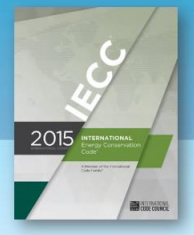
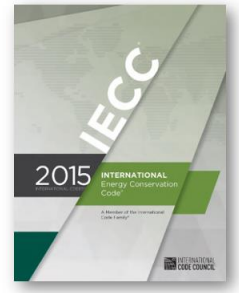
Honolulu Amendments to the 2015 IECC

Webinar
June 19, 2020



HAWAII STATE Energy Office | Hawai'i Energy | AIA Honolulu | HAWAII | ASHRAE Hawaii Chapter

Section 1
Introduction



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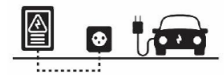
Section 2
Electric Vehicle & Solar PV Readiness



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Section 3
Hawaii Energy Incentives

Hawai'i Energy — Celebrating a Decade — Empowering Efficiency — 10

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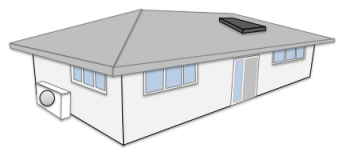
Section 4
Other Residential Amendments



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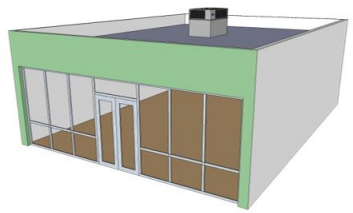
Section 5
Other Commercial Amendments



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Q&A

Erik Kolderup, PE, Kolderup Consulting
Howard Wiig, State Energy Office
Rocky Mould, Energy Program Manager, Honolulu Office of Climate Change, Sustainability & Resiliency
Brian Kealoha, Executive Director, Hawaii Energy

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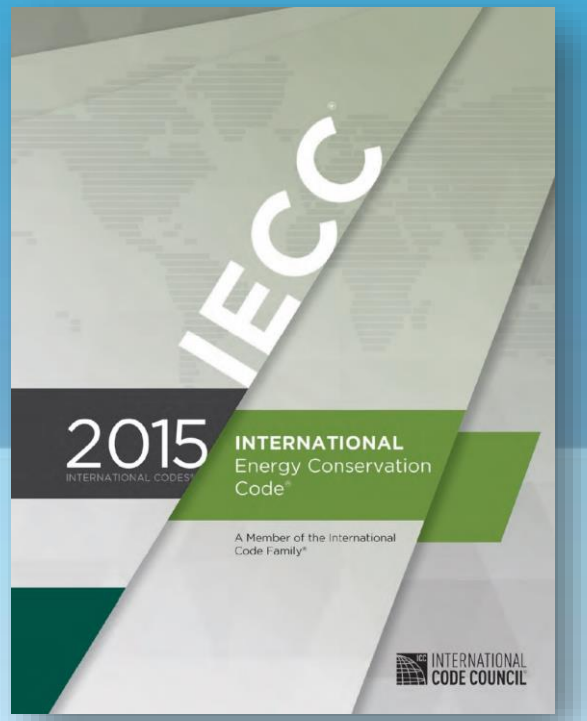


Webinar

June 19, 2020

HAWAII STATE Energy Office

Hawai'i Energy

AIA Honolulu

U.S. GREEN BUILDING COUNCIL USGBC HAWAII

ASHRAE Hawaii Chapter

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

COURSE DESCRIPTION

This 90-minute webinar covers the new City and County of Honolulu amendments to the 2015 IECC, which were approved by the City Council in May. Code changes affect both residential and nonresidential requirements. The amendments include changes to envelope efficiency and lighting control requirements as well as provisions for solar electric and electric vehicle readiness. Architects, engineers, project managers, county planning & permitting staff, developers and contractors are welcome to attend.

LEARNING OBJECTIVES

At the end of this course, participants will be able to:

1. Identify energy code amendments that apply to Honolulu projects
2. Use energy code checklists to review designs for compliance
3. Apply the electric vehicle readiness requirements to residential and nonresidential projects.
4. Apply the solar electric readiness requirements to residential projects

Introductions

Presenters

- Howard Wiig, State Energy Office
- Erik Kolderup, PE, Kolderup Consulting
- Rocky Mould, Energy Program Manager, Honolulu Office of Climate Change, Sustainability & Resiliency
- Brian Kealoha, Executive Director, Hawaii Energy

Acknowledgments

- Sehun Nakama, Hawaii Energy
- Karen Shishido, Hawaii Energy
- Gail Suzuki-Jones, State Energy Office
- Kathy Yim, State Energy Office

Topics

Introduction

PV and EV readiness requirements

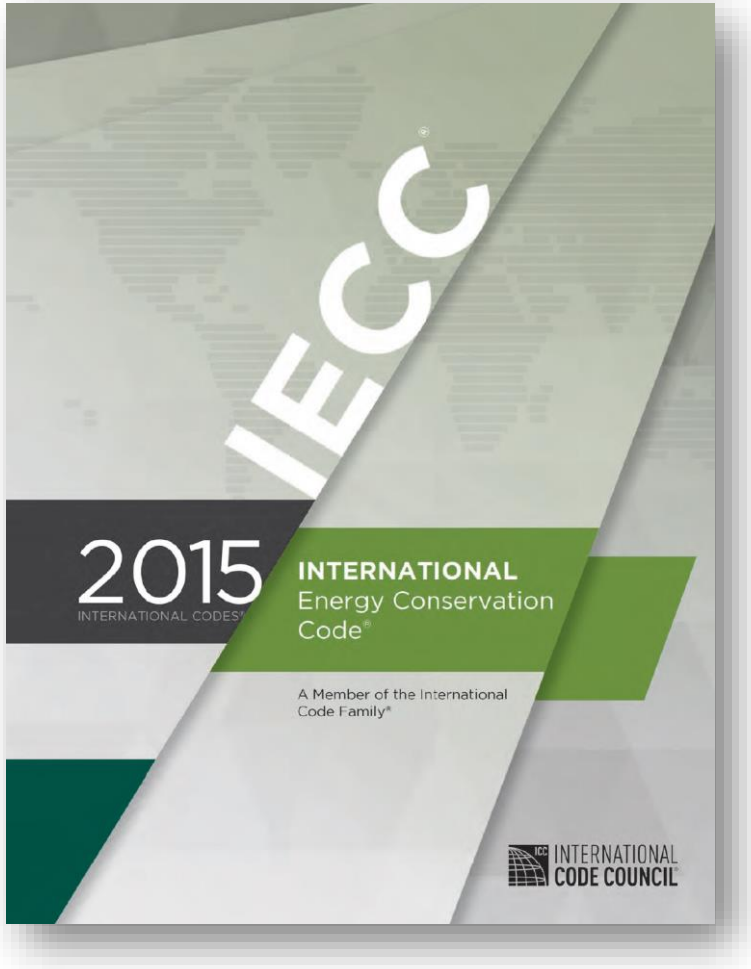
Hawaii Energy EV charging incentives

Other residential amendments

Other commercial amendments

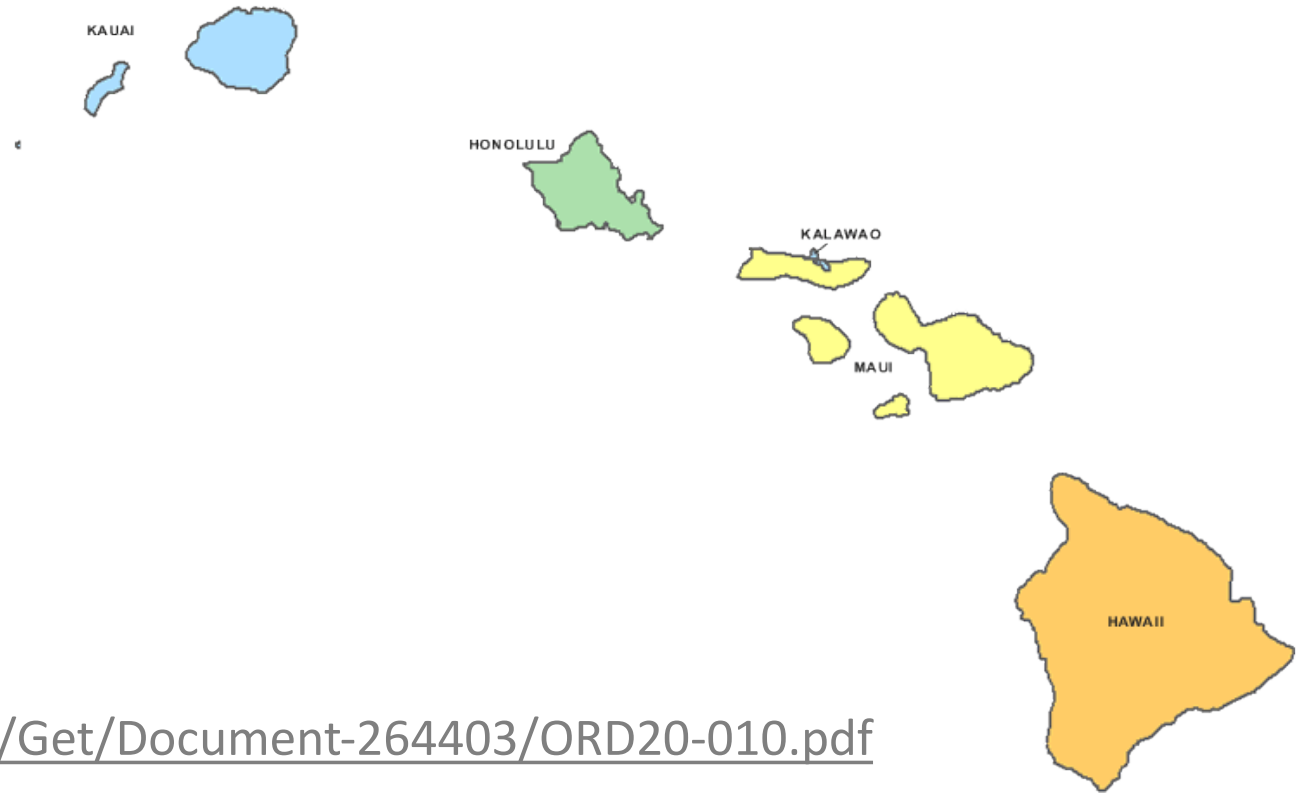
Q&A

Section 1
Introduction



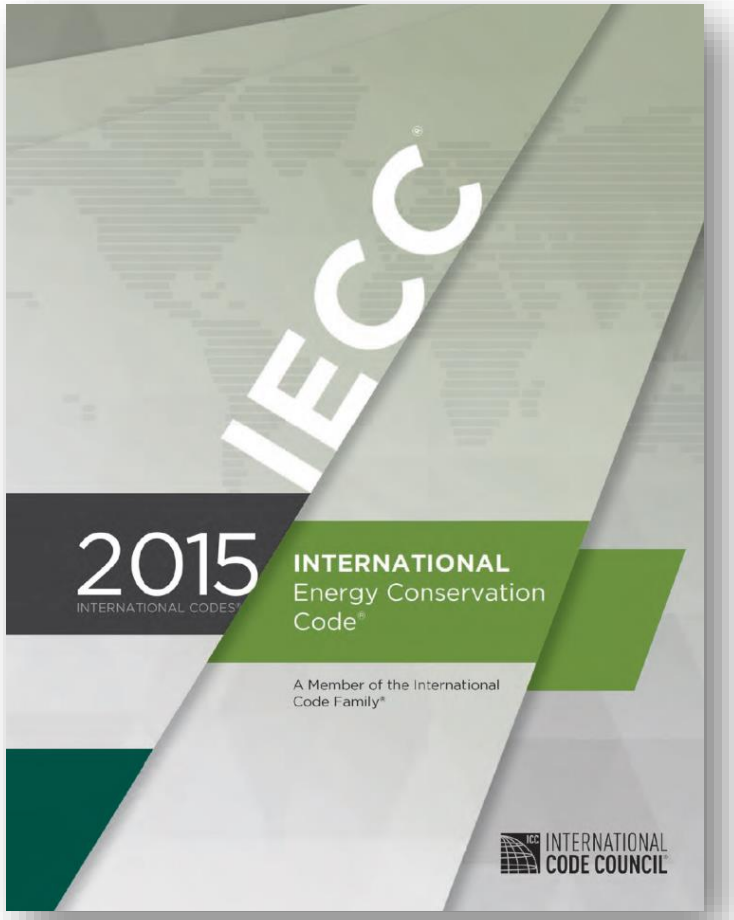
Adoption

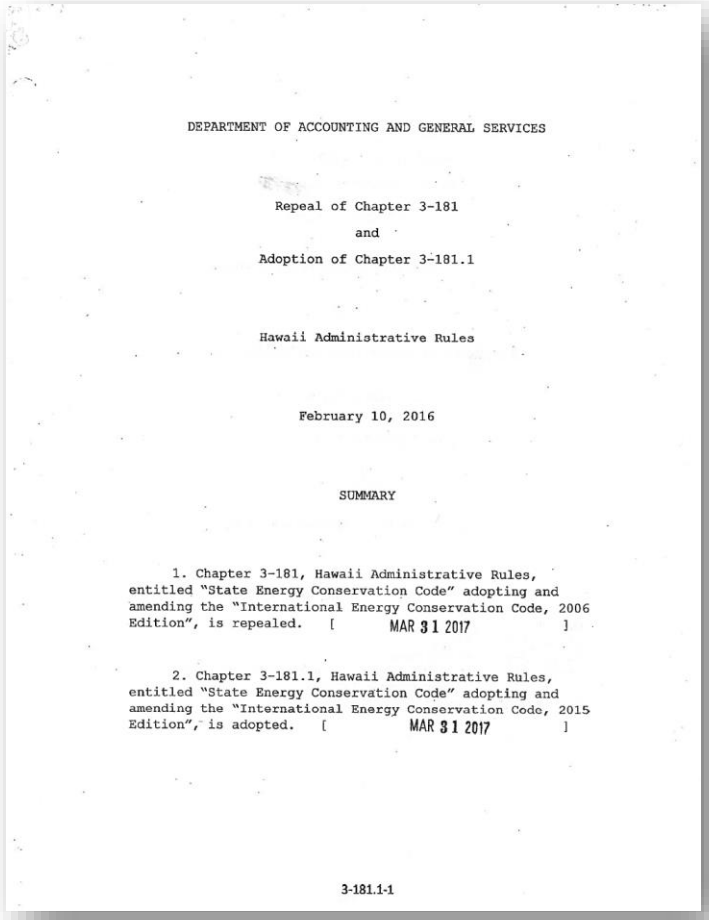
State – Mar. 2017
Kauai – Nov. 2018
Maui – Mar. 2019
Hawaii – Feb. 2020
Honolulu – June 2020



Honolulu amendments
http://www4.honolulu.gov/docushare/dsweb/Get/Document-264403/ORD20-010.pdf

Other amendments
http://energy.hawaii.gov/hawaii-energy-building-code/2015-iecc-update





DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

Repeal of Chapter 3-181
and
Adoption of Chapter 3-181.1

Hawaii Administrative Rules

February 10, 2016

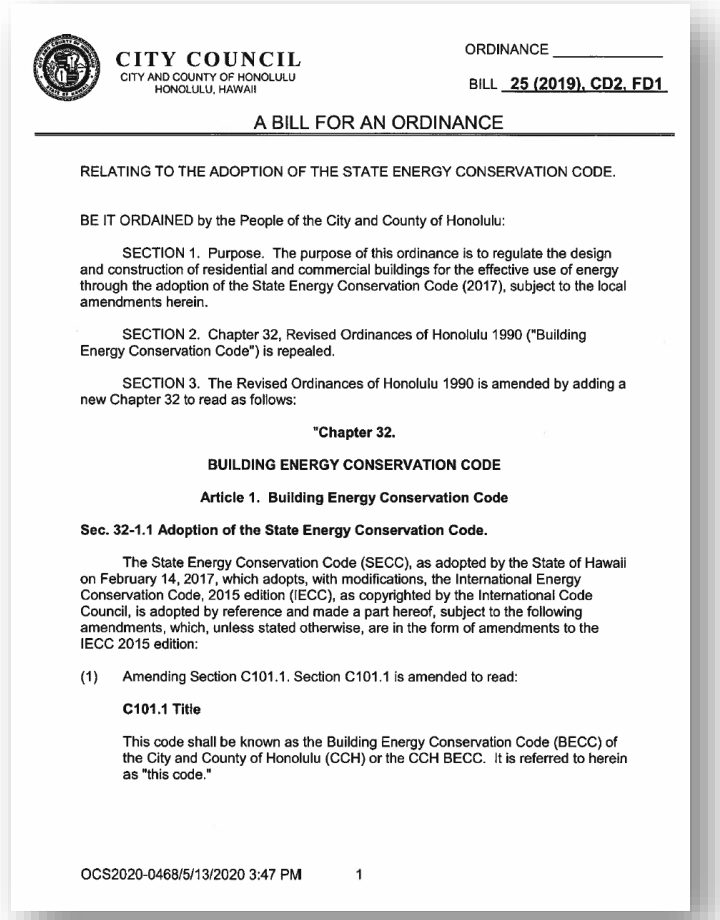
SUMMARY

1. Chapter 3-181, Hawaii Administrative Rules, entitled "State Energy Conservation Code" adopting and amending the "International Energy Conservation Code, 2006 Edition", is repealed. [MAR 31 2017]

2. Chapter 3-181.1, Hawaii Administrative Rules, entitled "State Energy Conservation Code" adopting and amending the "International Energy Conservation Code, 2015 Edition", is adopted. [MAR 31 2017]

3-181.1-1

State amendments
20 pages



CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

ORDINANCE _____

BILL 25 (2019), CD2, FD1

A BILL FOR AN ORDINANCE

RELATING TO THE ADOPTION OF THE STATE ENERGY CONSERVATION CODE.

BE IT ORDAINED by the People of the City and County of Honolulu:

SECTION 1. Purpose. The purpose of this ordinance is to regulate the design and construction of residential and commercial buildings for the effective use of energy through the adoption of the State Energy Conservation Code (2017), subject to the local amendments herein.

