Energy-Efficient Homes of the Future

October 12, 2022

HAWAIʻI STATE ENERGY OFFICE

Building Energy Education fundamentals

SEDAC SMART ENERGY DESIGN ASSISTANCE CENTER

ILLINOIS

Presentation Collaborators

Hawai'i Energy

AIA Honolulu

ASHRAE Hawaii Chapter

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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

Leading edge Hawai’i builders Castle & Cooke, D.R. Horton, Gentry Homes and Stanford Carr share their expertise in delivering efficient, comfortable and affordable homes, supporting the State’s transition to 100% clean energy.

LEARNING OBJECTIVES

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

1. Identify cost effective, energy efficient envelope insulation strategies for new homes
2. Describe efficient and cost-effective air conditioning systems for new homes
3. Define a path to net zero energy performance for new homes with renewable energy
4. Apply for energy efficiency incentives for new home construction

Today's agenda

1. Builder Presentations
   - Daryl Takamiya, Castle & Cooke
   - McKibbin Mist, D.R. Horton
   - Jayson McCullough, Gentry Homes
   - Daniel Sandomire, Stanford Carr Development
2. Incentive Programs
   - Denise Nakamura, Hawaii Energy
3. Q&A

Moderators

- Howard Wiig, State Energy Office
- Erik Kolderup, Kolderup Consulting

Acknowledgments

- Karen Shishido, Hawaii Energy
- Gail Suzuki-Jones, State Energy Office
- Kiera Williams, State Energy Office
- Alan Okimoto, State Energy Office
- Amanda Ho, State Energy Office

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Daryl Takamiya

Castle & Cooke

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Energy Efficient Homes

Building Sustainable Homes

Building Envelope

Energy Efficiency Starts with the Envelope

INSULATION

- Roof: R30
- Walls: R13
- Attic Space is ventilated to reduce heat load
  - Both ridge vent and O'Hagin vents
  - Baffles at bird blocks to keep insulation from blocking airflow

WINDOWS

- Impact Rated
- Double glazed, Low e
- SHGC of 0.21 (code is 0.25)
- Reduces noise
- Expensive (ex. Sliding Door went from $1,000 to $5,000).
- 6 month lead time.

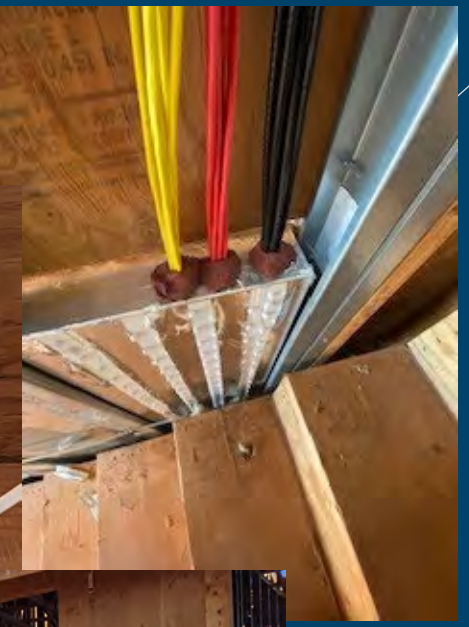
SIDING

- Hardie cementitious siding is specifically designed for a tropical climate.

Air Tightness

Blower Door Testing is required –No more than 5 air changes/hour allowed

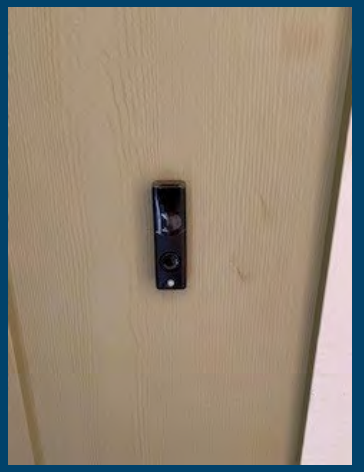
- Testing essentially pulls a vacuum on house.
- Seal under bottom tracks of wall framing.
- Seal all penetrations.
- All homes are fully plywood sheathed which aids in air tightness as well as structural rigidity.
- Increases R value of walls over steel studs, which have a higher thermal conductivity.
- Decreases noise.
- Aids in impact resistance during storm events.

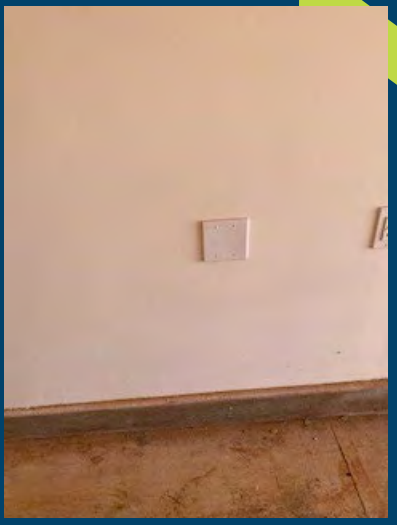


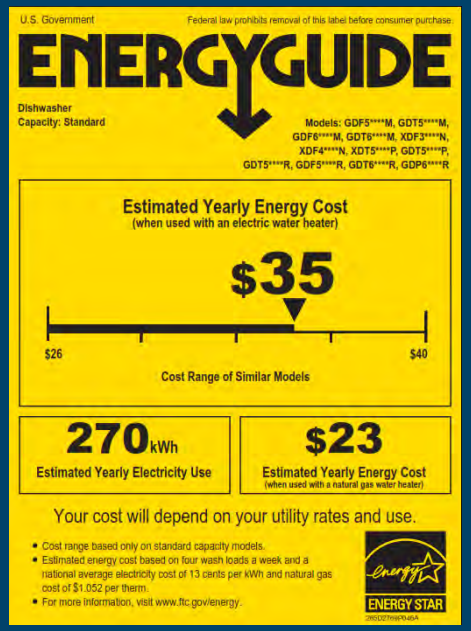
Electrical Efficiency

Energy Efficient Fixtures

- LED light fixtures
- PV Ready
- EV Ready
- Energy Star Appliances
- Smart home infrastructure – panel, doorbell camera, switch standard. Add-ons available as options.







Photovoltaic Systems

WHY AREN'T THEY STANDARD?

PV systems are not offered as a standard feature for several reasons:

- High initial cost. Cost would affect many buyer's ability to qualify for a new home.
- Homebuyers install PV when ready financially.
- Homebuyer can custom size system to their needs.
- Homebuyers get the PV tax credit.
- Over 36% of single family homebuyers have installed PV at Koa Ridge and more applications to the association keep coming in.
- PV will be standard on Mid-rises.
- PV structures over parking will offset common area electrical loads.

