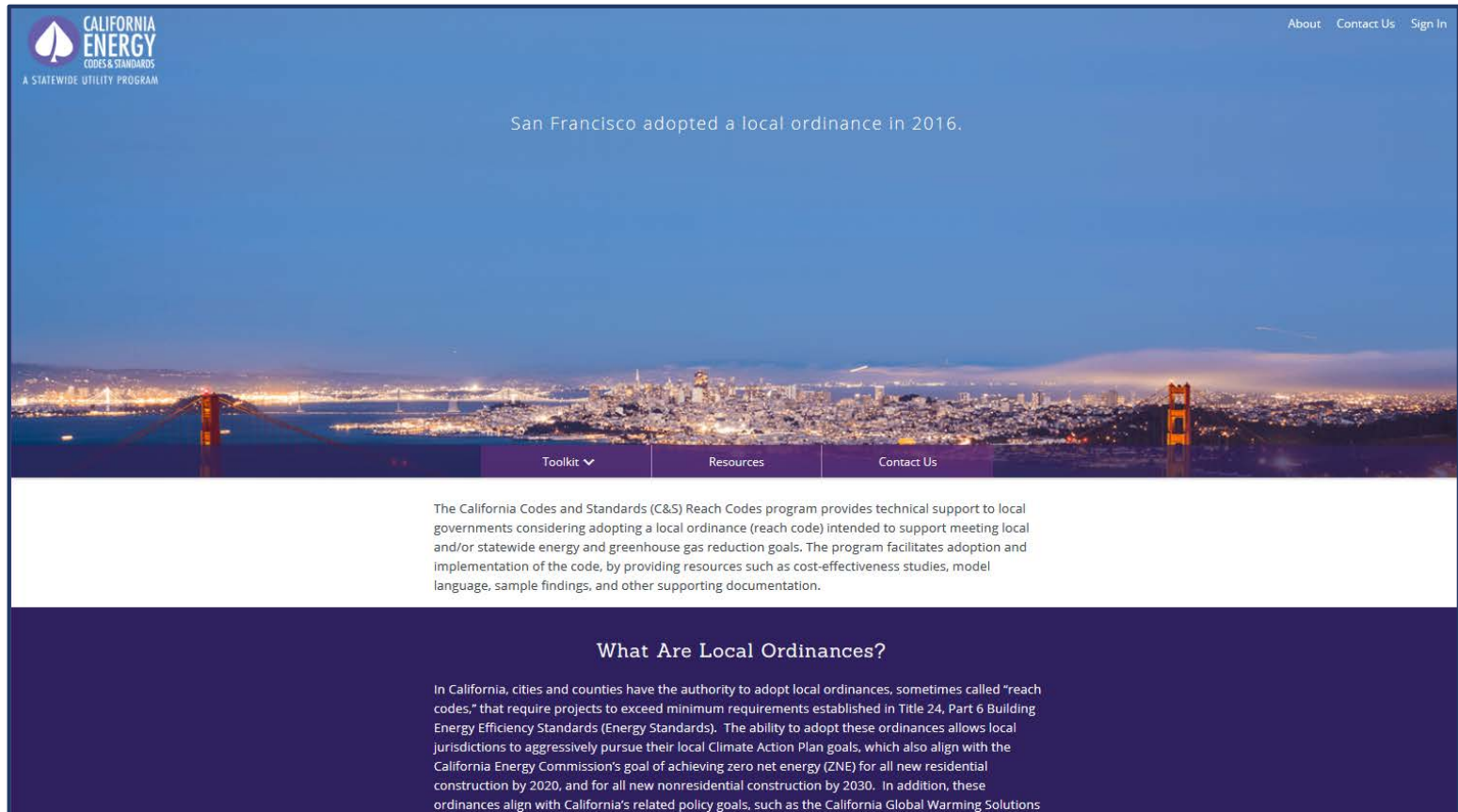
- Early collaboration with Planning and Building & Safety
- Consider alternative projects, i.e. pre-fab
- Establish tracking systems early
- Be prepared to be flexible
- Outreach, engage and educate!

Thank you!

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

2018 SEEC Forum

www.LocalEnergyCodes.com



- Model Language, Templates, Resources, Studies
- Linked to CEC, LGC, BayREN, SCREN, plus additional resources

Interactive Map of Adopted Ordinances

Screenshot of the California Energy Codes Standards website showing an interactive map of adopted ordinances.

The browser address bar shows the URL: <http://localenergycodes.com/content/local-ordinance>. The page title is "Reach Code Adoption".

The website header includes the California Energy Codes Standards logo and navigation links: About, Contact Us, Sign In.

The main navigation bar contains: Toolkit, Resources, Contact Us.

The map displays California with several cities labeled. Blue location pins are placed on the map, indicating adopted ordinances in the following cities: Santa Rosa, Sacramento, Yuba City, Chico, Reno, Carson City, Stockton, Modesto, San Francisco, San Jose, Santa Cruz, Salinas, Fresno, and Visalia. Green circles with numbers (2, 7, 3, 5) are overlaid on the map, likely representing specific ordinance versions or categories.

The map is powered by Leaflet, OpenStreetMap, and CartoDB.

The Windows taskbar at the bottom shows the search bar and several application icons. The system clock indicates the time is 4:22 PM on 5/15/2018.

What's on the horizon for reach codes?

- 2019 Standards become effective January 1, 2020.
- 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

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