SECTION 2. Chapter 32, Revised Ordinances of Honolulu 1990 ("Building Energy Conservation Code") is repealed.

SECTION 3. The Revised Ordinances of Honolulu 1990 is amended by adding a new Chapter 32 to read as follows:

"Chapter 32.

BUILDING ENERGY CONSERVATION CODE

Article 1. Building Energy Conservation Code

Sec. 32-1.1 Adoption of the State Energy Conservation Code.

The State Energy Conservation Code (SECC), as adopted by the State of Hawaii on February 14, 2017, which adopts, with modifications, the International Energy Conservation Code, 2015 edition (IECC), as copyrighted by the International Code Council, is adopted by reference and made a part hereof, subject to the following amendments, which, unless stated otherwise, are in the form of amendments to the IECC 2015 edition:

(1) Amending Section C101.1. Section C101.1 is amended to read:

C101.1 Title

This code shall be known as the Building Energy Conservation Code (BECC) of the City and County of Honolulu (CCH) or the CCH BECC. It is referred to herein as "this code."

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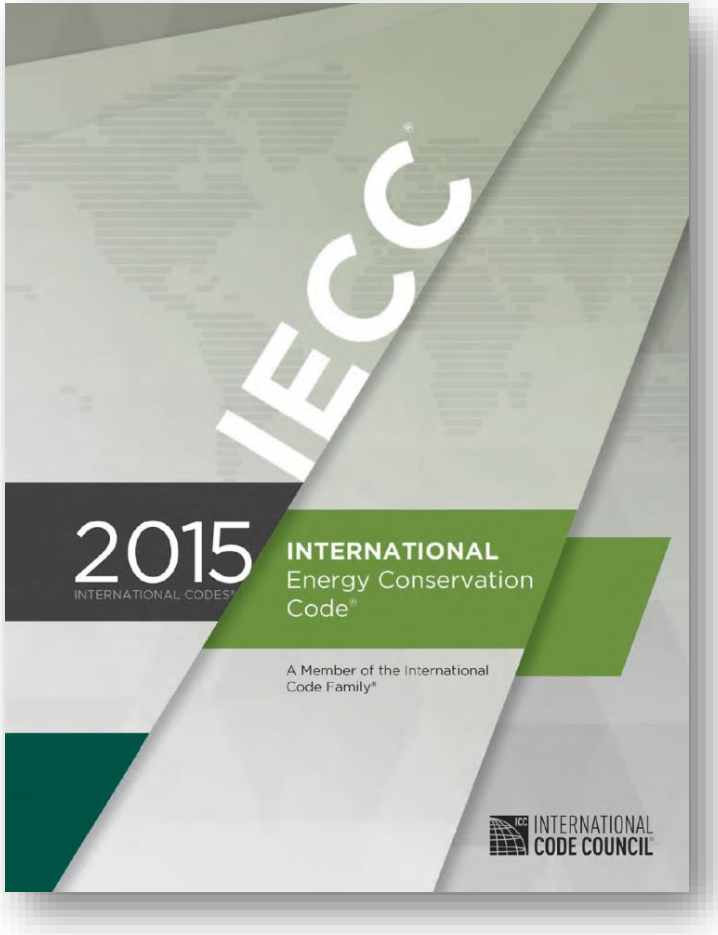
County amendments
24 pages

HAWAII STATE Energy Office
Hawai'i Energy



Commercial Provisions

Chapter 1 – Scope and Administration

Chapter 2 – Definitions

Chapter 3 – General Requirements

Chapter 4 – Commercial Energy Efficiency

Chapter 5 – Existing Buildings

Chapter 6 – References Standards

Residential Provisions

Chapter 1 – Scope and Administration

Chapter 2 – Definitions

Chapter 3 – General Requirements

Chapter 4 – Residential Energy Efficiency

Chapter 5 – Existing Buildings

Chapter 6 – References Standards

Residential

- 1- and 2-family dwellings (R-3)
- Multi-family (R-2 ≤ 3 stories)
- Residential care/assisted living (R-4 ≤ 3 stories)

Commercial

- All other buildings
  - Including R-1 (hotels)

Courtesy Daniel Sandomire, Armstrong Builders

Amended IECC sections - residential

IECC Section	Description	State or Honolulu Amendment
R103.1	Designer certification	State
R402.1	Low-energy buildings (envelope scope)	State
R401.2.1	Tropical Zone	Honolulu
R402.1	Wall – mass (CMU or concrete)	Honolulu
R402.3	Windows	Honolulu
R402.4.1.3	Air leakage – sampling	Honolulu
R403.5.5	Water heating – solar systems	Honolulu
R404.2	Ceiling fans	Honolulu
R404.2	Solar conduit and electrical panel readiness	Honolulu
R404.3	Electric vehicle readiness	Honolulu
R407	Points Option	Honolulu
R503.1.1	Roof replacement	Honolulu

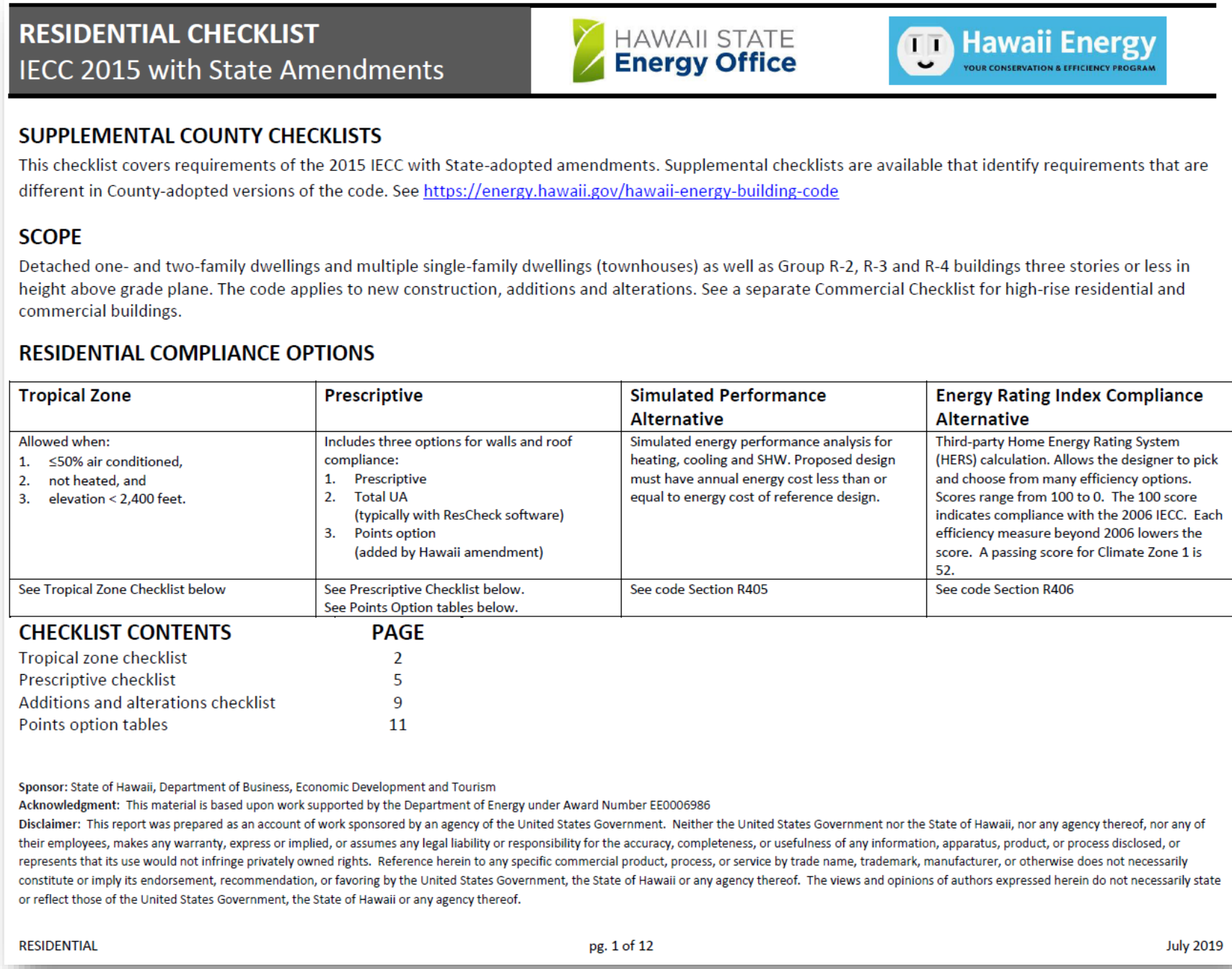
Amended IECC sections - commercial

IECC Section	Description	State or Honolulu Amendment
C103.1, C103.2	Designer certification	Honolulu
C402.1.1	Low-energy buildings (envelope scope)	State
C402.1, C402.2	Wall – mass (CMU or concrete)	Honolulu
C402.1, C402.2	Wall – metal frame	State
C402.1, C402.2	Wall – wood frame and other	State
C402.4.3	Windows – solar heat gain coefficient (SHGC)	Honolulu
C402.4.1.2	Skylights – maximum area	Honolulu
C403.2.4.2.4	Door switches	Honolulu
C405.2.2	Controls - time-switch	Honolulu
C405.2.2.2	Controls – light reduction	Honolulu
C405.2.3	Controls - daylight-responsive	Honolulu
C405.2.4	Controls – guest rooms	State
C405.10	Electrical sub-metering	State
C406.8	Electric vehicle infrastructure	Honolulu
C406.3	Reduced lighting power density	Honolulu
C408.2	Mechanical system commissioning	Honolulu
C503.1, C503.3.1	Roof replacement	Honolulu

Resources

Checklists

- Residential, 12 pages
- Commercial, 19 pages
- County supplements



RESIDENTIAL CHECKLIST
IECC 2015 with State Amendments

HAWAII STATE Energy Office

Hawaii Energy
YOUR CONSERVATION & EFFICIENCY PROGRAM

SUPPLEMENTAL COUNTY CHECKLISTS

This checklist covers requirements of the 2015 IECC with State-adopted amendments. Supplemental checklists are available that identify requirements that are different in County-adopted versions of the code. See https://energy.hawaii.gov/hawaii-energy-building-code

SCOPE

Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane. The code applies to new construction, additions and alterations. See a separate Commercial Checklist for high-rise residential and commercial buildings.

RESIDENTIAL COMPLIANCE OPTIONS

Tropical Zone	Prescriptive	Simulated Performance Alternative	Energy Rating Index Compliance Alternative
Allowed when: 1. ≤50% air conditioned, 2. not heated, and 3. elevation < 2,400 feet.	Includes three options for walls and roof compliance: 1. Prescriptive 2. Total UA (typically with ResCheck software) 3. Points option (added by Hawaii amendment)	Simulated energy performance analysis for heating, cooling and SHW. Proposed design must have annual energy cost less than or equal to energy cost of reference design.	Third-party Home Energy Rating System (HERS) calculation. Allows the designer to pick and choose from many efficiency options. Scores range from 100 to 0. The 100 score indicates compliance with the 2006 IECC. Each efficiency measure beyond 2006 lowers the score. A passing score for Climate Zone 1 is 52.
See Tropical Zone Checklist below	See Prescriptive Checklist below. See Points Option tables below.	See code Section R405	See code Section R406

CHECKLIST CONTENTS

Sponsor: State of Hawaii, Department of Business, Economic Development and Tourism
Acknowledgment: This material is based upon work supported by the Department of Energy under Award Number EE0006986

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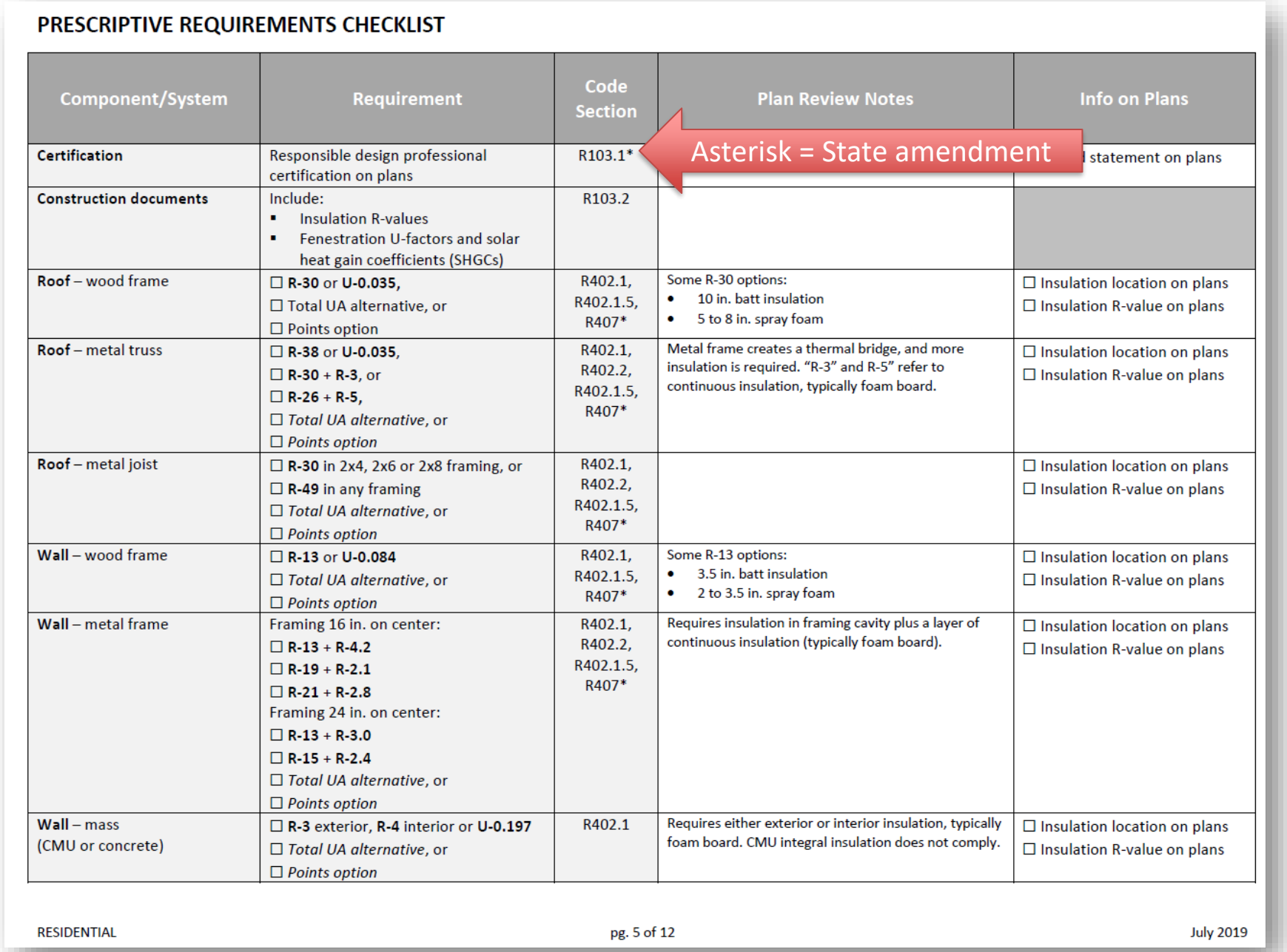

PRESCRIPTIVE REQUIREMENTS CHECKLIST

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Certification	Responsible design professional certification on plans	R103.1*	Asterisk = State amendment	l statement on plans
Construction documents	Include: ▪ Insulation R-values ▪ Fenestration U-factors and solar heat gain coefficients (SHGCs)	R103.2		
Roof – wood frame	☐ **R-30** or **U-0.035**, ☐ Total UA alternative, or ☐ Points option	R402.1, R402.1.5, R407*	Some R-30 options: • 10 in. batt insulation • 5 to 8 in. spray foam	☐ Insulation location on plans ☐ Insulation R-value on plans
Roof – metal truss	☐ **R-38** or **U-0.035**, ☐ **R-30** + **R-3**, or ☐ **R-26** + **R-5**, ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.2, R402.1.5, R407*	Metal frame creates a thermal bridge, and more insulation is required. "R-3" and R-5" refer to continuous insulation, typically foam board.	☐ Insulation location on plans ☐ Insulation R-value on plans
Roof – metal joist	☐ **R-30** in 2x4, 2x6 or 2x8 framing, or ☐ **R-49** in any framing ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.2, R402.1.5, R407*		☐ Insulation location on plans ☐ Insulation R-value on plans
Wall – wood frame	☐ **R-13** or **U-0.084** ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.1.5, R407*	Some R-13 options: • 3.5 in. batt insulation • 2 to 3.5 in. spray foam	☐ Insulation location on plans ☐ Insulation R-value on plans
Wall – metal frame	Framing 16 in. on center: ☐ **R-13** + **R-4.2** ☐ **R-19** + **R-2.1** ☐ **R-21** + **R-2.8** Framing 24 in. on center: ☐ **R-13** + **R-3.0** ☐ **R-15** + **R-2.4** ☐ *Total UA alternative*, or ☐ *Points option*	R402.1, R402.2, R402.1.5, R407*	Requires insulation in framing cavity plus a layer of continuous insulation (typically foam board).	☐ Insulation location on plans ☐ Insulation R-value on plans
Wall – mass (CMU or concrete)	☐ **R-3** exterior, **R-4** interior or **U-0.197** ☐ *Total UA alternative*, or ☐ *Points option*	R402.1	Requires either exterior or interior insulation, typically foam board. CMU integral insulation does not comply.	☐ Insulation location on plans ☐ Insulation R-value on plans

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Resources

Checklists

- Residential, 12 pages
- Commercial, 19 pages
- County supplements

RESIDENTIAL CHECKLIST
Honolulu County Supplement

HAWAII STATE Energy Office

Hawaii Energy
YOUR CONSERVATION & EFFICIENCY PROGRAM

OVERVIEW

Honolulu County adopted the 2015 IECC with amendments in June 2020, and the Honolulu amendments incorporate those adopted by the State of Hawaii on March 21, 2017 with some changes. This supplemental checklist includes only the requirements that differ in Honolulu County compared to the State amendments. The complete requirements of the 2015 IECC with State amendment are described in a separate checklist.