Mechanical

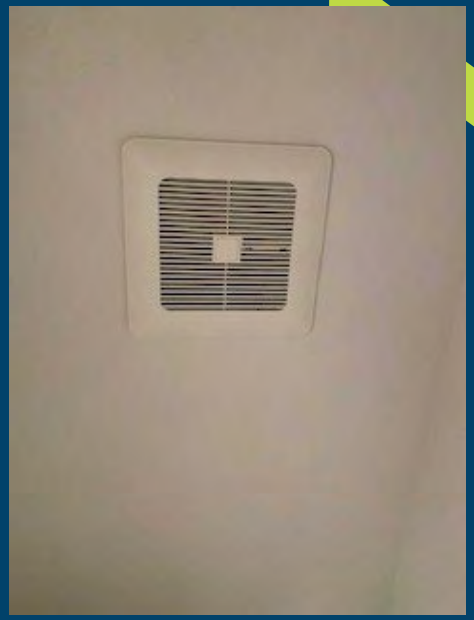
Energy Efficient HVAC Systems

Mitsubishi Split Systems

- Compressor has the ability to ramp up and down based on load
- Multiple Fan Coil Units allow owner to selectively cool rooms.
- 24.6 SEER.

Panasonic Whisper Green Select Bath Fan

- Energy Star – Rated most efficient.
- Constant on at 50 cfm to meet ventilation requirements – ramps up to 110 cfm when light is turned on.

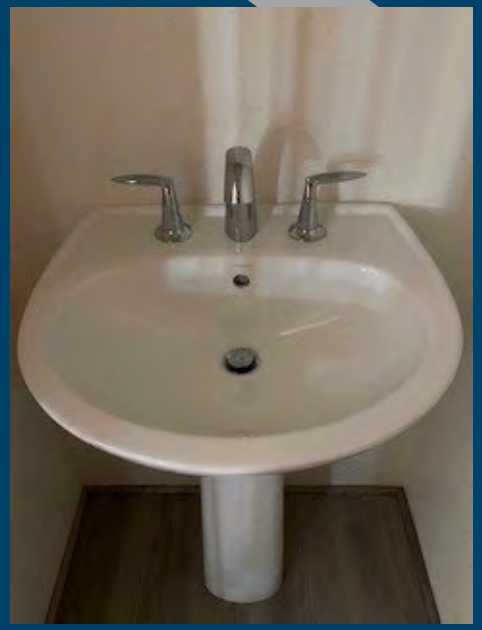


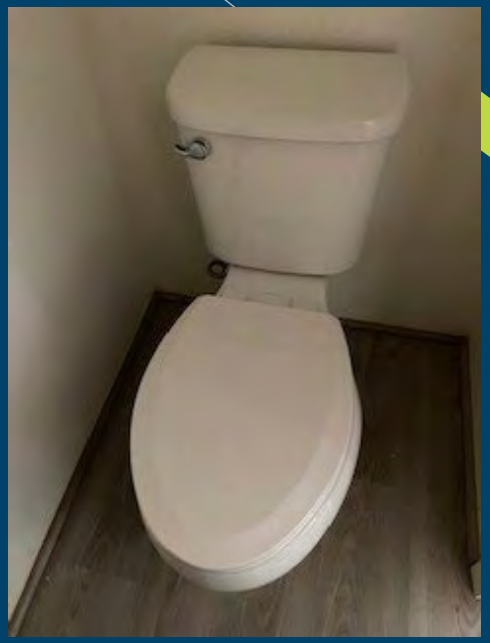
Plumbing

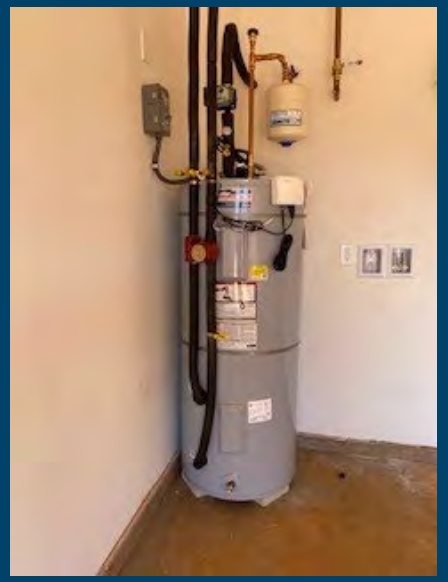
By Category

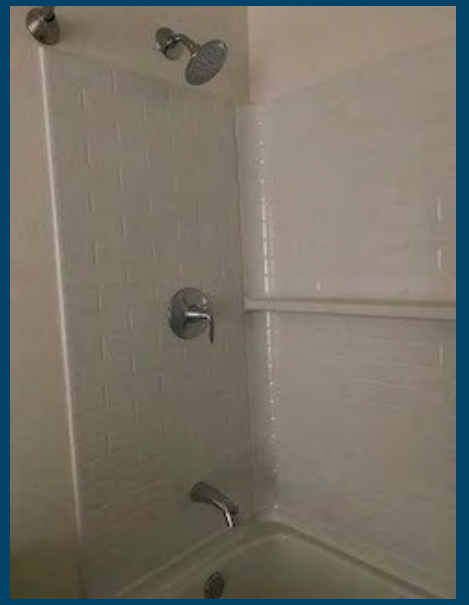
Watersense/Low Flow fixtures.

Solar Hot Water Heaters standard on all units, including multi-family.









Storm Water Filtration System

First of its kind in Hawaii:

- Filters rain water entering catch basins.
- Advanced membrane filtration.
- Removes a high level of total suspended solids, phosphorus, nutrients, metals, trash and hydrocarbons.
- Downside is maintenance (city will not accept or maintain) and cost ($400,000 to filter storm water for a 74 unit project).

Moving Forward

Midrises

Continue with same energy and water saving strategies

- LED electrical fixtures, low flow water fixtures, Energy Star appliances, Impact windows, air tight units.
- Add parking lot PV structures to offset common area electrical loads.
- White/light colored insulated built up roofing.

Thank You

Daryl Takamiya

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dtakamiya@castlecooke.com

Castlecookehawaii.com

McKibbin Mist

D.R. Horton

HAWAIʻI STATE ENERGY OFFICE

Jayson McCullough

Gentry Homes

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Gentry Homes Green Building Strategy

- Green building and energy efficiency as a design language

- Starts with Site Development
  - Green space & parks
  - Bike & walking paths
  - Drought tolerant landscaping in common areas
  - Non-potable water for common areas
  - Storm water run-off retention