AMENDED TROPICAL ZONE REQUIREMENTS

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
Windows – solar heat gain coefficient (SHGC)	≤ **0.25** if projection factor < 0.30 ≤ **0.40** if projection factor 0.30-0.50 N/A: projection factor ≥ 0.5. N/A: north windows if PF > 0.20 Jalousie windows exempt from SHGC requirement	R401.2.1	SHGC = solar heat gain factor. Low SHGC typically requires dual-pane glazing with a low-emittance coating that is designed to reduce solar heat gain. vertical distance from overhang to bottom of window. Overhang must extend at least 2 ft on each side of the window or to the nearest wall, whichever is less.	☐ SHGC indicated on plans ☐ Overhang dimensions on plans, if applicable
Ceiling fans	Ceiling fans or rough-ins or whole-house fan required for: ▪ Each bedroom ▪ Largest space not used as a bedroom	R401.2.1		☐ Ceiling fan locations on plans

Underlines and strikethroughs

RESIDENTIAL – HONOLULU COUNTY SUPPLEMENT pg. 1 of 5 June 2020

Resources

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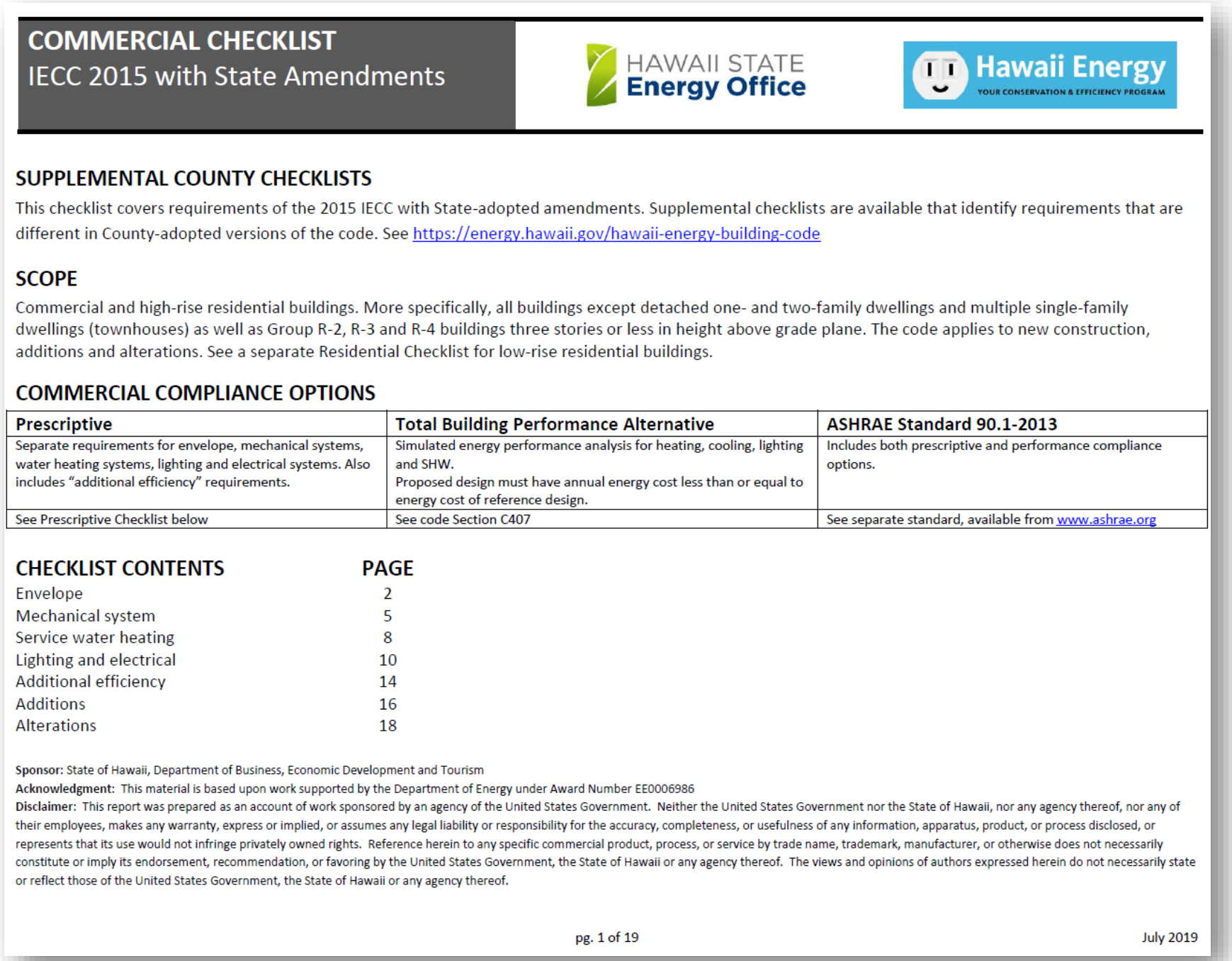

COMMERCIAL CHECKLIST
IECC 2015 with State Amendments

HAWAII STATE Energy Office

Hawaii Energy
YOUR CONSERVATION & EFFICIENCY PROGRAM

SUPPLEMENTAL COUNTY CHECKLISTS

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SCOPE

Commercial and high-rise residential buildings. More specifically, all buildings except detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane. The code applies to new construction, additions and alterations. See a separate Residential Checklist for low-rise residential buildings.

COMMERCIAL COMPLIANCE OPTIONS

Prescriptive	Total Building Performance Alternative	ASHRAE Standard 90.1-2013
Separate requirements for envelope, mechanical systems, water heating systems, lighting and electrical systems. Also includes "additional efficiency" requirements.	Simulated energy performance analysis for heating, cooling, lighting and SHW. Proposed design must have annual energy cost less than or equal to energy cost of reference design.	Includes both prescriptive and performance compliance options.
See Prescriptive Checklist below	See code Section C407	See separate standard, available from www.ashrae.org

CHECKLIST CONTENTS	PAGE
Envelope	2
Mechanical system	5
Service water heating	8
Lighting and electrical	10
Additional efficiency	14
Additions	16
Alterations	18

Sponsor: State of Hawaii, Department of Business, Economic Development and Tourism
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COMMERCIAL CHECKLIST
Honolulu Supplement

HAWAII STATE Energy Office

Hawaii Energy
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AMENDED ENVELOPE REQUIREMENTS

Component/System	Requirement	Code Section	Plan Review Notes	Info on Plans
ENVELOPE REQUIREMENTS				
Wall – mass (CMU or concrete)	**R-5.7** or **U-0.151** (Insulation not required with reflectance ≥0.64, shading PF≥0.3 or wall thickness ≥6 in.)	C402.1, C402.2	Requires either exterior or interior insulation. CMU integral insulation does not comply. No insulation is required if the mass wall has an exterior visible light reflectance of at least 64% or the wall is shaded with overhangs with projection that is at least 0.3 times the height of the wall or the wall is at least 6 inches thick.	☐ Insulation location on plans ☐ Insulation R-value on plans ☐ Wall surface visible light reflectance on plans (if applicable)
Windows – solar heat gain coefficient (SHGC)	≤ **0.25** if projection factor < 0.2. ≤ **0.30** if projection factor 0.2-0.5. ≤ **0.40** if projection factor ≥ 0.5. (Area-weighted average permitted) Jalousie windows exempted from SHGC requirement	C402.4.3	Projection factor = horizontal projection of overhang ÷ vertical distance from overhang to bottom of window. Area-weighted average SHGC allowed (by Hawaii amendment).	☐ SHGC indicated on plans ☐ Overhang dimensions on plans, if applicable
Skylights – maximum area	**≤ 3%** of gross roof area (≤ 5% when meeting daylighting requirements) (or ≤ 5% if lighting power ≤60% of allowance)	C402.4.1.2	Up to 5% allowed when space under the skylight has daylight-responsive controls or if the lighting power is no greater than 60% of the allowed power. If the project cannot comply with the prescriptive limit on skylight area, then it must comply with Section C407 Total Building Performance.	

Resources

Designer & Reviewer Checklists

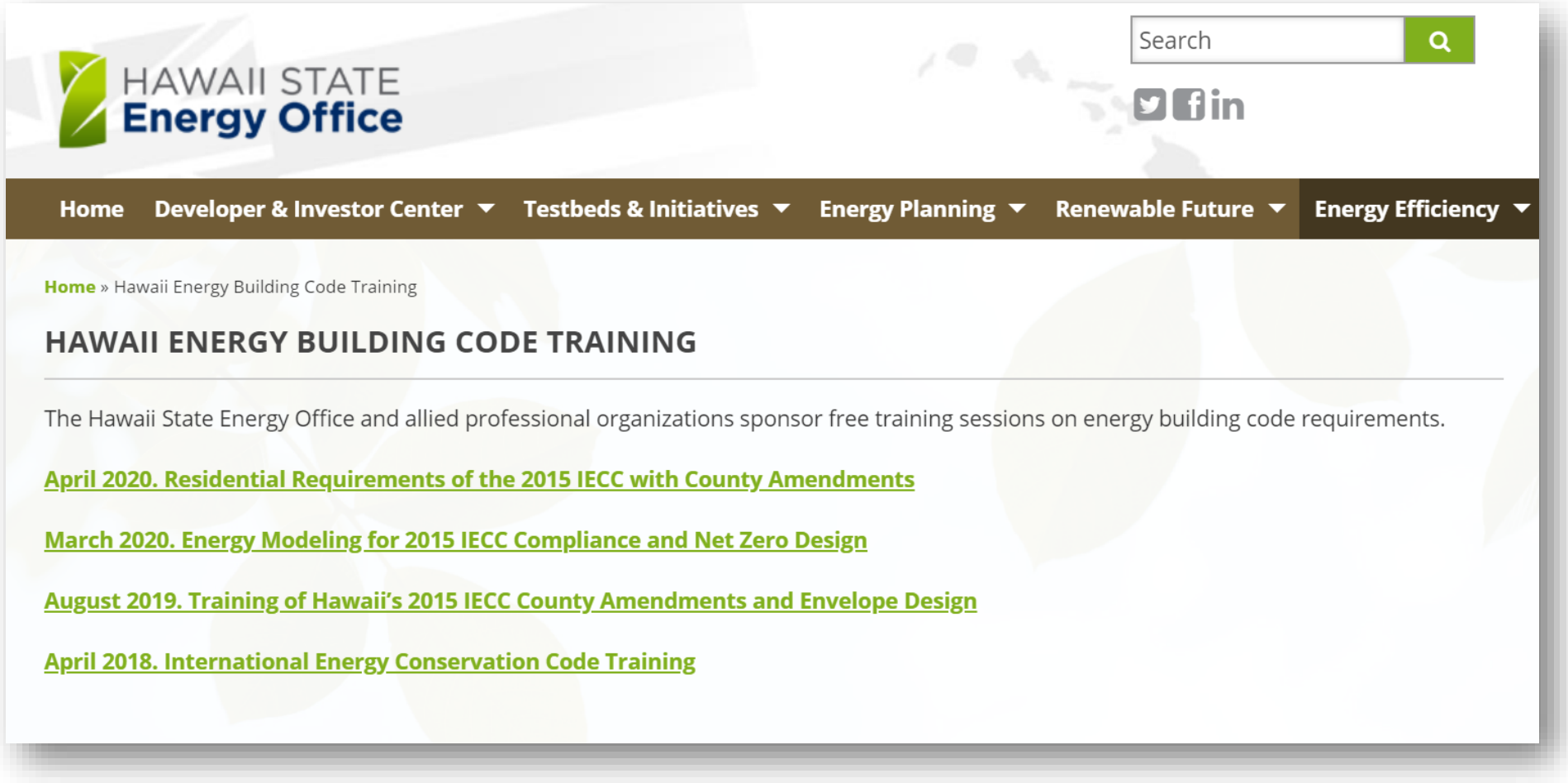
The following checklists are designed to simplify energy code compliance for Commercial building Designers and simplify review for Code Official Plan Reviewers. IECC 2006 checklists are provided as reference, while the IECC 2015 is based on the national code. State amendments have been made and counties may further amend, so be sure to check with the State Energy Office for the latest amended versions of the energy code.

- 2006 IECC Commercial Designer Checklist
- 2006 IECC Commercial Reviewer Checklist
- 2015 IECC Commercial Designer Checklist
- 2015 IECC Commercial Reviewer Checklist
- Checklist 2015 IECC Commercial
- Checklist 2015 IECC Commercial HonoluluSupplement
- Checklist 2015 IECC Residential
- Checklist 2015 IECC Residential HonoluluSupplement
- PY14 Code Compliance Study Maui & Hawaii Counties
- PY15 Code Compliance Study, Hawaii, Honolulu, & Maui counties
- 2018 Code Compliance Study (DBEDT), Hawai'I, Honolulu, Maui, Kaua'i Islands

https://hawaiienergy.com/codes

Resources

Past training



https://energy.hawaii.gov/building-code-training

Section 2

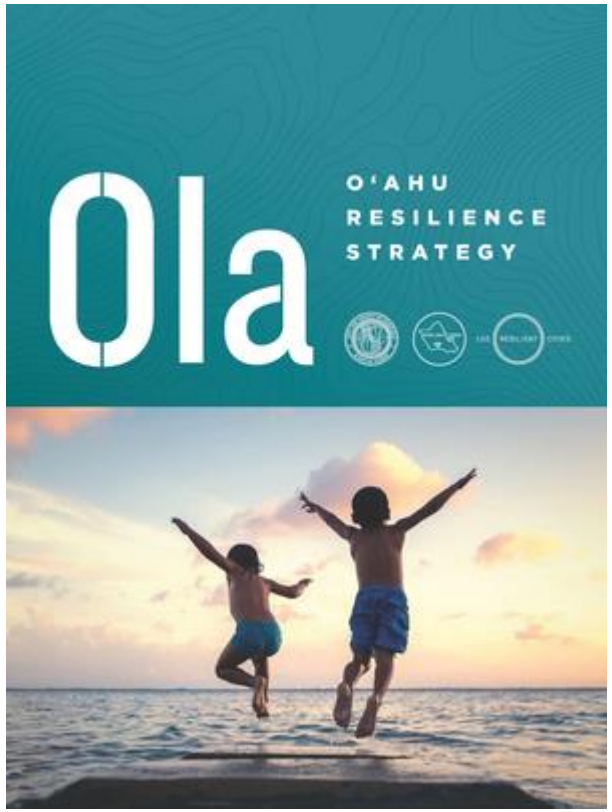
Electric Vehicle & Solar PV Readiness

City and County of Honolulu

Energy Code Update
EV and PV Readiness

Presented by Rocky Mould
Office of Climate Change, Sustainability and Resiliency
June 19, 2020

Balancing Goals



Remaining Rooted

Bouncing Forward

Climate Security

Community Cohesion

Impact of IECC Energy Code Update

- Supports resilience goals of reducing long term costs for residents and mitigating carbon emissions
- In 2018, a six-year old home that was constructed to the 2006 codes instead of the contemporary 2015 version has been using approximately **33% more energy** than needed for the past six years and **will continue for the life of the home** (30+ years)
- Tropical Code estimated at **48% energy savings** and reduction in building costs

IECC 2015 Energy and Carbon Impact – O‘ahu

Annual # of Private Residential Construction Permits 2019 - 2021	30 Year Cumulative Savings per Household	30 Year Cumulative Energy Savings to Residents	30 Year Cumulative Carbon Pollution Reduced (metric tons CO2)	Equivalent of Avoided Imported Barrels of Oil
2,500	$24,004	$168,595,892	271,085	627,619
5,000	$24,004	$314,415,377	416,764	964,897
10,000	$24,004	$550,827,744	833,528	1,929,794

- Equivalent savings calculated via EPA's Greenhouse Gas Equivalencies Calculator
- Annual # of homes estimated based on DBEDT's new private residential construction permits authorized from 2014-2016
- Assumptions based on 1.5% annual inflation and monthly electricity consumption of 500 kWh at $0.295 per kWh
- Tropical code impact not included

Climate Security

Action 27:
Transform the City's Public Fleet to 100 Percent Renewable Fuel by 2035

Performance Metric: % of City fleet comprised of hybrid and zero emissions vehicles

Photo Credit: City and County of Honolulu

Climate Security

Action 20:
Reduce Taxpayer Expense and Increase Renewable Energy through City-wide Energy Performance Contracts

Performance Metric: Increase in kW of renewable energy generation produced at City facilities

Photo credit: Honolulu Board of Water Supply

Climate Security

Action 24:
Expand Electric Vehicle Charging Infrastructure Island-wide

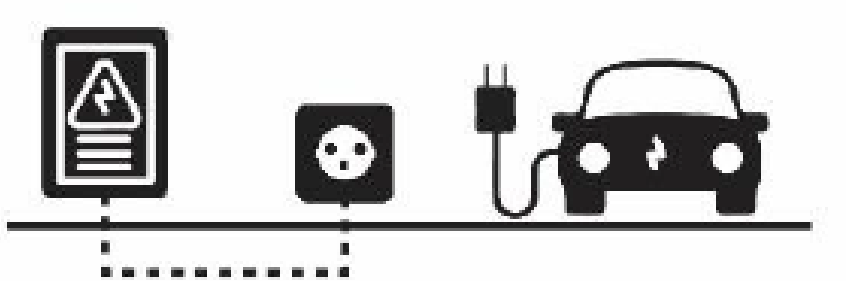
Performance Metric: number of public EV charging points installed on City properties

Notable Local Additions – Adopted CD2, FD1

- **R404.3 - Electric Vehicle Readiness**
  - **In addition to what is required by the Electrical Code, if a building permit application involves the installation of an electrical panel and parking area for either a multifamily dwelling of three stories or less or a detached dwelling or duplex, a dedicated receptacle for an electrical vehicle must be provided for with a minimum AC Level 2 charge in each enclosed attached garage, as defined in this code.**

Notable Local Additions – Adopted CD2, FD1

- **C406.8 - Electric Vehicle Infrastructure**



CHARGE METHODS ELECTRICAL RATING

Charge Method	Normal Supply Voltage (Volts)	Maximum Current (Amps- Continuous)	Supply power
AC Level 2 (enclosed attached residential garages only)	208 to 240 AC, 1-phase	Minimum 16A	208/240VAC/20-100A (16A-80A continuous)
AC Level 2	208 to 240V AC, 1-phase	Minimum 32A	208/240VAC/40-100A (32a-80A continuous)