Trade Partner Relationships

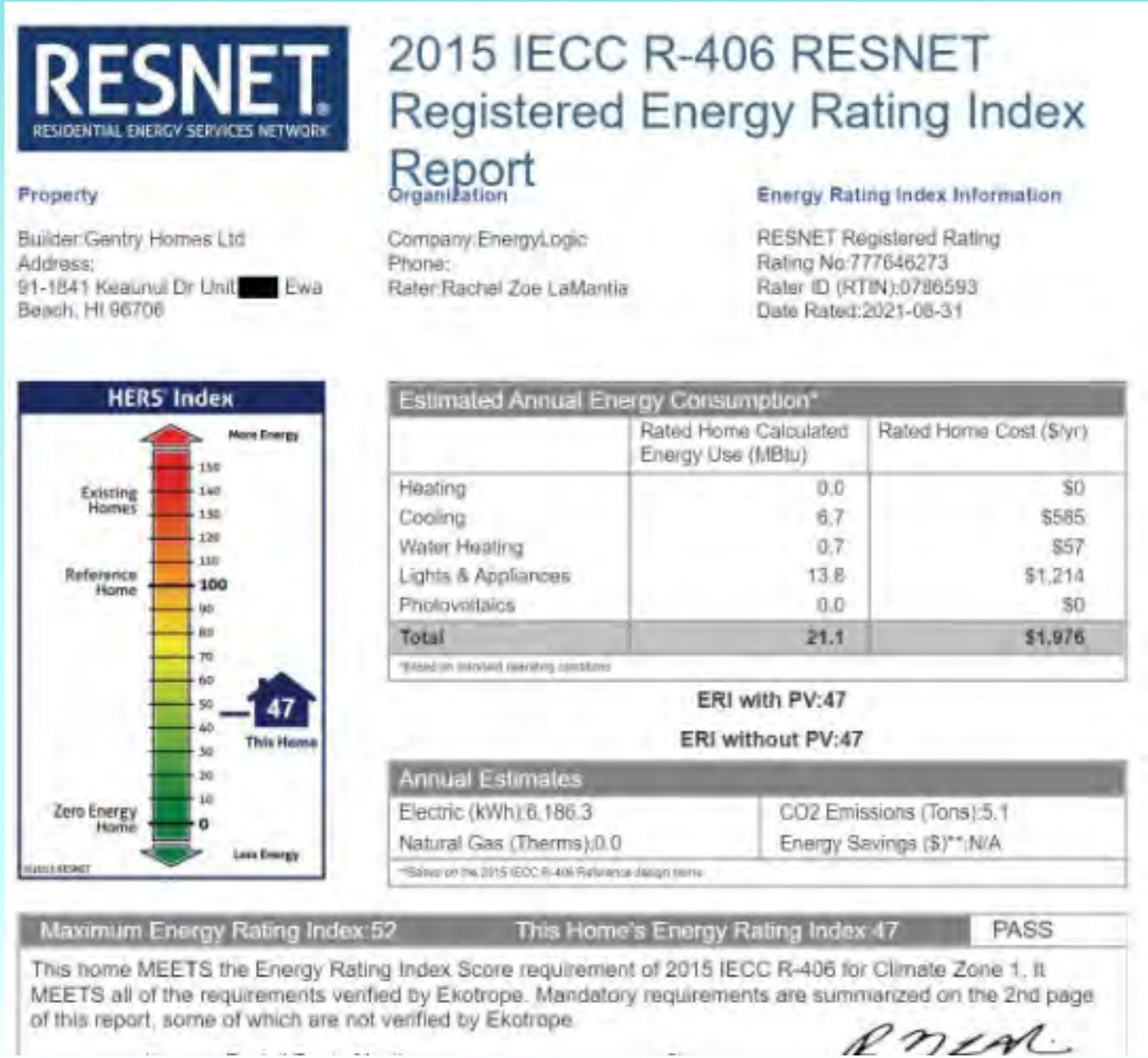
- Close long-lasting partnerships with subcontractors, suppliers, vendors, manufacturers, third party inspectors
- Need all parties to buy into the energy efficiency/environmentally conscious design philosophy to meet high standards
- Minimizing construction waste
  - Using lumber cutoffs of 30’’+ for window/door cripples, mechanical mounting/backing, etc.
  - Using aluminum plumb line braces
    - Long lasting and reusable with no wasted lumber
- Recycling excess spray foam insulation so it doesn’t end up in the Waimanalo Gulch or PVT landfill

Energy Code – Performance vs. Prescriptive

- **Performance** vs. **Prescriptive** method of energy compliance
- **Prescriptive path**:
  - Requires that each component is built to a certain standard
- **Performance path**:
  - Requires that the building as a whole performs to a specific standard (i.e. must use less energy than the same building built using the prescriptive method)
  - Based on Energy Rating Index (ERI) Home Energy Rating System (HERS) index
  - Requires an energy rater certification
    - Inspections – Insulation/Ducting/Building Envelope/Fenestration
    - Testing: Blower door leakage test. ACH – air changes per hour

Performance Method

- IECC's alternative compliance path for residential buildings
- Energy Rating Index (ERI)
  - Model based rating system
- Requires third party performance testing/rating
- RESNET
  - National standards-making body for building energy efficiency rating & certification systems



RESNET
RESIDENTIAL ENERGY SERVICES NETWORK

2015 IECC R-406 RESNET Registered Energy Rating Index Report

Property
Builder:Gentry Homes Ltd
Address:
91-1841 Kealunui Dr Unit [redacted] Ewa Beach, HI 96706

Organization
Company:EnergyLogic
Phone:
Rater:Rachel Zoe LaMantia

Energy Rating Index Information
RESNET Registered Rating
Rating No:7776462?3
Rater ID (RTIN):0786593
Date Rated:2021-08-31

HERS Index

Estimated Annual Energy Consumption*

	Rated Home Calculated Energy Use (MBtu)	Rated Home Cost ($/yr)
Heating	0.0	$0
Cooling	6.7	$585
Water Heating	0.7	$57
Lights & Appliances	13.8	$1,214
Photovoltaics	0.0	$0
Total	**21.1**	**$1,976**

*Based on standard operating conditions

ERI with PV:47

ERI without PV:47

Annual Estimates

Electric (kWh):6,186.3	CO2 Emissions (Tons):5.1
Natural Gas (Therms):0.0	Energy Savings ($)**:N/A

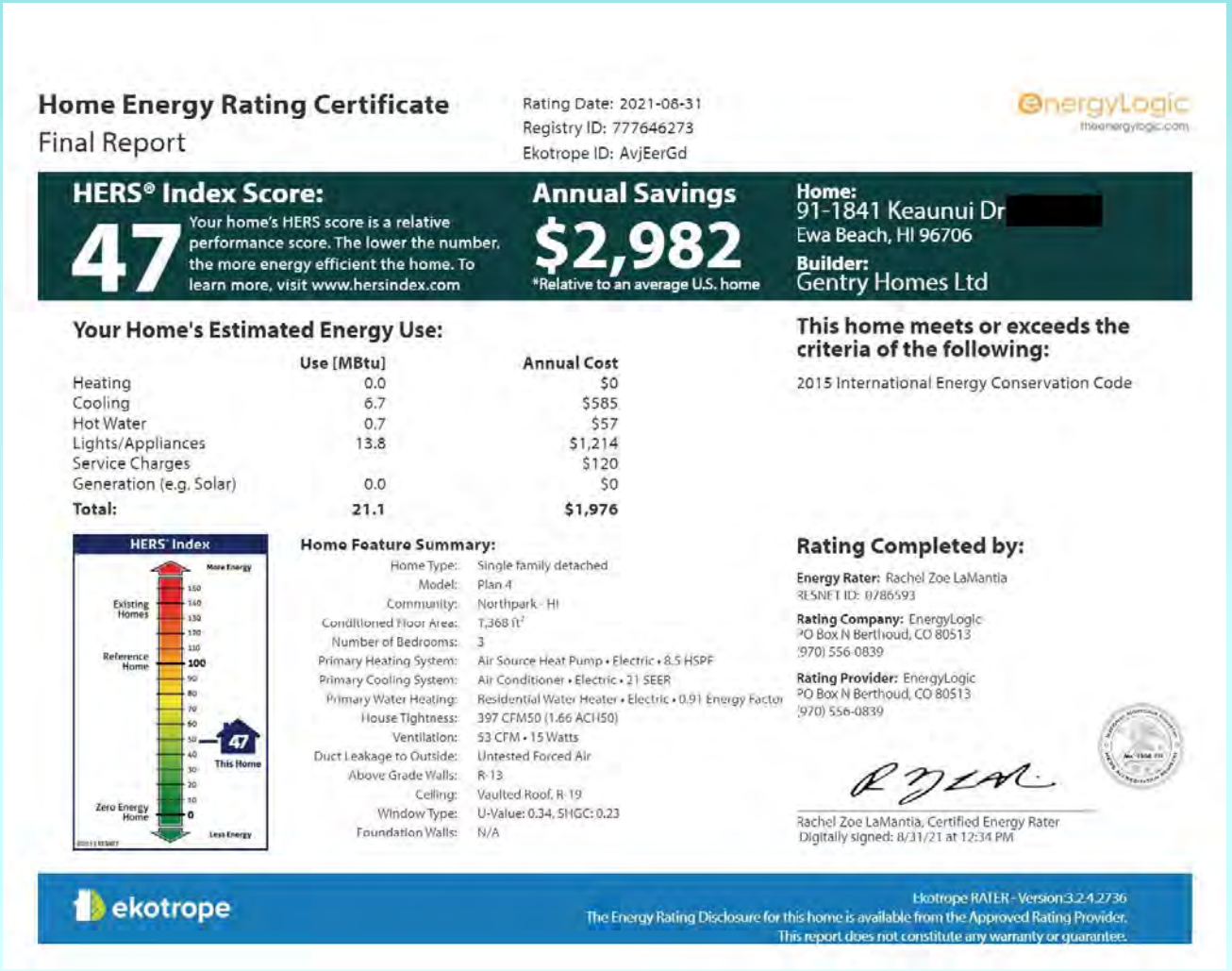
**Based on the 2015 IECC R-406 Reference design home