Notable Local Additions – Adopted CD2, FD1

- **C406.8.1 – Baseline percentage electric vehicle readiness compliance path**
  - Newly-constructed parking stalls for newly constructed residential multi-unit buildings that add eight or more new parking stalls must be electric vehicle charger ready for at least 25 percent of the newly-added parking stalls. Newly-constructed parking stalls for newly-constructed commercial buildings that add 12 or more new parking stalls must be electric vehicle charger ready for at least 25 percent for the newly-added parking stalls
  - "Electric vehicle charger ready" means that sufficient wire, conduit, electrical panel service capacity, overcurrent protection devices, and suitable termination points are provided to connect to a charging station capable of providing simultaneously an AC Level 2 charge per required parking stall

Notable Local Additions – Adopted CD2, FD1

- **C406.8.1 – Baseline percentage electric vehicle readiness compliance path (continued)**

Residential Multi-Unit, Commercial, and Retail

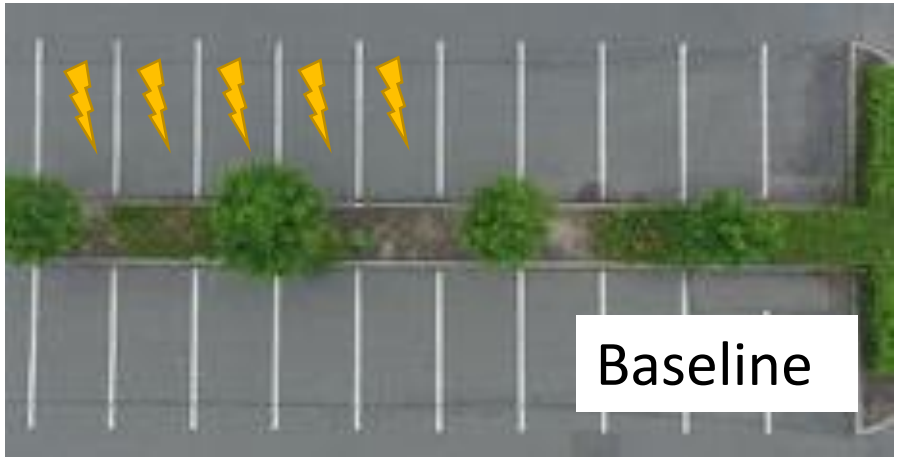
25% of new parking stalls
Multi-Unit- 8 or more parking stalls
Commercial- 12 or more parking stalls

Retail Buildings only **20%** new parking stalls (“discounted” compliance requirement)

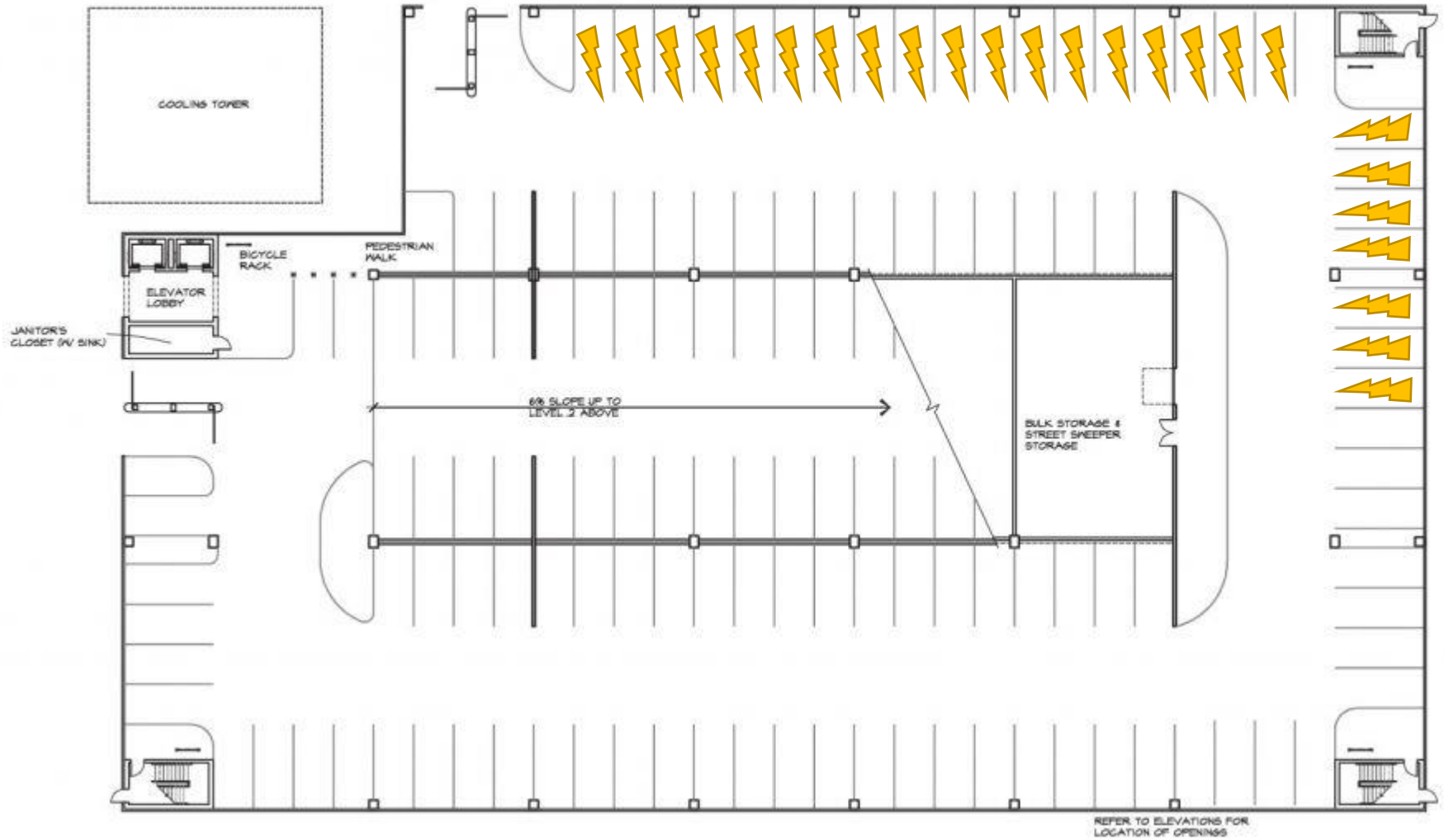
Affordable Housing

20% of new parking stalls for households earning 100% to 140% AMI (“discounted” compliance requirement)
100% and below AMI are fully exempted. No EV-Ready parking stalls required.

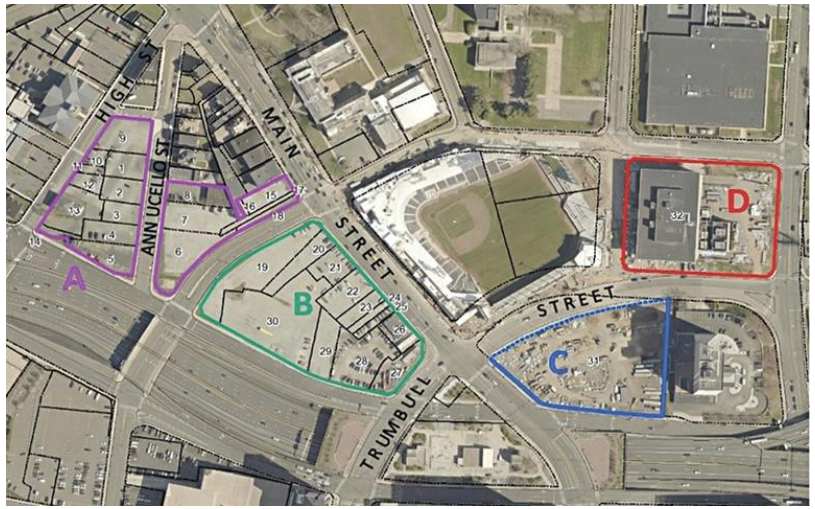
Electric Vehicle “EV” Readiness (Parking Lot, 20 stalls)



Electric Vehicle “EV” Readiness (100 stalls- Parking w/ 25% charging)



Added in Flexibility for Designer Pros and Developers



Notable Local Additions – Adopted CD2, FD1

- **R406.8.2- Points-based electric vehicle readiness compliance path-**
  - **Newly-constructed parking stalls for newly constructed residential multi-unit buildings that add eight or more newly-added parking stalls must be equipped to achieve no less than one point for every four parking stalls based on the EV charger capacity requirements and values listed in Table C406.8.2. Newly-constructed parking stalls for newly-constructed commercials buildings that add twelve or more newly-added parking stalls must be equipped to achieve no less than one point for every four parking stalls based on the capacity requirements and values listed in Table C406.8.2.**

Electric Vehicle Readiness – Points Table

Table C406.8.2
ELECTRIC VEHICLE READINESS POINTS-BASED COMPLIANCE VALUES

			Compliance Points		
Electric Vehicle Charger Capacity Level	**Charging Rate (kW) at 208 Vac**	**Time to charge 50 kW battery (hrs)**	**Dedicated EV Ready Stalls**	**Common Area EV Ready Stalls**	**Common Area Stall w/ EV Charging Equipment Installed**
Level 2, Minimum 16A	**3.4**	15	1 (in enclosed attached garage)	N/A	N/A
Level 2, Minimum 32A	**6.7**	7.5	1	4	7
Level 2, 64A to 80A	**13.3**	3.8	1	7	14
DCFC 50 kW (480/277 Vac 3-phase)	**50.0**	1.0	1	25	50

EV-Readiness Points-based System – Adopted CD2, FD1

- **C406.8.2 – Points-based electric vehicle readiness compliance path (continued)**
  - Parking for Retail can only utilize “Dedicated” or “Common Area with EVSE Installed”
  - Developers can aggregate points over multiple projects provided that no single project is less then 10% of compliance for the single project or at least one parking space, whichever is greater.
    - Aggregation plans must be submitted and verified at the time of permitting
  - Retail and AMI compliance “discounts” and exemptions apply to points table as well

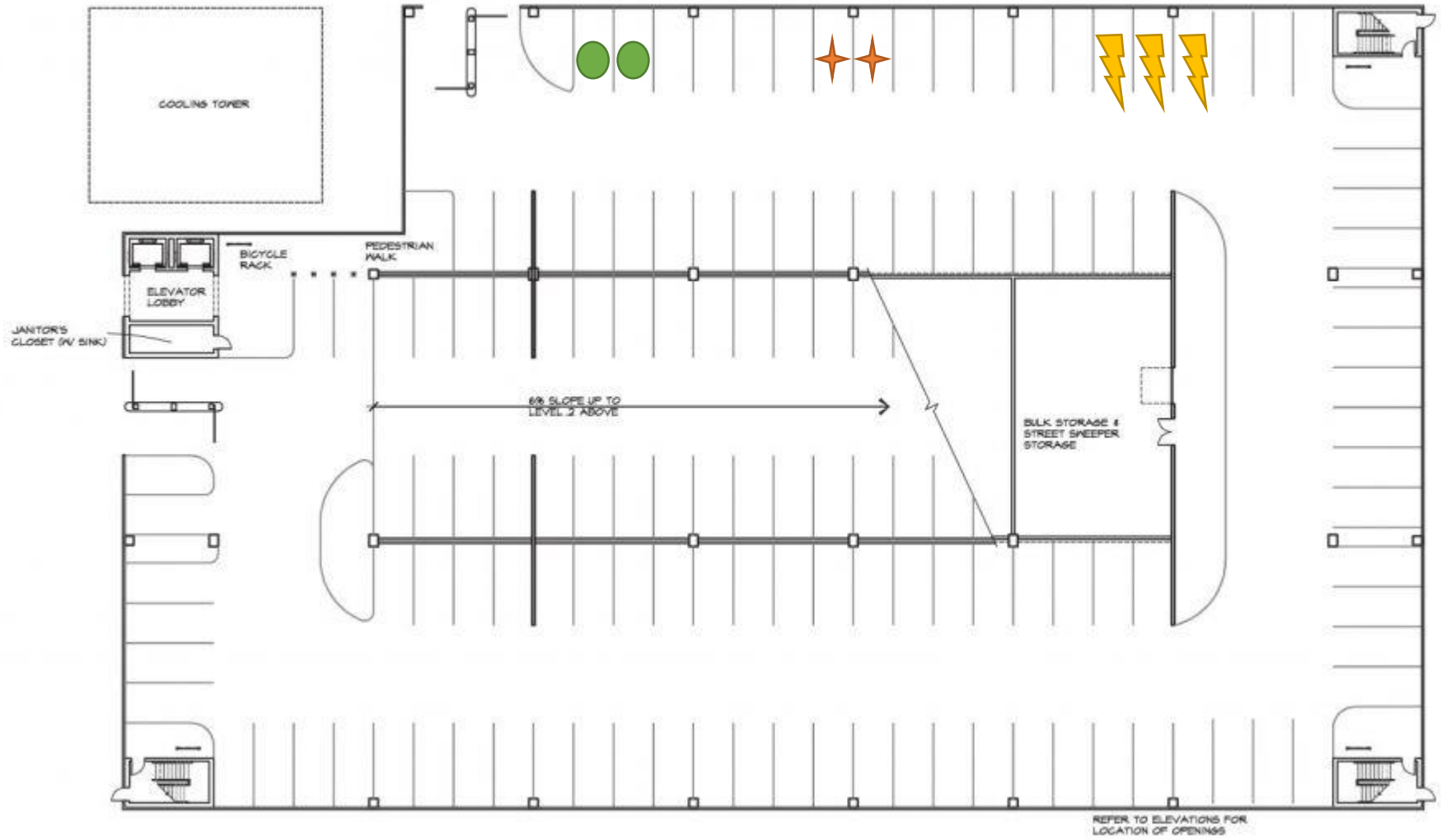
Electric Vehicle "EV" Readiness (100 stalls- Parking w/ Points Compliance)

Electric Vehicle Charger Capacity Level	Charging rate (kW)	Time to charge 50 kW battery (hrs)	Dedicated EV Ready Stalls	Common Area EV Ready Stalls	Common Area Stall with EV Charging Equipment Installed
Level 2, Minimum 16A	3.4	14.7	1 (enclosed garage)	NA	NA
Level 2, Minimum 32A	6.7	7.5	1	4	7
Level 2, 64A to 80A	13.3	3.8	1	7	14
DCFC 50 kW(480/277 Vac 3-phase)	50.0	1.0	1	25	50

of EV-Ready Stalls required to comply

	# of stalls	Stalls per point	Dedicated	Common Area	Common/EVSE Installed
BASELINE	**100**	4	25		
Points System					
Level 2, Minimum 32A			25	6	4
Level 2, 64A to 80A			25	4	2
DCFC 50 kW(480/277 Vac 3-phase)			25	1	1

Electric Vehicle "EV" Readiness (100 stalls- Parking w/ Points Compliance)



= Level 2 EV Charging Stations installed in Common Area Stalls

= Dedicated EV Ready Stall, Level 2, Minimum 32A

(assigned, sold, leased, or attached contractually)

= Common Area EV Ready Stall, Level 2, Minimum 32A

Electric Vehicle “EV” Readiness

EV-Readiness Cost Estimates

- EV Readiness for new construction directly supports the Administration's commitment to transform all ground transportation to renewable fuels by 2035.
- Retrofitting for EV conduits costs 4 to 8 times more than ensuring EV Readiness during new construction.
- Average residential buildings have a 50-year lifespan on average. It is critical that charging infrastructure is incorporated in the pre-construction stage to ensure buildings can accommodate future EV-driving residents.

Cost of Installing "EV Ready" Infrastructure

Scenario	Cost Per EV Parking Space with 40A Circuit	
	New Build	Retrofit
5-10 EV spaces	$920	$10,273
26+ EV spaces	$860	$3,634

Source: "Plug-In Electric Vehicle Infrastructure Cost-Effectiveness Report for San Francisco" and "Southern California Edison 'Charge Ready' Program Advisory Board Meeting #5 (August 2017) – Slide 11"

EV-Readiness Cost Estimates

Figure 3. Relative Cost per PEV Charging Space of PEV Charging Infrastructure in New Construction vs. Retrofits (2016 dollars)

Source: "Plug-In Electric Vehicle Infrastructure Cost-Effectiveness Report for San Francisco"

Range EV-Readiness Cost Estimates vs. Mortgage PMT and Energy Savings

		Level 2 Home		Level 2 Parking Garage		Level 2 Curb-side	
		Min	Max	Min	Max	Min	Max
Total Retrofit Cost including EVSE (Charger)		650	1800	3550	7500	5300	13150
Adjusted for EV-Ready New Construction							
-- Less Charging Station Hardware		$150	$600	$1,800	$4,500	$3,550	$9,650
-- Reduced Labor-related costs	90%			$459	$1,179	$580	$1,550
-- Reduced Labor-related costs	75%			$683	$1,733	$1,075	$2,900
Range of Level 2 EV Readiness				**$459**			**$2,900**

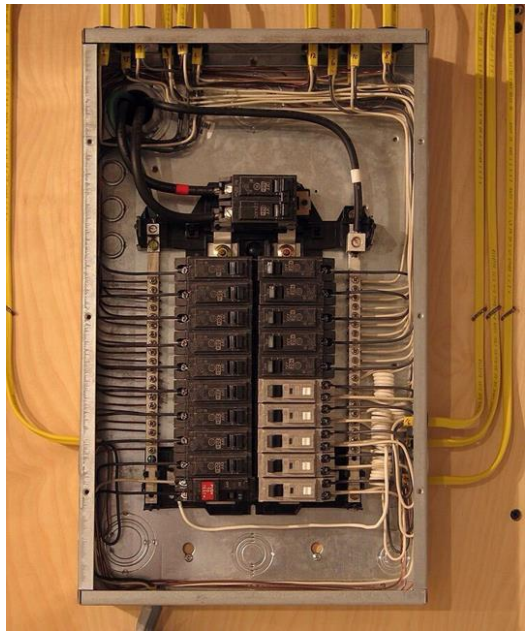
Bill 25(2019) EV Readiness Cost of Compliance vs. Mortgage PMT and Energy Saving		
Interest rate	4.00%	
Payments per year	12	
Total Number of Payments over 30 years	360	
Unit cost - present value	$ 400,000.00	
Mortgage Payment (Monthly)	($1,311.85)	
Total Cost of Compliance (range)	$ 459.00	$ 2,900.00
Levelized Monthly Cost of Compliance	($1.51)	($9.51)
% of Monthly Mortgage Payment	***0.11%***	***0.73%***
Savings on Average utility bill	33%	65%
$155 per month; 31 cents per kWh; 500 kWh per month	$ 51.15	$ 100.75
Overall Monthly Benefit	**$ 49.64**	**$ 91.24**

- Relative to overall construction costs for commercial multi-family and non-residential, EV-readiness is estimated to add from 0.13% and 0.17%.