Maximum Energy Rating Index:52	This Home's Energy Rating Index:47	PASS

This home MEETS the Energy Rating Index Score requirement of 2015 IECC R-406 for Climate Zone 1. It MEETS all of the requirements verified by Ekotrope. Mandatory requirements are summarized on the 2nd page of this report, some of which are not verified by Ekotrope

HERS Index

- RESNET/HERS Certified Energy Rater
- Plan Review
- On-site inspections
  - Insulation
  - Air Sealing
  - Mechanical equipment/duct work
  - Fenestration
- Testing
  - Blower door leakage test
    - ACH50 – air changes per hour @ 50 pascals
  - Duct Leakage Testing
  - Final confirmed HERS/ERI index rating
  - Compliance Report & Certificate



Home Energy Rating Certificate
Final Report

Rating Date: 2021-08-31
Registry ID: 777646273
Ekotrope ID: AvjEerGd

EnergyLogic
theenergylogic.com

HERS® Index Score: 47
Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings $2,982
*Relative to an average U.S. home

Home:
91-1841 Keaunui Dr [redacted]
Ewa Beach, HI 96706
Builder:
Gentry Homes Ltd

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	0.0	$0
Cooling	6.7	$585
Hot Water	0.7	$57
Lights/Appliances	13.8	$1,214
Service Charges		$120
Generation (e.g. Solar)	0.0	$0
Total:	**21.1**	**$1,976**

This home meets or exceeds the criteria of the following:
2015 International Energy Conservation Code

HERS® Index
More Energy
Existing Homes
Reference Home
100
47
This Home
Zero Energy Home
0
Less Energy

Home Feature Summary:

Home Type:	Single family detached
Model:	Plan 4
Community:	Northpark - HI
Conditioned Floor Area:	1,368 ft²
Number of Bedrooms:	3
Primary Heating System:	Air Source Heat Pump • Electric • 8.5 HSPF
Primary Cooling System:	Air Conditioner • Electric • 21 SEER
Primary Water Heating:	Residential Water Heater • Electric • 0.91 Energy Factor
House Tightness:	397 CFM50 (1.66 ACH50)
Ventilation:	53 CFM • 15 Watts
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-13
Ceiling:	Vaulted Roof, R-19
Window Type:	U-Value: 0.34, SHGC: 0.23
Foundation Walls:	N/A

Rating Completed by:

Energy Rater: Rachel Zoe LaMantia
RESNET ID: 0786593

Rating Company: EnergyLogic
PO Box N Berthoud, CO 80513
(970) 556-0839

Rating Provider: EnergyLogic
PO Box N Berthoud, CO 80513
(970) 556-0839

Rachel Zoe LaMantia, Certified Energy Rater
Digitally signed: 8/31/21 at 12:34 PM