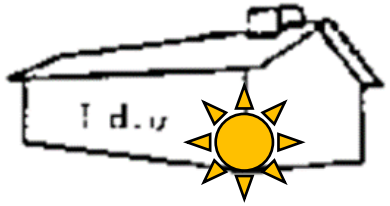
Sources: **"**Plug-In Electric Vehicle Infrastructure Cost-Effectiveness Report for San Francisco**"** and Rocky Mountain Institute

PV-Readiness

- **R404.2 Solar Conduit and electrical panel readiness**
  - **New single family detached dwellings, two-family detached dwellings, and duplexes must install for each residence an electrical panel with reserved space to accommodate not less than a five Kilowatt (AC) photovoltaic system, New multi-family dwellings must install an electrical panel that includes space reserved to accommodate a PV system (1) sized to serve common area electrical loads, or (2) sized to the roof space available.**

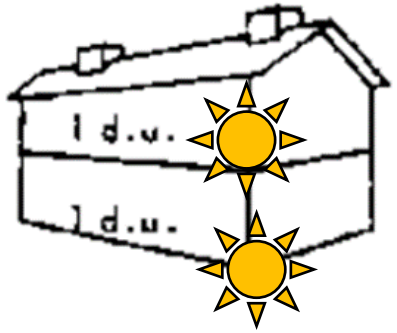


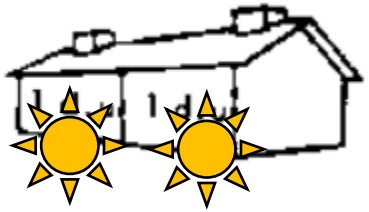
PV- Ready



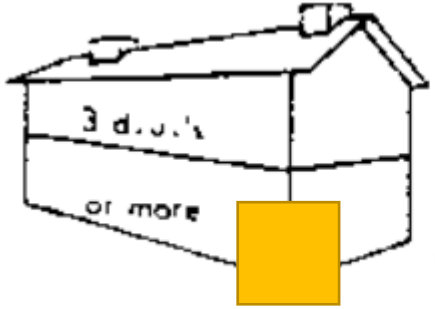
SINGLE-FAMILY DETACHED

TWO-FAMILY DETACHED





SINGLE-FAMILY SEMI-DETACHED
(duplex building)



MULTIPLE-FAMILY

= Electrical panel reserved space for 5 Kilowatt (AC)

= Electrical panel sized to serve common area loads or sized to the roof space available

Questions?

UPDATED Range Confirms EV-Readiness Cost Estimates

Appendix A: EV Readiness Cost Breakdown

		Level 2 Home		Level 2 Parking Garage		Level 2 Curb-side		DC Fast Charging		Description/Key Assumptions
		Min	Max	Min	Max	Min	Max	Min	Max	
Charging Station Hardware		$450	$1,000	$1,500	$2,500	$1,500	$3,000	$12,000	$35,000	
Electrician Materials		$50	$150	$210	$510	$150	$300	$300	$600	• $1.50-2.50/ft for conduit and wire, plus misc other materials • $50-80/hr • $500-1000 if new breaker is required • Assume 2x electrical cost for level 3
Electrician Labor		$100	$350	$1,240	$2,940	$800	$1,500	$1,600	$3,000	
Other Materials				$50	$100	$50	$150	$100	$400	• $25-100/ft for trenching/boring- depends on surface , soil, and underground complexity • Mounting, signage, protection and restoration also included here, but don't usually contribute more than a few hundred dollars.
Other Labor				$250	$750	$2,500	$7,500	$5,000	$15,000	
Transformer		N/A	N/A	N/A	N/A	N/A	N/A	$10,000	$25,000	• 480V transformer installed by utility
Mobilization		$50	$200	$250	$500	$250	$500	$600	$1,200	• Home: 1-3 hours of electrician time for a home installation • Public: $250-500 of time for 1-2 electricians and other labor. We found that the work could usually be completed in a single visit from each contractor.
Permitting		$0	$100	$50	$200	$50	$200	$50	$200	• Varies from city to city, often a flat fee for one or several stations
Total Retrofit Cost including EVSE (Charger)		$650	$1,800	$3,550	$7,500	$5,300	$13,150	$29,650	$80,400	
Adjusted for EV-Ready New Construction										
-- Less Charging Station Hardware		$150	$600	$1,800	$4,500	$3,550	$9,650	$17,050	$44,200	
-- Reduced Labor-related costs	90%			$459	$1,179	$580	$1,550	$11,110	$28,000	
-- Reduced Labor-related costs	75%			$683	$1,733	$1,075	$2,900			
Range of Level 2 EV Readiness				$459			$2,900			

Source: RMI sourced through Ohm Home at https://www.ohmhomenow.com/electric-vehicles/ev-charging-station-cost/

Section 3

Hawaii Energy Incentives

Electric Vehicle Charging Station Incentive Program

Brian Kealoha
Executive Director, Hawai‘i Energy

EV Charging Station Incentive Program

State-funded Incentives
Established through HB 1585 / Act 142

- $400,000 for EVCS installations completed 01/01/20 – 06/30/21
- Rebates are first-come first served, as funding lasts, for completed installations
  - Applications may be submitted within 12 months of completed installations
- Statewide eligibility, including Kaua‘i county
  - Eligible: Workplace, multi-unit dwellings, general public charging and fleet charging
  - Not eligible: Single-family residences and privately/individually owned parking stalls

Level 2 Charger

DC Fast Charger

Multi-port, Networked Level 2 and DC Fast-Chargers

- Level 2: $4,500 (first-time installation) and $3,000 (retrofit)
- DCFC: $35,000 (first-time installation) and $28,000 (retrofit)

Bonus Incentive for Affordable Housing Developments

Affordable Housing Developments
On All Islands

- New and existing affordable housing developments (AHD)
- Serving households making no more than 100% of the Area Median Income (AMI) as defined per county
- Program Requirements
  - Follows all other existing and new program requirements

Level 2
Charger

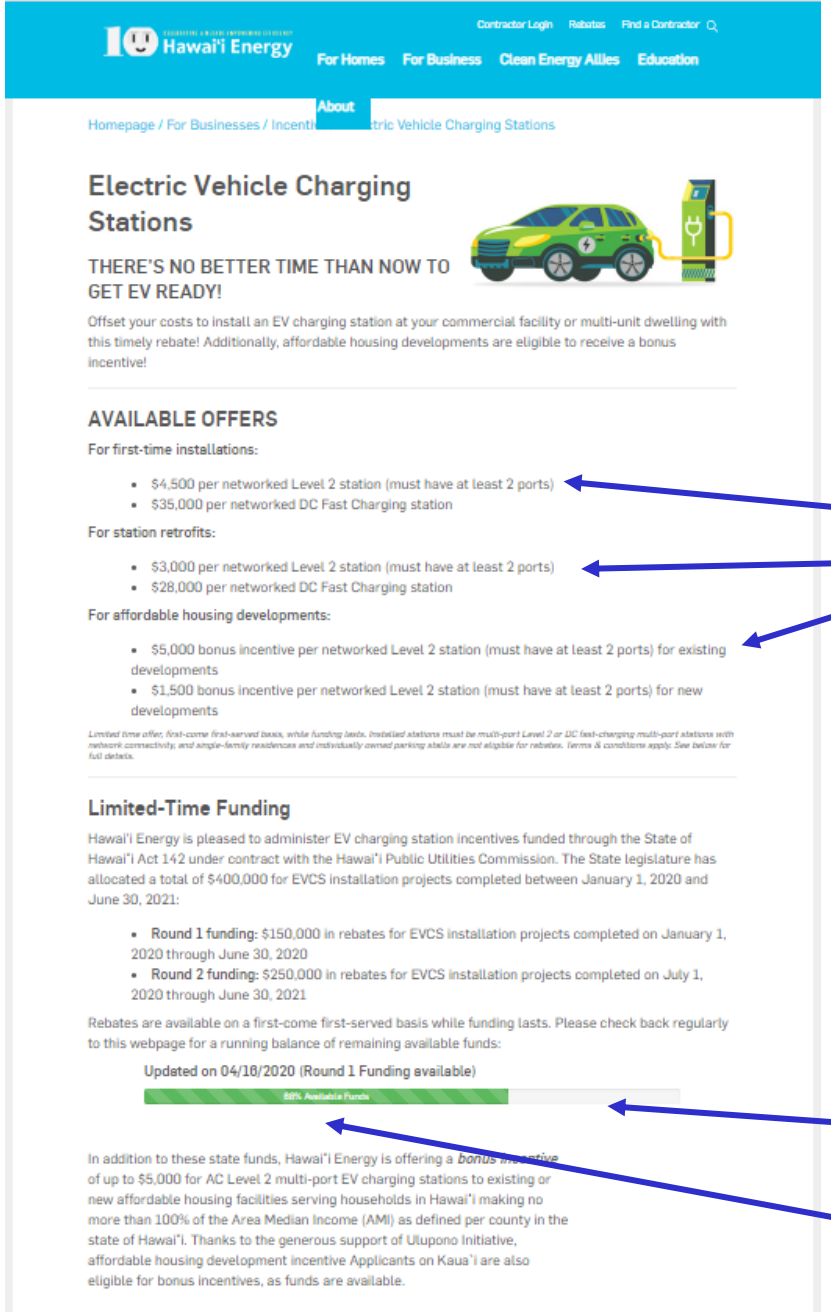
Multi-port, Networked Level 2

- $5,000 bonus rebate per station for existing AHDs
- $1,500 bonus rebate per station for new AHDs
- Less other rebates and incentives applied toward the total project cost
- DCFC not eligible

New Program Requirements

Effective July 1, 2020

- Limit on rebates applicants may receive through 12/31/20
  - Up to six (6) Level 2 stations per site OR
  - Up to one (1) DCFC per site
- Submit applications for full project scope
  - If applications exceed the above limits, additional rebates may be provided depending on available funds starting 01/01/21
- Rebate(s) will be reserved for 4 months after Hawai‘i Energy approval
- Reserved funding be released if installation not completed within 4 months

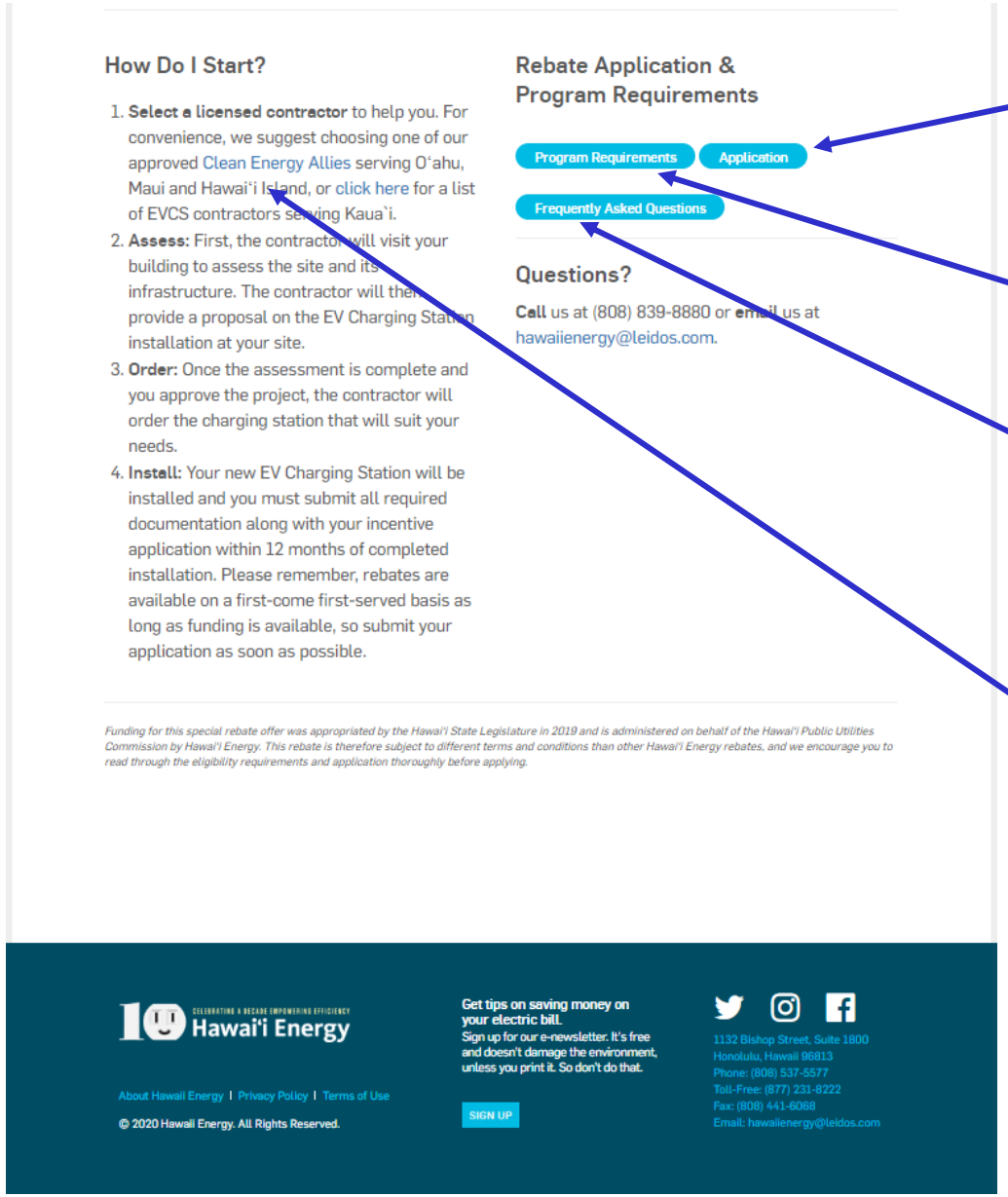


www.hawaiienergy.com/evcharging

Main program information

Tally of Available Funds

Last Updated



Incentive Application

Program Requirements

Frequently Asked Questions

Find a Contractor

Hawai'i Energy

Contractor Login | Rebates | Find a Contractor

For Homes | For Business | Clean Energy Allies | Education | About

Homepage / For Businesses / Incentives / Electric Vehicle Charging Stations

Electric Vehicle Charging Stations

THERE'S NO BETTER TIME THAN NOW TO GET EV READY!

Offset your costs to install an EV charging station at your commercial facility or multi-unit dwelling with this timely rebate!

AVAILABLE OFFERS

For first-time installations:

- $4,500 per networked Level 2 station (must have at least 2 ports)
- $35,000 per networked DC Fast Charging station

For station retrofits:

- $3,000 per networked Level 2 station (must have at least 2 ports)
- $28,000 per networked DC Fast Charging station

Limited time offer, first-come first-served basis, while funding lasts. Installed stations must be multi-port Level 2 or DC fast-charging multi-port stations with network connectivity, and single-family residences and individually owned parking stalls are not eligible for rebates. Terms & conditions apply. See below for full details.

Limited-Time Funding

Hawai'i Energy is pleased to administer EV charging station incentives funded through the State of Hawai'i Act 142 under contract with the Hawai'i Public Utilities Commission. The State legislature has allocated a total of $400,000 for EVCS installation projects completed between January 1, 2020 and June 30, 2021:

- **Round 1 funding**: $150,000 in rebates for EVCS installation projects completed on January 1, 2020 through June 30, 2020
- **Round 2 funding**: $250,000 in rebates for EVCS installation projects completed on July 1, 2020 through June 30, 2021

Rebates are available on a first-come first-served basis while funding lasts. Please check back regularly to this webpage for a running balance of remaining available funds:

Updated on 01/24/2020: 100% funds remaining

100% Available Funds

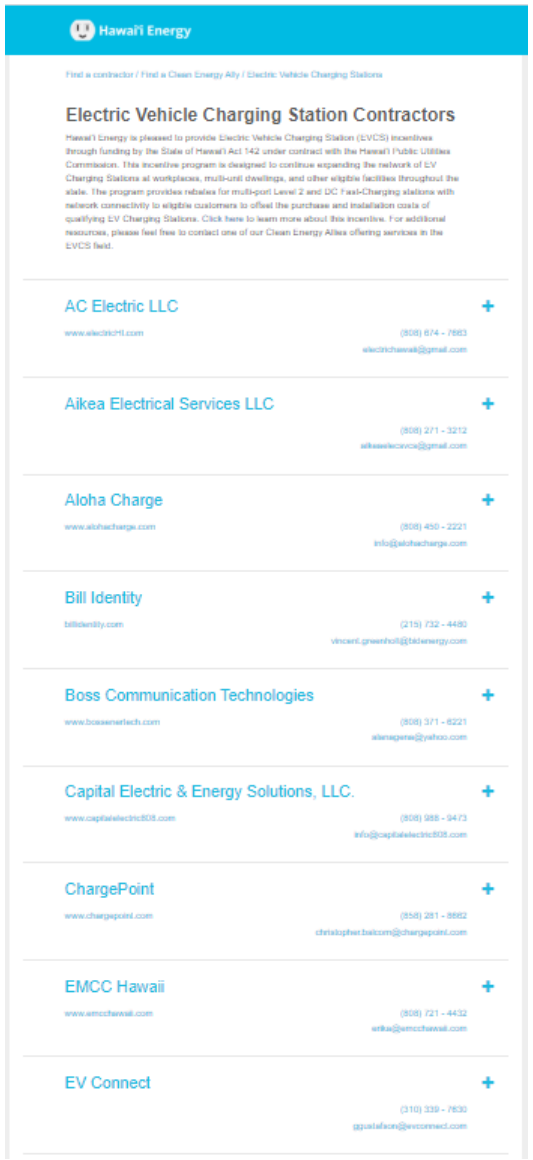
Other Way to Find a Contractor

www.hawaiienergy.com/evcharging

Tally of Available Funds

Last Updated

Clean Energy Allies (32): C&C HNL, Maui, Hawai‘i Island



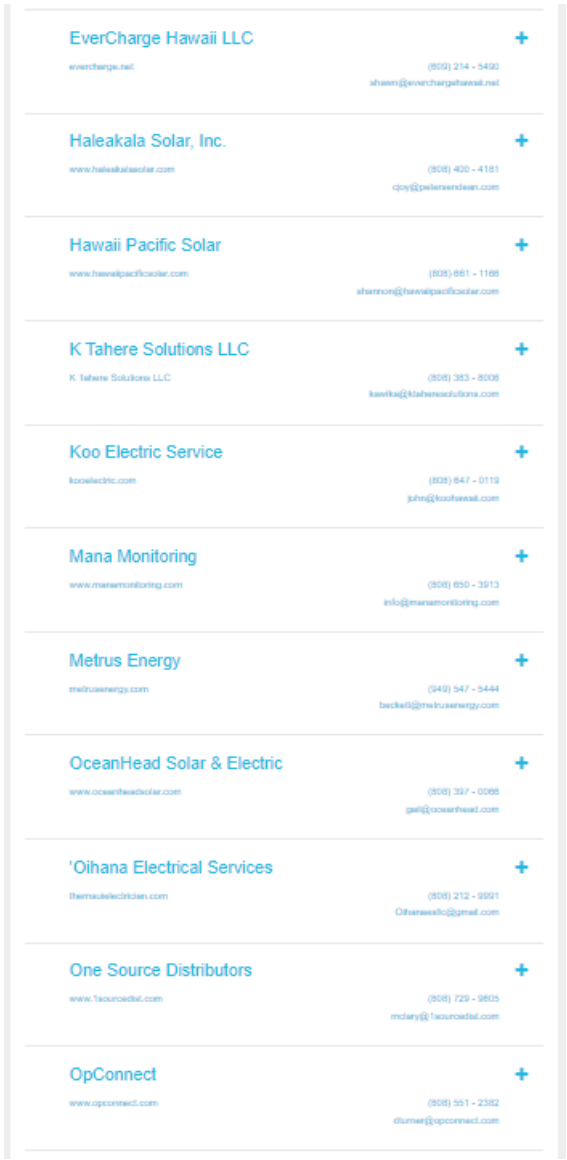
Hawai'i Energy

Find a contractor / Find a Clean Energy Ally / Electric Vehicle Charging Stations

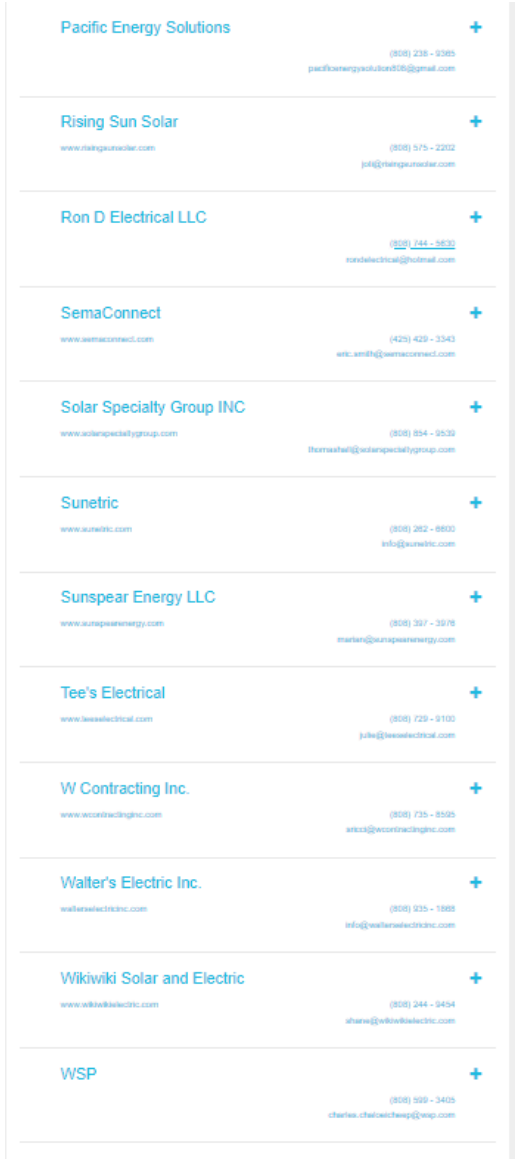
Electric Vehicle Charging Station Contractors

Hawai'i Energy is pleased to provide Electric Vehicle Charging Station (EVCS) incentives through funding by the State of Hawai'i Act 142 under contract with the Hawai'i Public Utilities Commission. This incentive program is designed to continue expanding the network of EV Charging Stations at workplaces, multi-unit dwellings, and other eligible facilities throughout the state. The program provides rebates for multi-port Level 2 and DC Fast-Charging stations with network connectivity to eligible customers to offset the purchase and installation costs of qualifying EV Charging Stations. Click here to learn more about this incentive. For additional resources, please feel free to contact one of our Clean Energy Allies offering services in the EVCS field.

- AC Electric LLC
- Aikea Electrical Services LLC
- Aloha Charge
- Bill Identity
- Boss Communication Technologies
- Capital Electric & Energy Solutions, LLC.
- ChargePoint
- EMCC Hawaii
- EV Connect



- EverCharge Hawaii LLC
- Haleakala Solar, Inc.
- Hawaii Pacific Solar
- K Tahere Solutions LLC
- Koo Electric Service
- Mana Monitoring
- Metrus Energy
- OceanHead Solar & Electric
- 'Oihana Electrical Services
- One Source Distributors
- OpConnect



- Pacific Energy Solutions
- Rising Sun Solar
- Ron D Electrical LLC
- SemaConnect
- Solar Specialty Group INC
- Sunetric
- Sunspear Energy LLC
- Tee's Electrical
- W Contracting Inc.
- Walter's Electric Inc.
- Wikiwiki Solar and Electric
- WSP

Funds are Limited

Many projects are in the works

- Paid out $55,500 to date
- More than $250K additional projects in the pipeline
- Remaining available funds tracked on website (www.hawaiienergy.com/evcharging)
- Several large proposals with DC fast-chargers for EV fleets
- Submit applications ASAP to reserve rebate funds

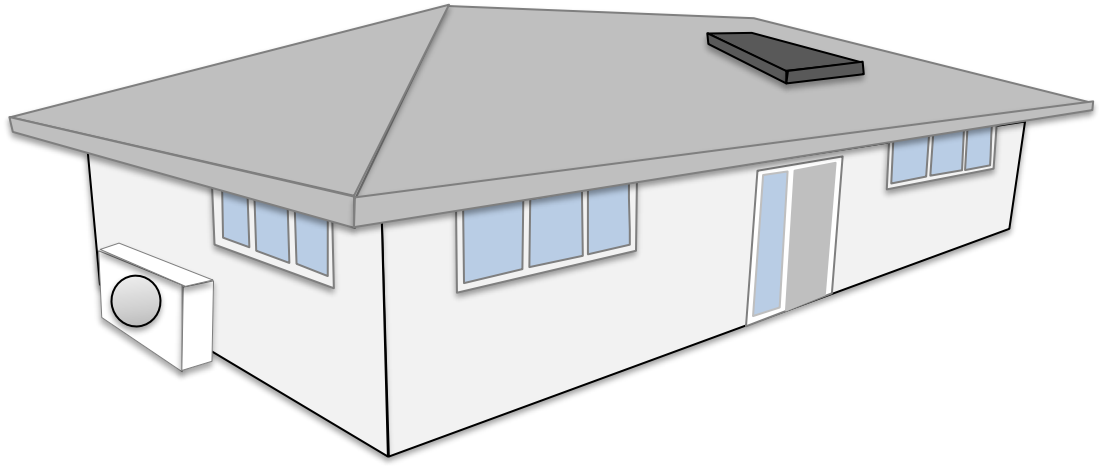
Stay Connected

Residential: 537-5577 | **Business:** 839-8880 | **Neighbor Islands:** 1-877-231-8222

facebook.com/hawaiienergy www.hawaiienergy.com @myhawaiienergy

Section 4

Other Residential Amendments



What's covered

Envelope

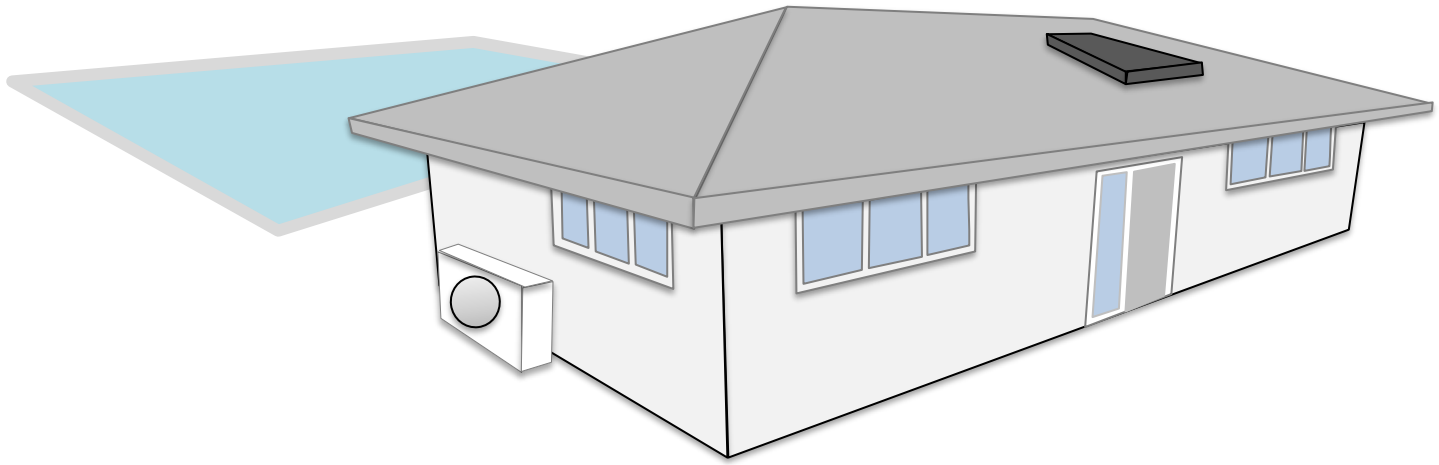
Roof
Walls
Window & skylights
Air leakage

Systems

Air conditioning controls
Duct insulation
Duct leakage
Water heating
Swimming pool

Electrical

Permanently installed lighting
Ceiling fan
EV readiness
PV readiness



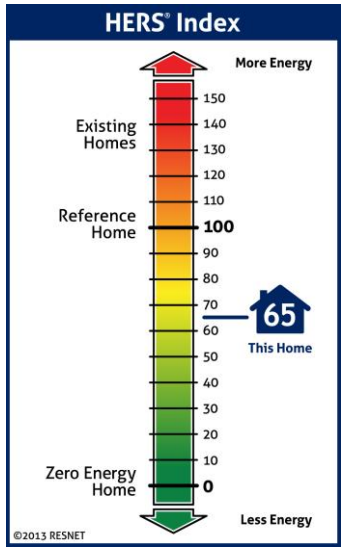
Not covered

Plug-in lighting
Appliances
AC efficiency
Water heater efficiency

Compliance options - residential

1. Tropical Zone
   - ≤50% air conditioned
   - not heated
   - elevation < 2,400 feet
     (5,000 ft Hawaii County)
2. Prescriptive
   - Envelope (+ Points Option)
   - Systems
   - Electrical power and lighting systems
3. Simulated performance alternative
   - Proposed design energy cost ≤ standard reference design
4. Energy rating index (ERI)
   - ERI ≤ 52

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement R-Value	Slab R-Value	Crawl Space Wall R-Value
1	NR	0.75	0.25	30	13	3/4	NA[1]	0	0	0



Amended IECC sections - residential

IECC Section	Description	State or Honolulu Amendment
R103.1	Designer certification	State
R402.1	Low-energy buildings (envelope scope)	State
R401.2.1	Tropical Zone	Honolulu
R402.1	Wall – mass (CMU or concrete)	Honolulu
R402.3	Windows	Honolulu
R402.4.1.3	Air leakage – sampling	Honolulu
R403.5.5	Water heating – solar systems	Honolulu
R404.2	Ceiling fans	Honolulu
R404.2	Solar conduit and electrical panel readiness	Honolulu
R404.3	Electric vehicle readiness	Honolulu
R407	Points Option	Honolulu
R503.1.1	Roof replacement	Honolulu

Designer certification - residential

R103.1 General

…The responsible design professional must provide on the plans a **signed statement** certifying that the project is in compliance with this code.

State & Honolulu amendment

Exception

Any building, electrical or plumbing work that is not required to be prepared, design, approved or observed by a licensed professional architect or engineer, pursuant to HRS Chapter 464…

Envelope exemptions - residential

R402.1.1 Low-energy buildings

Exempt from the envelope requirements:

1. Peak design rate of energy usage <3.4 Btu/hr-ft^2 for space conditioning
2. Unconditioned space that does **not** contain habitable space

State amendment

Unconditioned habitable space must meet envelope requirements

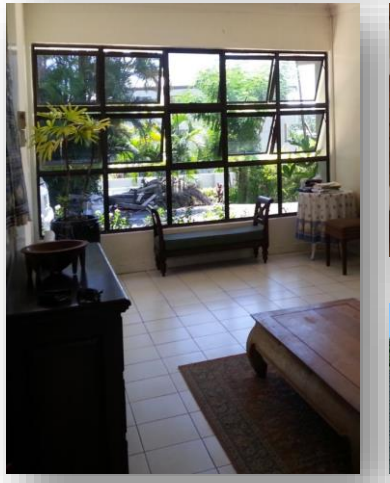
Tropical Zone Option (R401.2.1)

Can use this path if

- ≤50% air conditioned,
- not heated, and
- elevation < 2,400 feet (5,000 feet Hawaii County)

Requirements

- Roof insulation (credit for cool roof)
- Windows SHGC (overhang and jalousie exceptions)
- Skylight U-factor
- Natural ventilation window openings and interior door latches
- Ceiling fans or whole-house fan
- Relaxed air leakage specs for jalousie windows
- Solar water heating
- High efficacy lighting
- Envelope sealing for AC areas



R401.2.1 Tropical Zone

Honolulu Version

R401.2.1 Tropical zone. *Residential buildings* in the tropical zone at elevations below 2,400 feet (731.5 m) above sea level must comply with this chapter by satisfying the following conditions:

1. Not more than one-half of the area of the *dwelling unit* is air conditioned.

2. The *dwelling unit* is not heated.

3. Solar, wind, or another renewable energy source supplies not less than 90 percent of the energy for service water heating.

4. Glazing in conditioned space must have a maximum *solar heat gain coefficient* as specified in Table R402.2.1.

Table R402.2.1.
WINDOW SHGC REQUIREMENTS

Projection Factor of overhang from base of average window sill	SHGC
< 0.30	0.25
0.30 - 0.50	0.40
≥ 0.50	N/A

a. Exception: North-facing windows with pf > 0.20 are exempt from the SHGC requirement. Overhangs shall extend two feet on each side of window or to nearest wall, whichever is less.

b. Exception: Jalousie windows are excepted from SHGC requirements.

Honolulu changes vs. state

5. Skylights in dwelling units must have a maximum Thermal Transmittance (U-factor), as specified in Table R402.1.2.

6. Permanently installed lighting is in accordance with Section R404.

7. The roof/ceiling complies with one of the following options:

   a. Comply with one of the roof surface options in Table C402.3 and install R-13 insulation or greater; or

   b. Install R-19 insulation or greater.

   If present, attics above the insulation are vented and attics below the insulation are unvented.

   Exception: The roof/ceiling assembly are permitted to comply with Section R407.

8. Roof surfaces have a minimum slope of one fourth inch per foot of run. The finished roof does not have water accumulation areas.

9. Operable fenestration provides ventilation area equal to not less than 14 percent of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.

10. Bedrooms with exterior walls facing two different direction have operable fenestration or exterior walls facing two different directions.

11. Interior doors to bedrooms are capable of being secured in the open position.

12. Ceiling fans or whole house fans are provided for bedrooms and the largest space that is not used as bedroom.

13. Walls, floors and ceilings separating air conditioned spaces from non-air conditioned spaces shall be constructed to limit air leakage in accordance with the requirements in Table R402.4.1.1.