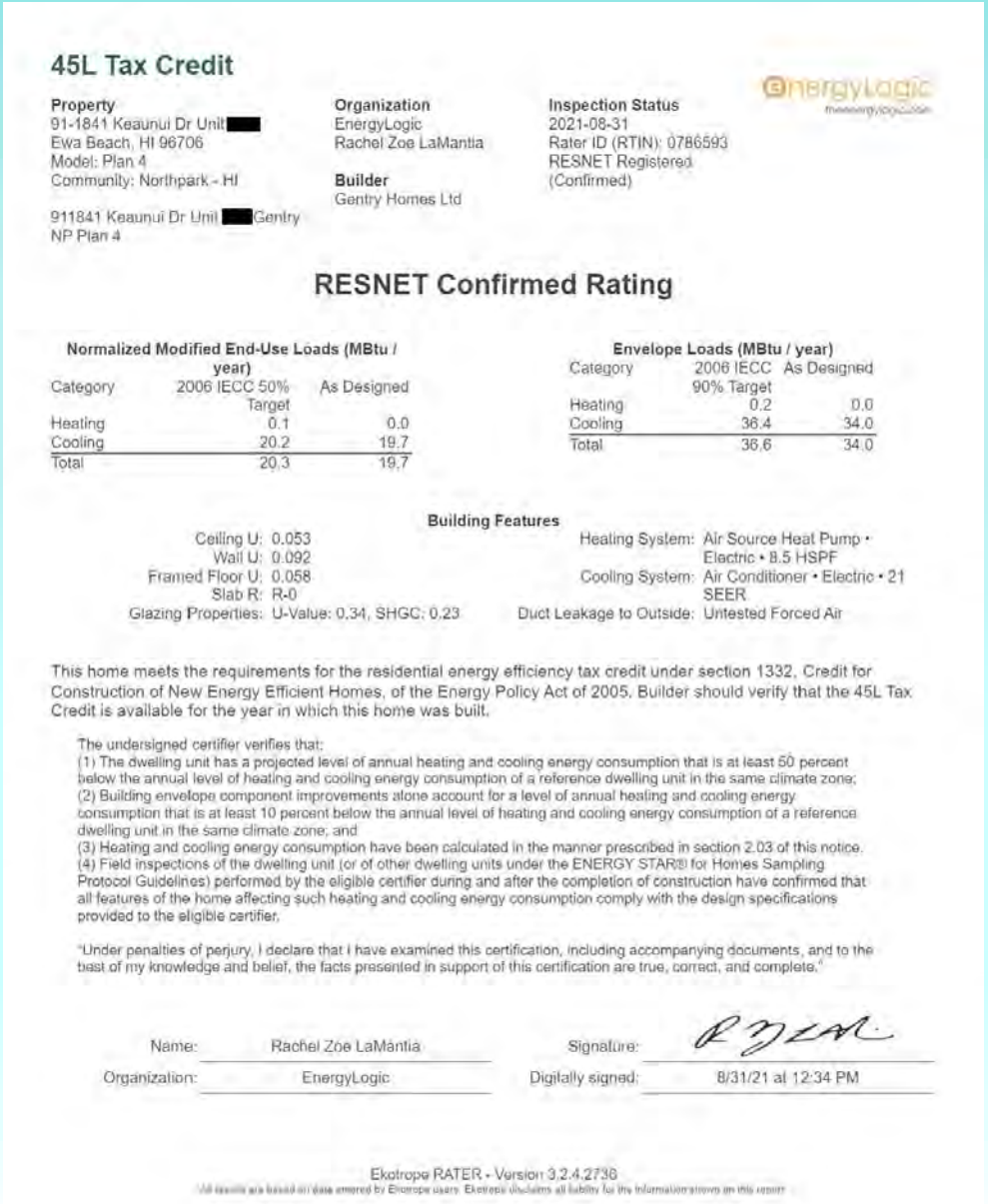
ekotrope

Ekotrope RATER - Version:3.2.4.2736
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Home Construction – 45L Tax Credit

Residential Energy Efficiency Tax Credit

- $2,000/dwelling unit
- Help offset costs associated with green building
  - Certified annual energy consumption of at least 50% below the level of a “compatible dwelling unit”
    - “Compatible Dwelling Unit” based on an equivalent home built to 2006 IECC standards
  - RESNET/HERS Rating used for certification
- The Inflation Reduction Act of 2022 changes the requirements of the 45L Tax Credit, effective January 1, 2023
  - $2,500/dwelling
    - Must now meet Energy Star requirements
  - $5,000/dwelling
    - Must meet the DOE Zero Energy Ready Home Requirements (ZERH)



45L Tax Credit

EnergyLogic

Property
91-1841 Keaunui Dr Unit [redacted]
Ewa Beach, HI 96706
Model: Plan 4
Community: Northpark - HI

911841 Keaunui Dr Unit [redacted] Gentry NP Plan 4

Organization
EnergyLogic
Rachel Zoe LaMantia

Builder
Gentry Homes Ltd

Inspection Status
2021-08-31
Rater ID (RTIN): 0786593
RESNET Registered
(Confirmed)

RESNET Confirmed Rating

Normalized Modified End-Use Loads (MBtu / year)

Category	2006 IECC 50% Target	As Designed
Heating	0.1	0.0
Cooling	20.2	19.7
Total	20.3	19.7

Envelope Loads (MBtu / year)

Category	2006 IECC 90% Target	As Designed
Heating	0.2	0.0
Cooling	36.4	34.0
Total	36.6	34.0

Building Features

Ceiling U: 0.053
Wall U: 0.092
Framed Floor U: 0.058
Slab R: R-0
Glazing Properties: U-Value: 0.34, SHGC: 0.23

Heating System: Air Source Heat Pump • Electric • 8.5 HSPF
Cooling System: Air Conditioner • Electric • 21 SEER
Duct Leakage to Outside: Untested Forced Air

This home meets the requirements for the residential energy efficiency tax credit under section 1332, Credit for Construction of New Energy Efficient Homes, of the Energy Policy Act of 2005. Builder should verify that the 45L Tax Credit is available for the year in which this home was built.

The undersigned certifier verifies that:
(1) The dwelling unit has a projected level of annual heating and cooling energy consumption that is at least 50 percent below the annual level of heating and cooling energy consumption of a reference dwelling unit in the same climate zone;
(2) Building envelope component improvements alone account for a level of annual heating and cooling energy consumption that is at least 10 percent below the annual level of heating and cooling energy consumption of a reference dwelling unit in the same climate zone; and
(3) Heating and cooling energy consumption have been calculated in the manner prescribed in section 2.03 of this notice.
(4) Field inspections of the dwelling unit (or of other dwelling units under the ENERGY STAR® for Homes Sampling Protocol Guidelines) performed by the eligible certifier during and after the completion of construction have confirmed that all features of the home affecting such heating and cooling energy consumption comply with the design specifications provided to the eligible certifier.

"Under penalties of perjury, I declare that I have examined this certification, including accompanying documents, and to the best of my knowledge and belief, the facts presented in support of this certification are true, correct, and complete."

Name: Rachel Zoe LaMantia
Signature:
Organization: EnergyLogic
Digitally signed: 8/31/21 at 12:34 PM

Ekotrope RATER - Version 3.2.4.2736

Open Cell Foam Insulation

Daniel Sandomire

Stanford Carr Development

HAWAIʻI STATE ENERGY OFFICE

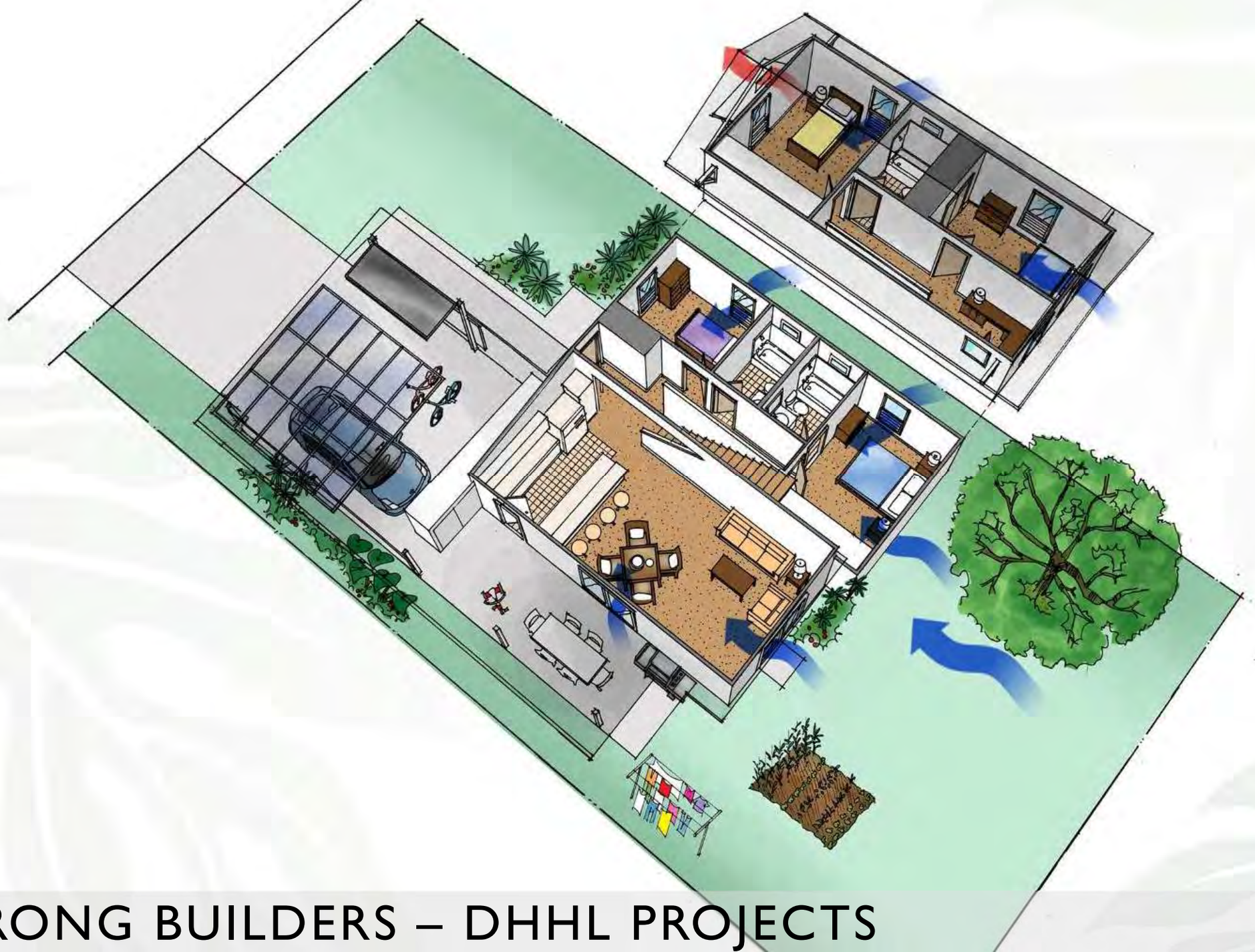
ENERGY EFFICIENT HOMES OF THE FUTURE

Daniel M. Sandomire, AIA, RIBA, LEED AP

Stanford Carr Development LLC

October 12, 2022

ENERGY EFFICIENT HOMES OF THE (RECENT) PAST



ARMSTRONG BUILDERS – DHHL PROJECTS

ARMSTRONG BUILDERS – DHHL PROJECTS

ARMSTRONG BUILDERS – DHHL KUMUHAU, WAIMANALO

ARMSTRONG BUILDERS – DHHL KUMUHAU, WAIMANALO

ARMSTRONG BUILDERS – DHHL LAIOPUA VILLAGE 5, KONA

ARMSTRONG BUILDERS – DHHL LAIOPUA VILLAGE 5, KONA

BIA HAWAII – NEW HAWAIIAN HOME

ARMSTRONG DEVELOPMENT – KEALA O WAILEA

ARMSTRONG DEVELOPMENT – KEALA O WAILEA

ARMSTRONG DEVELOPMENT - KALAMA KAI, KIHEI

ARMSTRONG DEVELOPMENT - KALAMA KAI, KIHEI

STANFORD CARR DEVELOPMENT – HALEKAUWILA PLACE

STANFORD CARR DEVELOPMENT – HALE KEWALO

ENERGY EFFICIENT HOMES OF TODAY

STANFORD CARR DEVELOPMENT – HALE MOILIILI, DHHL

STANFORD CARR DEVELOPMENT – KALEIMA'O VILLAGE, W. LOCH

STANFORD CARR DEVELOPMENT – HO'OMALU AT WAIKOLOA

ENERGY EFFICIENT HOMES OF THE FUTURE

1970s Tower

After Demolition

Quay Quarter Tower

3XN & BVN ARCHITECTS - SYDNEY

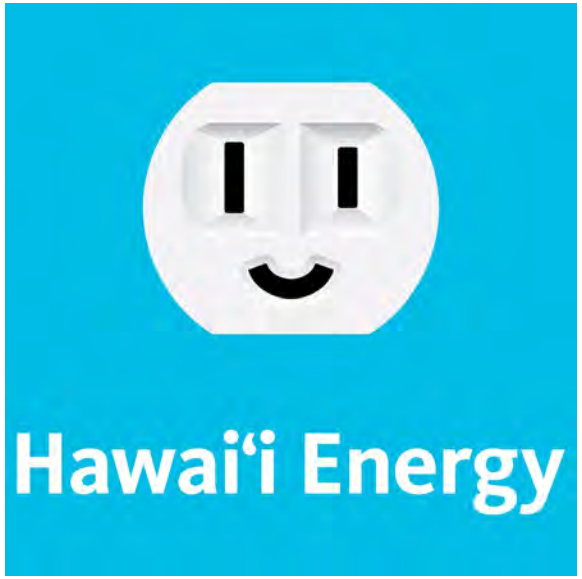
DOUGLAS EMMETT – 1132 BISHOP STREET

WATRY DESIGN INC – RETROFIT STUDY

SHELDEN ARCHITECTURE – WICHITA, KA

Denise Nakamura