Envelope prescriptive requirements

- Windows
  - SHGC (Table R402.1.2) ← Jalousie exception (Honolulu)
- Skylights
  - SHGC & U-factor (Table R402.1.2)
  - Total UA (R402.1.5)
- Wall and roof – four options
  - Insulation R-value (Table R402.1.2) ← Mass wall exception (Honolulu)
  - Assembly U-factor (Table R402.1.4)
  - Total UA (R402.1.5)
  - Points option (R407) ← Wall and roof alternative (State & Honolulu)
- Air leakage
  - Air barrier, sealing
  - Testing (optional Kauai, Maui, Hawaii County) ← Sampling exception (Honolulu)

Envelope prescriptive requirements

Windows

1. U-factor – no requirement
2. Solar heat gain coefficient (SHGC) ≤ 0.25

Exceptions

1. Up to 15 ft^2
2. Area-weighted average allowed
3. Jalousie windows (Honolulu County)

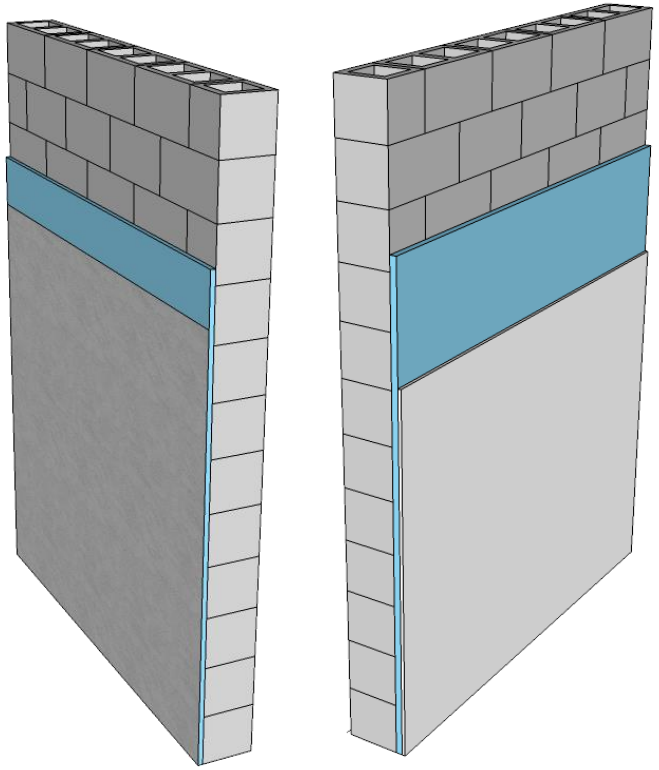
Envelope prescriptive requirements

Walls – mass

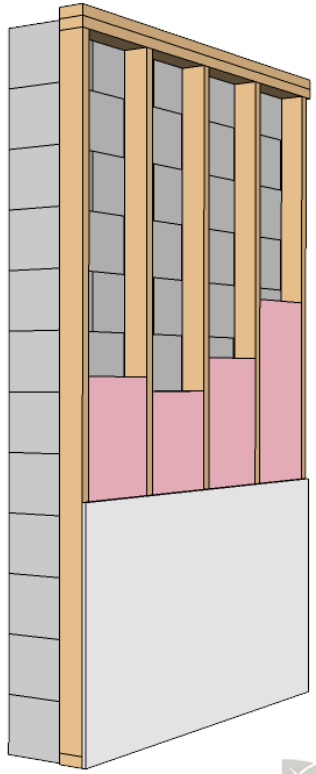
1. R-3 exterior insulation (Table R402.1.2)
2. R-4 interior insulation (Table R402.1.2)
3. U-0.197 (Table R402.1.4)

Amendments on next slide

R-3 exterior
≥ 0.50 in. polyisocyanurate
≥ 0.60 in. polystyrene



R-4 interior
≥ 0.67 in. polyisocyanurate
≥ 0.80 in. polystyrene



U-factor ≤ 0.197
≥ R-4 in wood furring
≥ R-11 in metal furring

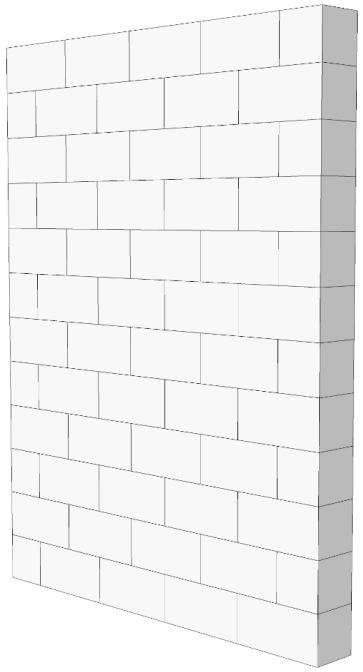
Envelope prescriptive requirements

Walls – mass

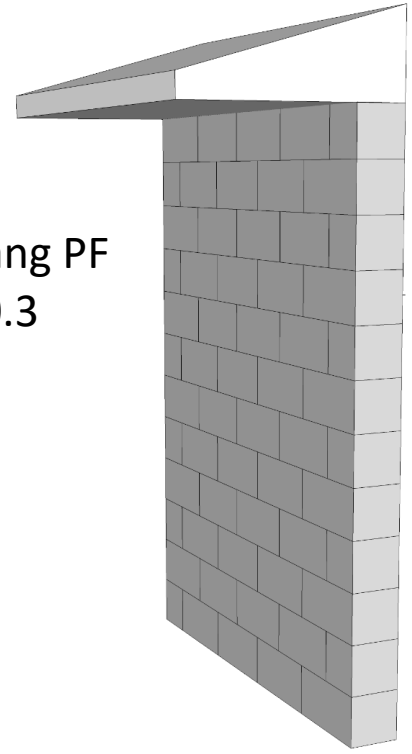
1. R-3 exterior insulation (Table R402.1.2)
2. R-4 interior insulation (Table R402.1.2)
3. U-0.197 (Table R402.1.4)

Honolulu County Amendment

Exterior reflectance ≥ 0.64



Overhang PF ≥ 0.3



Thickness ≥ 6 inches

Envelope – Points Option (R407)

Total points ≥ 0

- Roof + walls
- Roof alone
- Walls alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Reasons to use it

1. Want <R-30 roof insulation
2. Avoid foam board insulation for metal-framed walls
3. Avoid insulation for mass walls

Envelope – Points Option (R407)

Total points ≥ 0

- Roof + walls
- Roof alone
- Walls alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Wood Framed Walls

Measure	Standard Home Points	Tropical Zone Points
R-13 cavity wall insulation	0	1
R-19 roof insulation	-1	0
R-19 roof insulation + cool roof membrane[1] or radiant barrier[3]	0	1
R-19 roof insulation + attic venting[2]	0	1
R-30 roof Insulation	0	1
R-13 wall Insulation + high reflectance walls[4]	1	2
R-13 wall + 90% high efficacy lighting and Energy Star appliances[5]	1	2
R-13 wall Insulation + exterior shading wpf=0.3[6]	1	2
Ductless air conditioner[7]	1	1
1.071 X Federal minimum SEER for air conditioner	1	1
1.142 X Federal minimum SEER for air conditioner	2	2
No air conditioning installed	NA	2
House floor area ≤ 1,000 ft^2	1	1
House floor area ≥ 2,500 ft^2	-1	-1
Energy Star fans[8]	1	1
Install 1 kW or greater of solar electric	1	1
Reduce fenestration from 14% to 10% (Hawaii County only)	NA	-1

See also checklist

Envelope – Points Option (R407)

Total points ≥ 0

- Roof + walls
- Roof alone
- Walls alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Metal Framed Walls

Measure	Standard Home Points	Tropical Zone Points
R-13 + R-3 wall insulation	0	1
R-13 cavity wall insulation + R-0	-1	0
R-13 wall Insulation + high reflectance walls[4]	0	1
R-13 wall + 90% high efficacy lighting and Energy Star Appliances[5]	1	2
R-13 wall insulation + exterior shading wpf=0.3[6]	0	1
R-30 roof Insulation	0	1
R-19 roof Insulation	-1	0
R-19 + cool roof membrane[1] or radiant barrier[3]	0	1
R-19 roof Insulation + attic venting[2]	0	1
Ductless air conditioner[7]	1	1
1.071 X Federal minimum SEER for air conditioner	1	1
1.142 X Federal minimum SEER for air conditioner	2	2
No air conditioning installed	NA	2
House floor area ≤ 1,000 ft^2	1	1
House floor area ≥ 2,500 ft^2	-1	-1
Energy Star Fans[8]	1	1
Install 1 kW or greater of solar electric	1	1
Reduce fenestration from 14% to 10% (Hawaii County only)	NA	-1

See also checklist

Envelope – Points Option (R407)

Total points ≥ 0

- Roof + walls
- Roof alone
- Walls alone

Options for credit

- Insulation
- Cool roof
- Radiant barrier
- Wall reflectance
- More efficient lighting
- Efficient appliances
- Wall shading
- Ductless AC
- High efficiency AC
- No AC
- Small dwelling
- Energy Star fans
- Solar electric

Honolulu County Amendment

Mass Walls

Measure	Standard Home Points	Tropical Zone Points
R-3/4 insulation	0	1
R-0 wall insulation	-1	0
R-0 Wall Insulation + high reflectance walls[4]	0	1
R-0 wall insulation + 90% high efficacy lighting and Energy Star Appliances[5]	1	2
R-0 Wall Insulation + exterior shading wpf=0.3[6]	0	1
R-19 Roof Insulation	-1	0
R-19 + Cool roof membrane[1] or Radiant Barrier[3]	0	1
R-19 Roof Insulation + Attic Venting[2]	0	1
R-30 Roof Insulation	0	1
Ductless air conditioner[7]	1	1
1.071 X Federal minimum SEER for air conditioner	1	1
1.142 X Federal minimum SEER for air conditioner	2	2
No air conditioning installed	NA	2
House floor area ≤ 1,000 ft^2	1	1
House floor area ≥ 2,500 ft^2	-1	-1
Energy Star Fans[8]	1	1
Install 1 kW or greater of solar electric	1	1

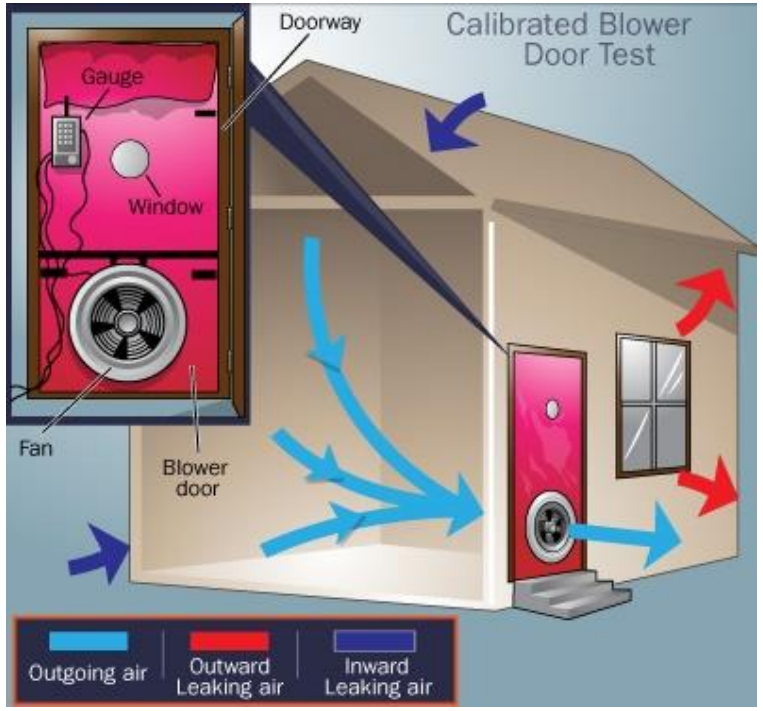
See also checklist

Envelope – Air Leakage (R402.4)

Honolulu amendment

Testing

Leakage ≤ 5 air changes per hour at 0.2 in. w.c. pressure (50 Pa)



R402.1.3 Sampling

- For builders of multiple similar homes or multi-family units
- Allows air leakage testing on sample of units
- RESNET sampling procedures

Systems – Duct Testing (R403.3.3 & R403.3.4)

Rough-in test ⇐ or ⇒ **Postconstruction test**

Leakage ≤ 4 cfm/100 ft^2

Leakage ≤ 3 cfm/100 ft^2
(without air handler)

Leakage ≤ 4 cfm/100 ft^2

Honolulu amendment

R402.1.3 Sampling

- Also applies to duct testing

Test **not** required if air handler and all ducts are within the thermal envelope

Systems – Solar Water Heating (R403.5.4)

State & Honolulu amendment

Solar water heating systems are required for new single-family residential construction pursuant to HRS 196-6.5 unless a variance is approved pursuant to HRS Section 196-6.5

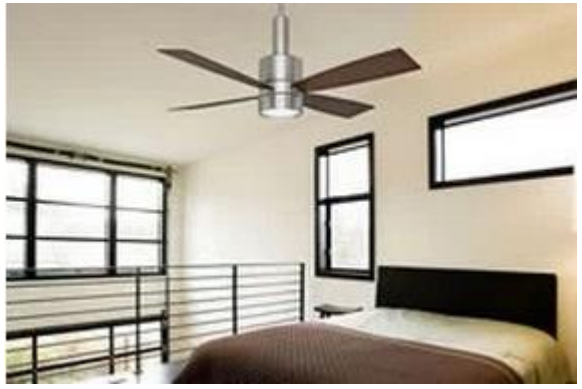
Honolulu change vs. state

Systems – Ceiling Fans (R403.6.2)

Honolulu amendment

R403.6.2 Ceiling Fans

A ceiling fan or whole house fan ~~ceiling fan rough-in~~ is provided for bedrooms and the largest space that is not used as bedroom.



Exception

For production homes, a ceiling fan junction box is acceptable and ceiling fan must be provided as a buyer's option.

Alterations

Honolulu amendment

Alterations (R503)

- New construction requirements for altered components
- Several exceptions (partial list)
  - Wall or roof cavity already filled with insulation
  - Wall or roof cavity is not exposed
  - Roof recover
  - Glazing-only replacement
  - Roof replacement

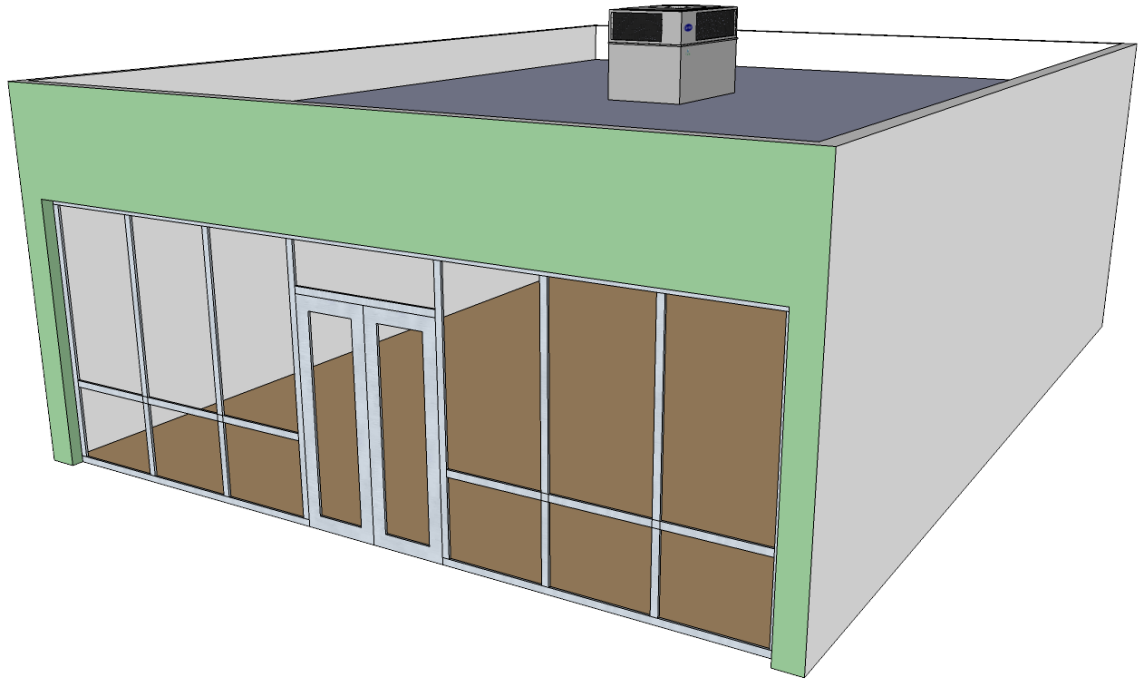
Roof replacement

Choose two:

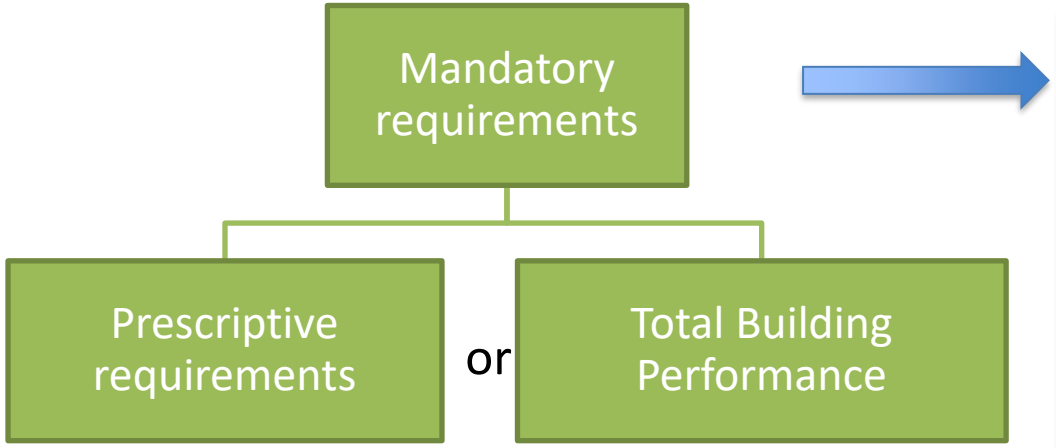
1. Energy Star compliant roof covering
2. Radiant barrier
3. Attic ventilation via solar attic fans or ridge vent or gable vent
4. A minimum of two exceptions listed in C402.3

Section 5

Other Commercial Amendments



Commercial compliance



Mandatory requirements

C402.5	Air leakage
C403.2	Mech. systems
C404	Water heating
C405.2	Lighting controls
C405.3	Exit signs
C405.5	Exterior lighting
C405.6	Sub-metering
C405.7	Transformers
C405.8	Motors

Insulation
Windows & skylights
Complex HVAC req.
Interior lighting power
Additional efficiency

Computer simulation

This path necessary if window area >40% or skylight area >3%

Additional efficiency

Comply with at least one:

1. More efficient HVAC
2. **Reduced lighting power density**
3. Enhanced lighting controls
4. On-site renewable energy
5. Dedicated outdoor air system
6. High-efficiency SWH

Amended IECC sections - commercial

IECC Section	Description	State or Honolulu Amendment
C103.1, C103.2	Designer certification	Honolulu
C402.1.1	Low-energy buildings (envelope scope)	State
C402.1, C402.2	Wall – mass (CMU or concrete)	Honolulu
C402.1, C402.2	Wall – metal frame	State
C402.1, C402.2	Wall – wood frame and other	State
C402.4.3	Windows – solar heat gain coefficient (SHGC)	Honolulu
C402.4.1.2	Skylights – maximum area	Honolulu
C403.2.4.2.4	Door switches	Honolulu
C405.2.2	Controls - time-switch	Honolulu
C405.2.2.2	Controls – light reduction	Honolulu
C405.2.3	Controls - daylight-responsive	Honolulu
C405.2.4	Controls – guest rooms	State
C405.10	Electrical sub-metering	State
C406.8	Electric vehicle infrastructure	Honolulu
C406.3	Reduced lighting power density	Honolulu
C408.2	Mechanical system commissioning	Honolulu
C503.1, C503.3.1	Roof replacement	Honolulu

Designer certification - commercial

Honolulu amendment

C103.1 General

…The responsible design professional shall provide on the plans a signed statement certifying that the project is in compliance with this code.