Hawaii Energy



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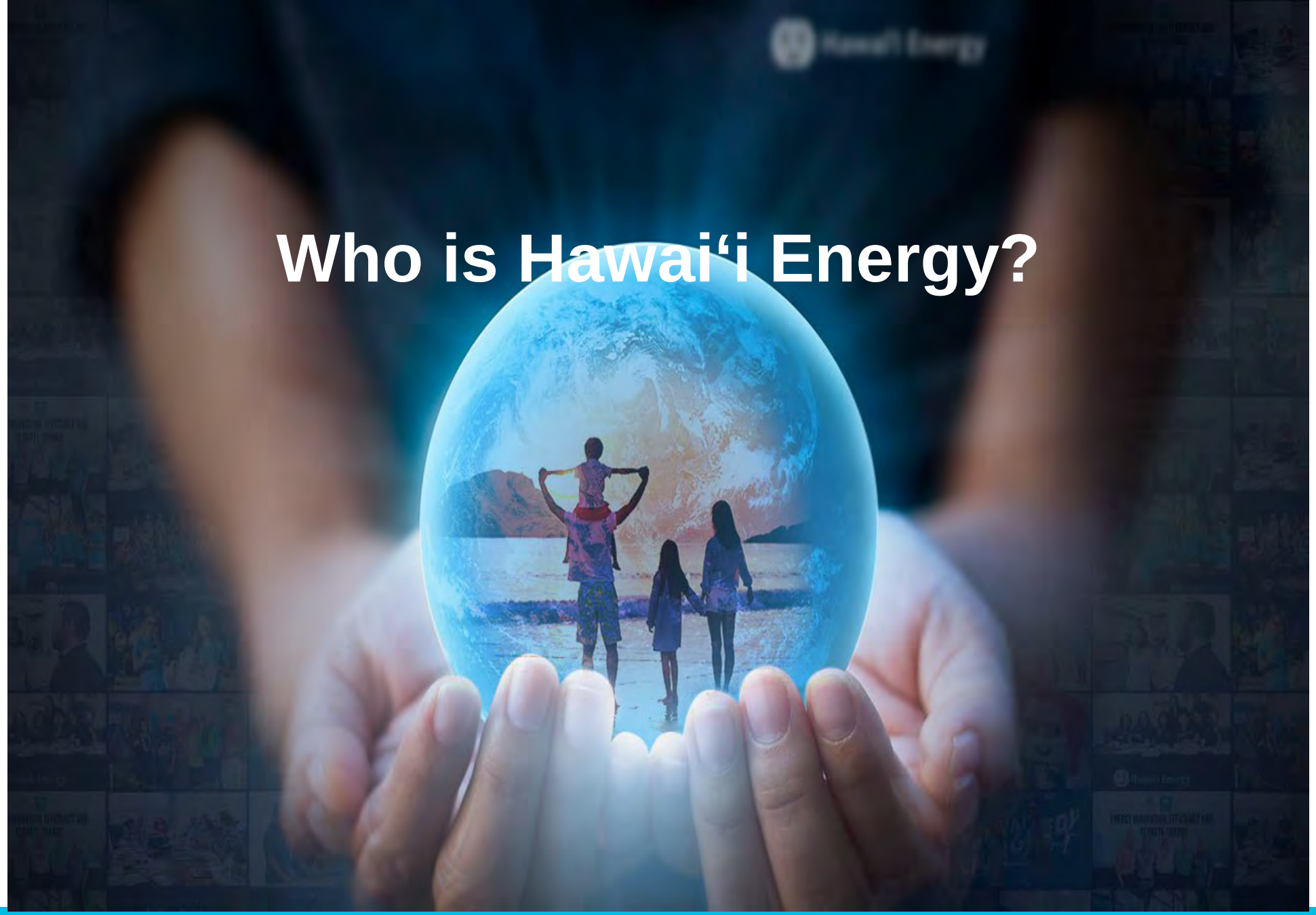
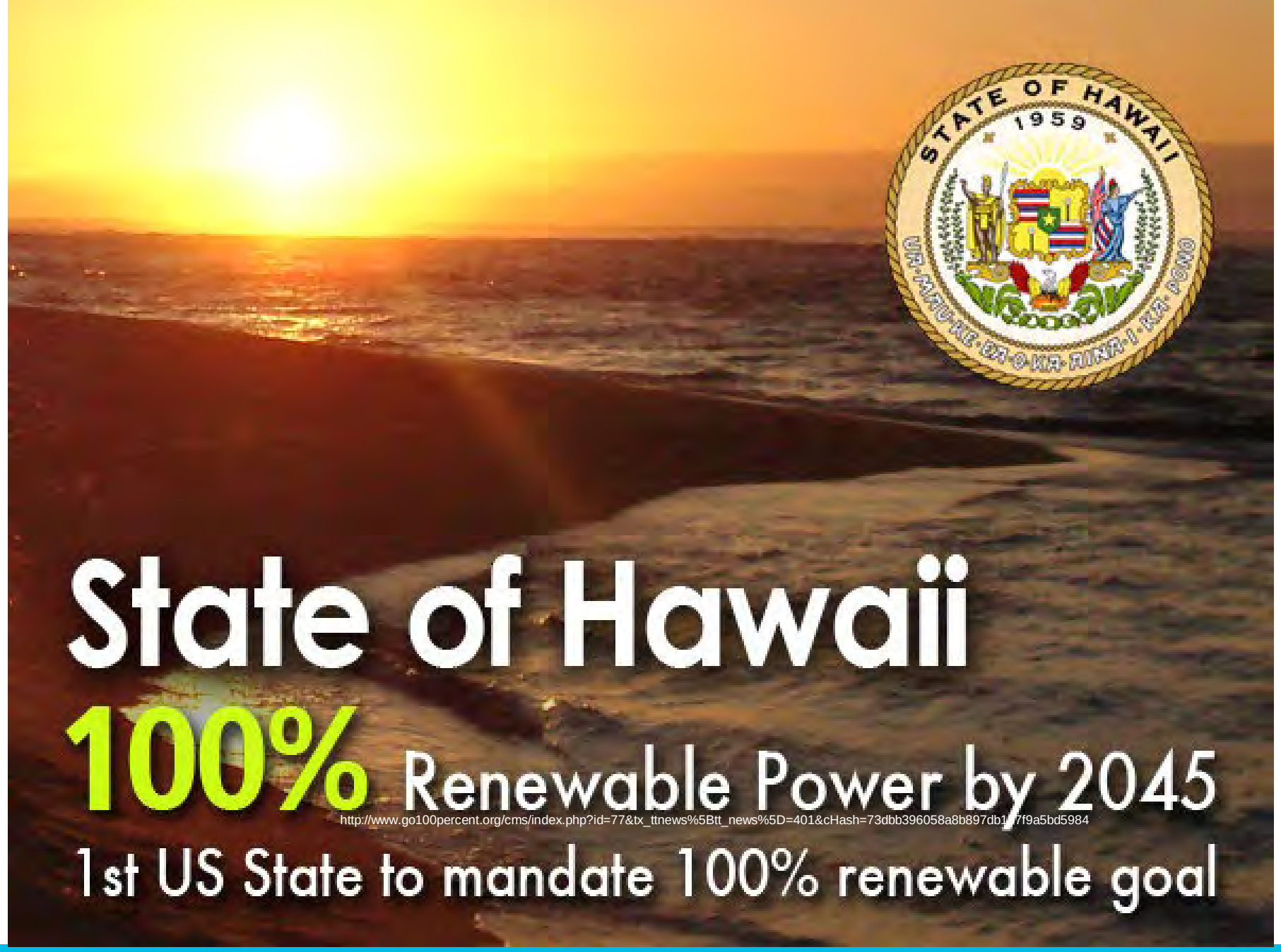
Hawai‘i Energy

Who is Hawai‘i Energy?




STATE OF HAWAII
1959
State of Hawaii
100% Renewable Power by 2045
http://www.go100percent.org/cms/index.php?id=77&tx_ttnews%5Btt_news%5D=401&cHash=73dbb396058a8b897db1...7f9a5bd5984
1st US State to mandate 100% renewable goal

Empowering island families and businesses to:

- Reduce energy consumption
- Make smarter energy choices
- Save money
- Pursue a 100% clean energy future

- Here to support the counties of Hawai‘i, Honolulu and Maui with energy conservation and efficiency program.
- Provides financial assistance, education & training, and technical assistance
- Administered by Leidos Engineering under the direction of the Hawai‘i Public Utilities Commission.

Residential New Construction Rebates

New construction & major renovation projects can receive rebates for:

- incorporating energy-efficient features into building designs
- exceeding building code requirements.

Single Family Homes

Multifamily Projects

Residential New Construction – Single Family (Detached)

Minimum Requirements

85% LED Lighting
50% ENERGY STAR® Appliances Installed — $250

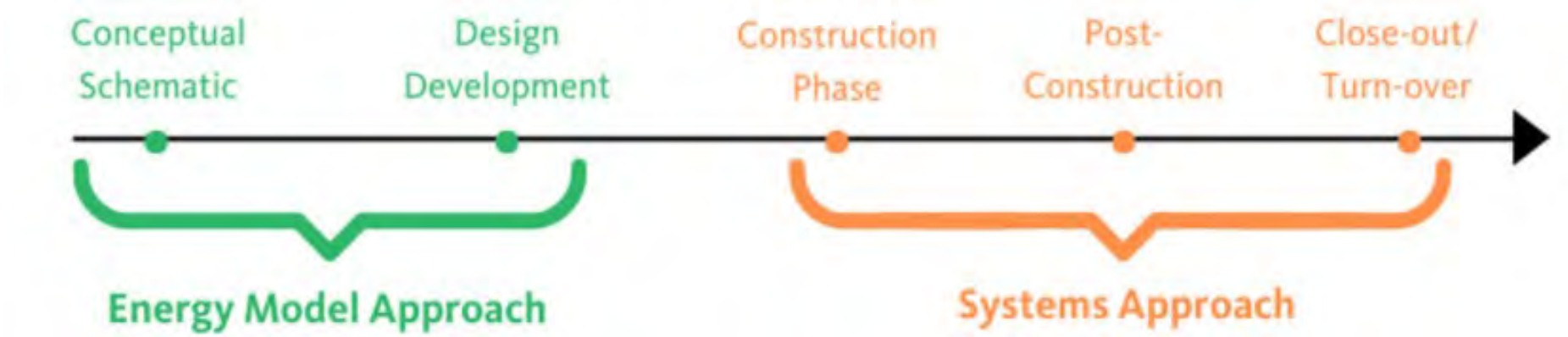
ENERGY STAR® certified (refrigerator, dishwasher, clothes washer, and clothes dryer)