Exception

Any building, electrical or plumbing work that is not required to be prepared, design, approved or observed by a licensed professional architect or engineer, pursuant to HRS Chapter 464…

C103.2 Information on Construction Documents

CITY AND COUNTY OF HONOLULU
REVISED ORDINANCES OF HONOLULU 1990
CHAPTER 32

To the best of my knowledge, this project's design substantially conforms to the Building Energy Conservation Code for:

_____ Building Component Systems
_____ Electrical Component Systems
_____ Mechanical Component Systems

Signature: _____ Date: _____
Name: _____
Title: _____
License No.: _____

Include only those items that the signator is responsible for. This block shall be on the first sheet of the pertinent plan, e.g. architectural, electrical, and mechanical. The above may be submitted separately to the Code Official in a letter including the identification of the building.

Envelope exemptions - commercial

State amendment

C402.1.1 Low-energy buildings

Exempt from the envelope requirements:

1. Peak design rate of energy usage <3.4 Btu/hr-ft^2 for space conditioning
2. Unconditioned space that does **not** contain habitable space
3. Greenhouses

Unconditioned habitable space must meet envelope requirements

Envelope prescriptive requirements

Wall insulation (Table C402.1.3)

	Type	Min. Insulation
Walls	Mass	R-5.7ci
	Metal building	R-13 + R-6.5ci
	Metal framed	R-13+ R-5ci
	Wood framed and other	R-13+ R-5ci R-20

ci = continuous insulation

R-0 alone with:

- Reflectance ≥ 0.64, or
- Overhang PF ≥ 0.3
- Thickness ≥ 6 in.

Honolulu amendment

R-13 alone with:

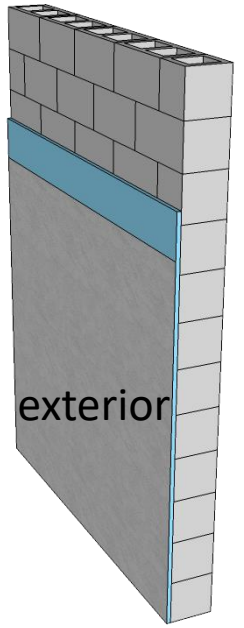
- Reflectance ≥ 0.64, or
- Overhang PF ≥ 0.3

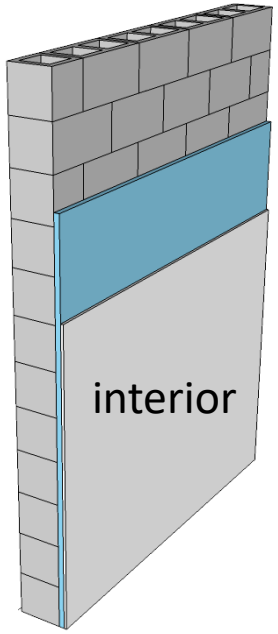
State & Honolulu amendment

Envelope prescriptive requirements

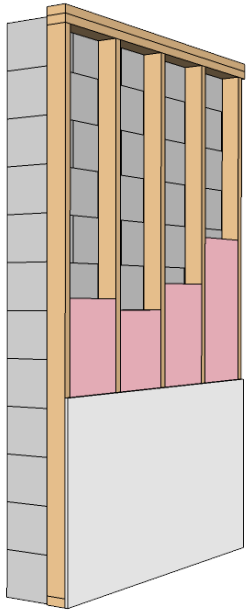
Commercial mass wall options

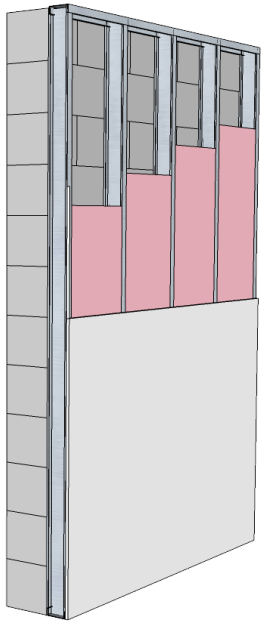
Honolulu amendment



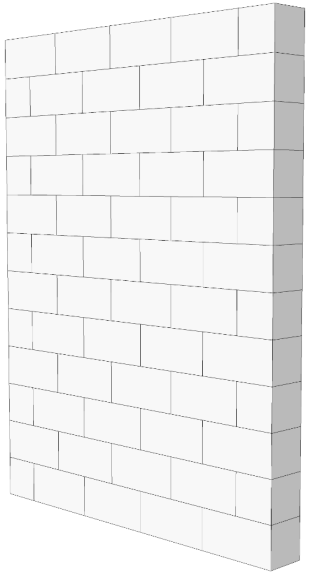


R-5.7 insulation
(1 in. polyisocyanurate or
1.25 in. polystyrene)

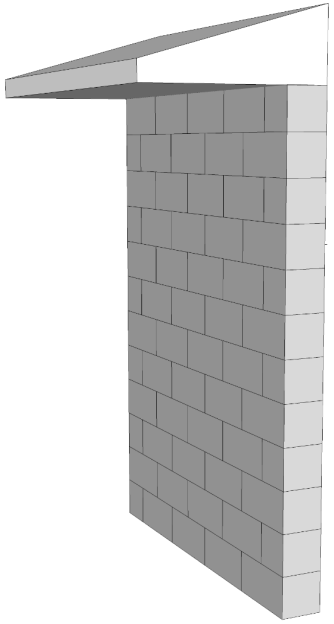




U-factor ≤ 0.151
Interior furring
R-6 in wood or **R-13** in metal



Reflectance
≥ 0.64

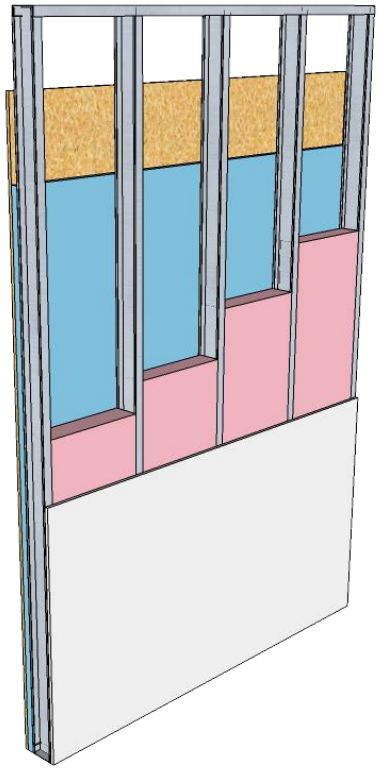


Overhang PF
≥ 0.3

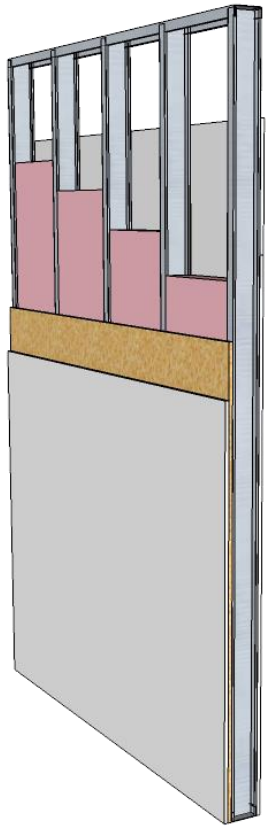
Thickness
≥ 6 inches

Envelope prescriptive requirements

Commercial metal-framed wall options

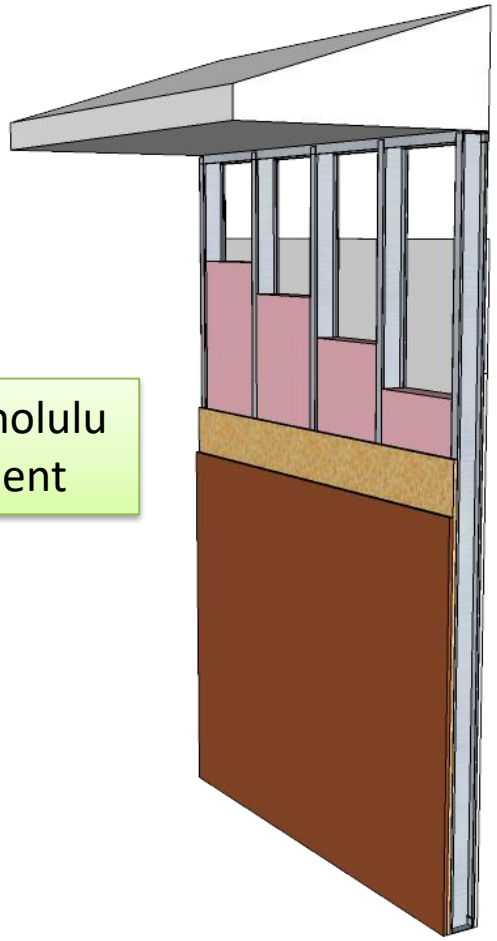


R-13 + **R-5** continuous



R-13+ Reflectance ≥ **0.64**

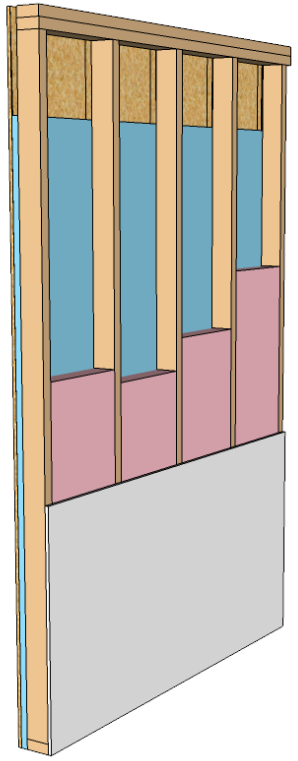
State & Honolulu amendment



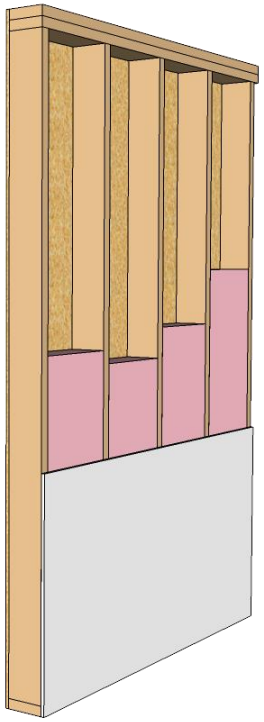
R-13 + Overhang **PF ≥ 0.3**

Envelope prescriptive requirements

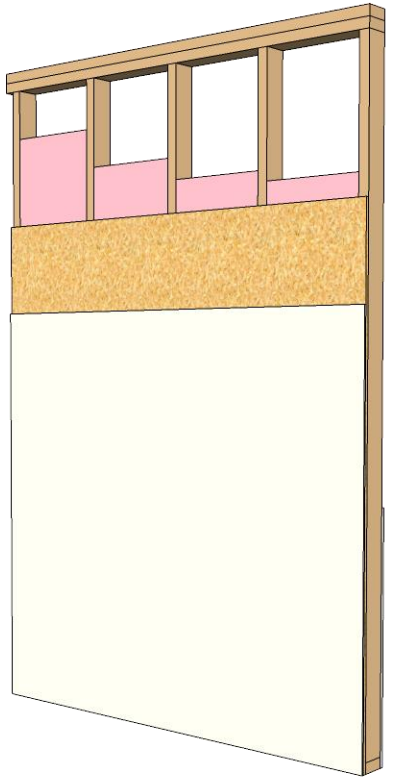
Commercial wood-framed wall options



R-13 +
R-3.8 continuous

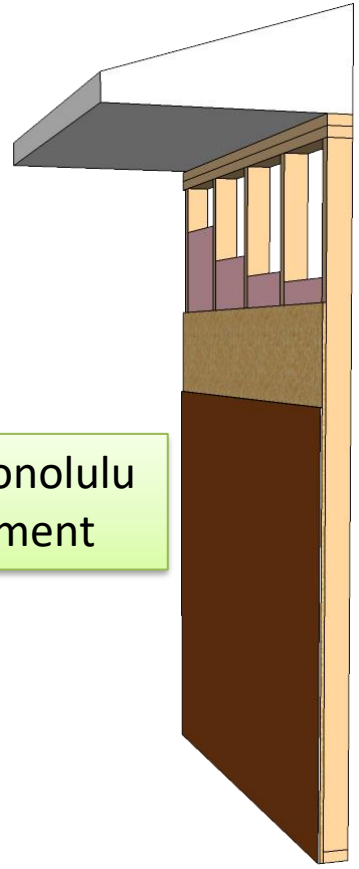


R-20



R-13 +
Reflectance ≥ **0.64**

State & Honolulu amendment

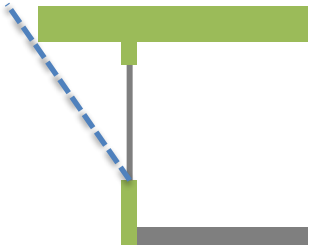
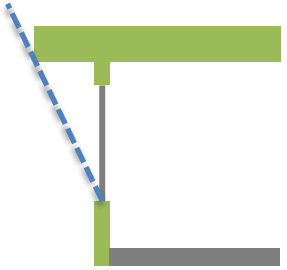
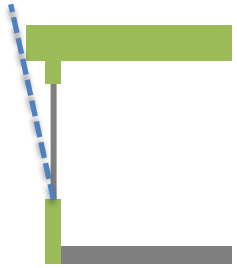


R-13 +
Overhang PF ≥ **0.3**

Envelope prescriptive requirements

Maximum solar heat gain coefficient (SHGC) (C402.4)

Honolulu amendment

	Large overhang	Medium overhang	Small overhang
			
	PF ≥ 0.5	0.20 ≤ PF < 0.50	PF < 0.20
E/S/W	SHGC ≤ 0.40	SHGC ≤ 0.30	SHGC ≤ 0.25
North	SHGC ≤ 0.40	SHGC ≤ 0.37	SHGC ≤ 0.33

Area-weighted average SHGC allowed by Hawaii amendment

Jalousie windows exempt

https://breezway.com/

Envelope prescriptive requirements

Maximum fenestration area (C402.4)

Window area **≤ 30%** of gross wall area

Up to 40% with daylighting controls

Skylight area **≤ 3%** of gross roof area

Up to 5% with daylighting controls

Honolulu amendment

+ Up to 5% if lighting power ≤ 60% of allowance

Otherwise, use Total Building Performance compliance option

www.veluxusa.com

Mechanical systems mandatory requirements

Door Switches (C403.2.4.2.4)

Space types

- Hotel and motel sleeping units
- Guest suites
- Time-share condominiums

Control operation

- Disable cooling or reset to ≥90°F
- < 5 minutes of opening

State & Honolulu amendment

Mechanical systems mandatory requirements

HVAC and service water heating commissioning (C403.2.11 & C408.2)

- Required when
  - ≥ 480,000 Btu/h cooling capacity, or
  - ≥ 600,000 Btu/h space and water heating capacity

  } Typically ≥ 20,000 ft^2
- Requires:
  - Notes on construction documents
  - Commissioning plan
  - Systems adjusting and balancing
  - Functional performance testing
    - Equipment
    - Controls
- Preliminary commissioning report ➡ Prior to ~~final inspections~~ certificate of occupancy
- Final commissioning report
- Construction documents and O&M Manuals

Honolulu amendment

Lighting mandatory requirements

Lighting controls

Occupant sensor controls (C405.2.1)
Time-switch controls (C405.2.2)
Light-reduction controls (C405.2.2.2)
Daylight-responsive controls (C405.2.3)
Specific application controls (C405.2.4)
Exterior lighting controls (C405.2.5)

Honolulu amendment

Not required in spaces with lighting power ≤ 60% of allowance

State & Honolulu amendment

Guest Room Master Control (C405.2.4)

Applies to

- Guest rooms and suites
- Timeshare condos

Auto shut off

- Installed lights
- Switched receptacles
- < 20 minutes after guest leaves

Key card system complies

Electrical mandatory requirements

Sub-metering (C405.10)

For new buildings with tenants, metering collected for

1. Entire building, and
2. Each tenant occupying ≥1,000 ft²

Tenants shall have access to data collected for their space

State amendment

Electrical mandatory requirements

Electric vehicle infrastructure (C406.8)

Discussed earlier

Honolulu amendment

Prescriptive requirements

Additional Efficiency Package Options (C406)

Buildings must comply with at least one additional efficiency feature:

1. More efficient HVAC
2. Reduced lighting power density → Lighting power ≤ 80% of allowance (vs. ≤90% in IECC)
3. Enhanced lighting controls
4. On-site renewable energy
5. Dedicated outdoor air system
6. High-efficiency SWH

Honolulu amendment

Alterations

Alterations (C503)

- New construction requirements apply to altered components
- Several exceptions (partial list)
  - Wall or roof cavity already filled with insulation
  - Wall or roof cavity is not exposed
  - Roof recover
  - Glazing-only replacement
  - Roof replacement

Honolulu amendment

Roof replacement

Either

1. initial reflectance ≥ 85% and aged reflectance ≥ 75%, or

2. Choose two:
   - Energy Star compliant roof covering
   - Radiant barrier
   - Attic ventilation via solar attic fans or ridge vent or gable vent
   - A minimum of two exceptions listed in C402.3

Q&A

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2015 IECC available:

- http://iccsafe.org/publications

State Energy Code Website:

- http://energy.hawaii.gov/hawaii-energy-building-code

Hawaii Energy Code Website

- https://hawaiienergy.com/codes