Optional Incentives

High SEER A/C — $250

Smart Thermostats — $50

Multi-family and Commercial Building Incentives & Rebates: Energy Model



Up to $5,000 for energy model

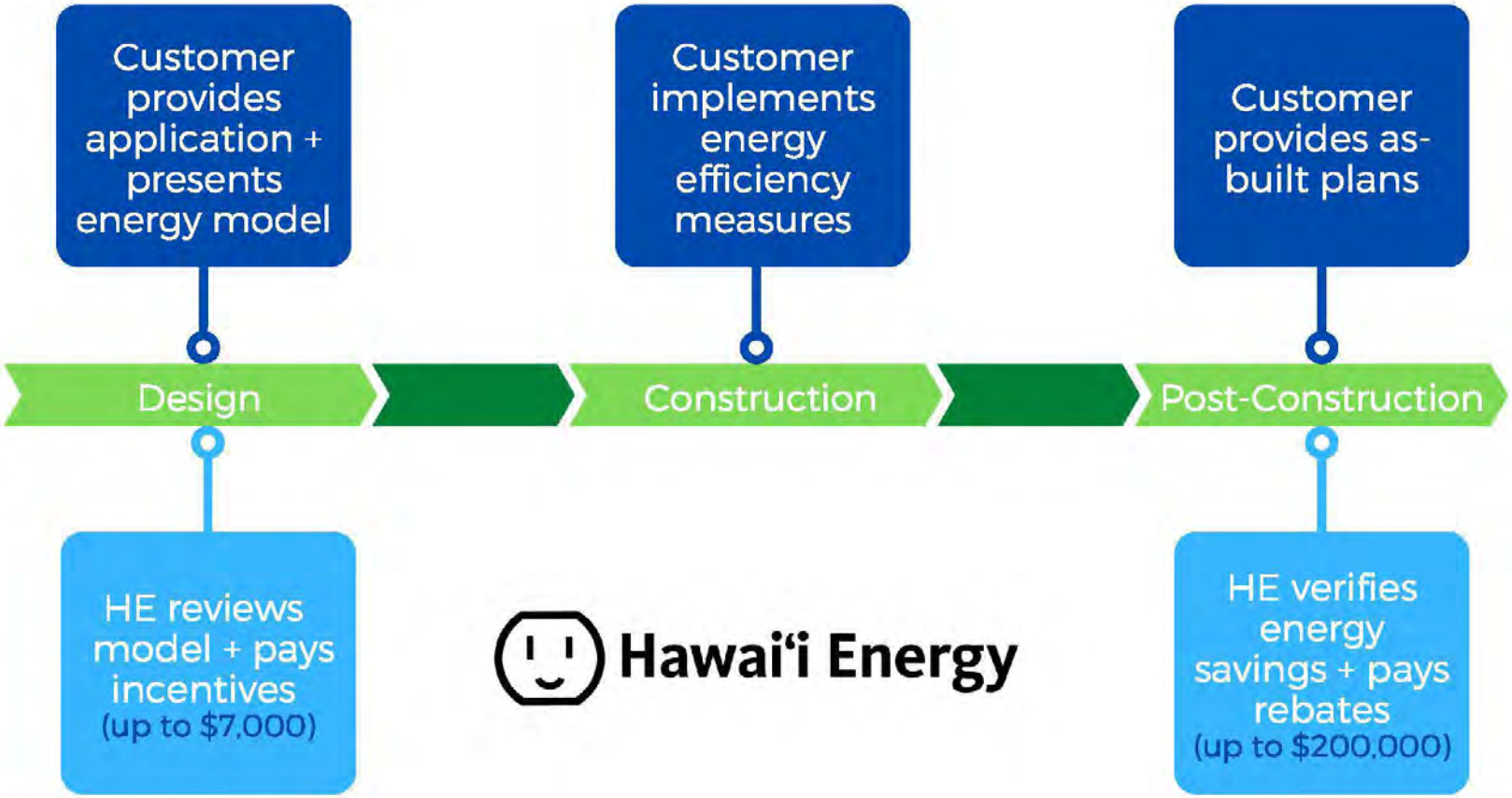
$1,000 to owner/developer

$1,000 to architect/design team for presentation

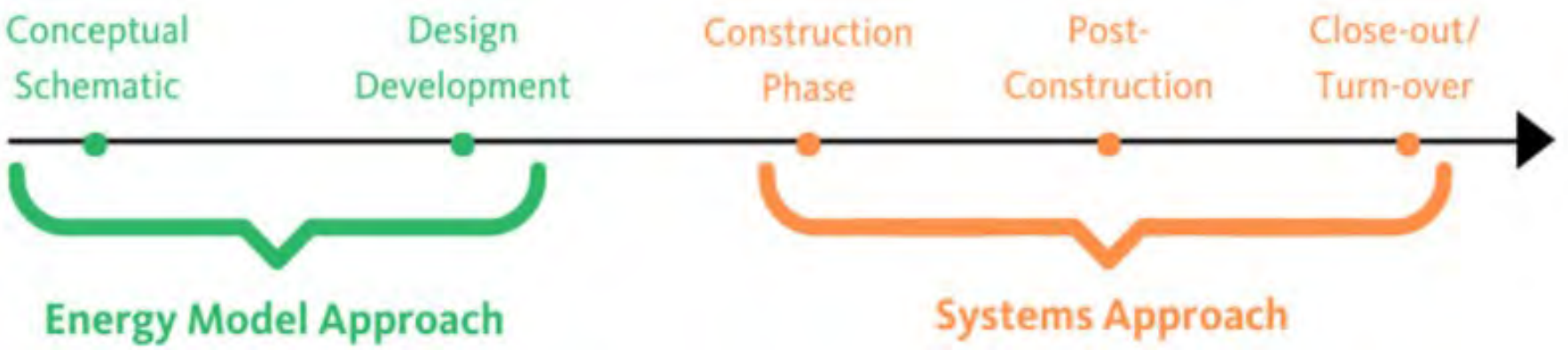
Energy savings rebate at $0.12/kWh savings predicted by energy model *(capped at $200,000)*

Demand savings rebate at $125/kW savings

Energy Model Approach



Multi-family and Commercial Building Incentives & Rebates: Systems Approach



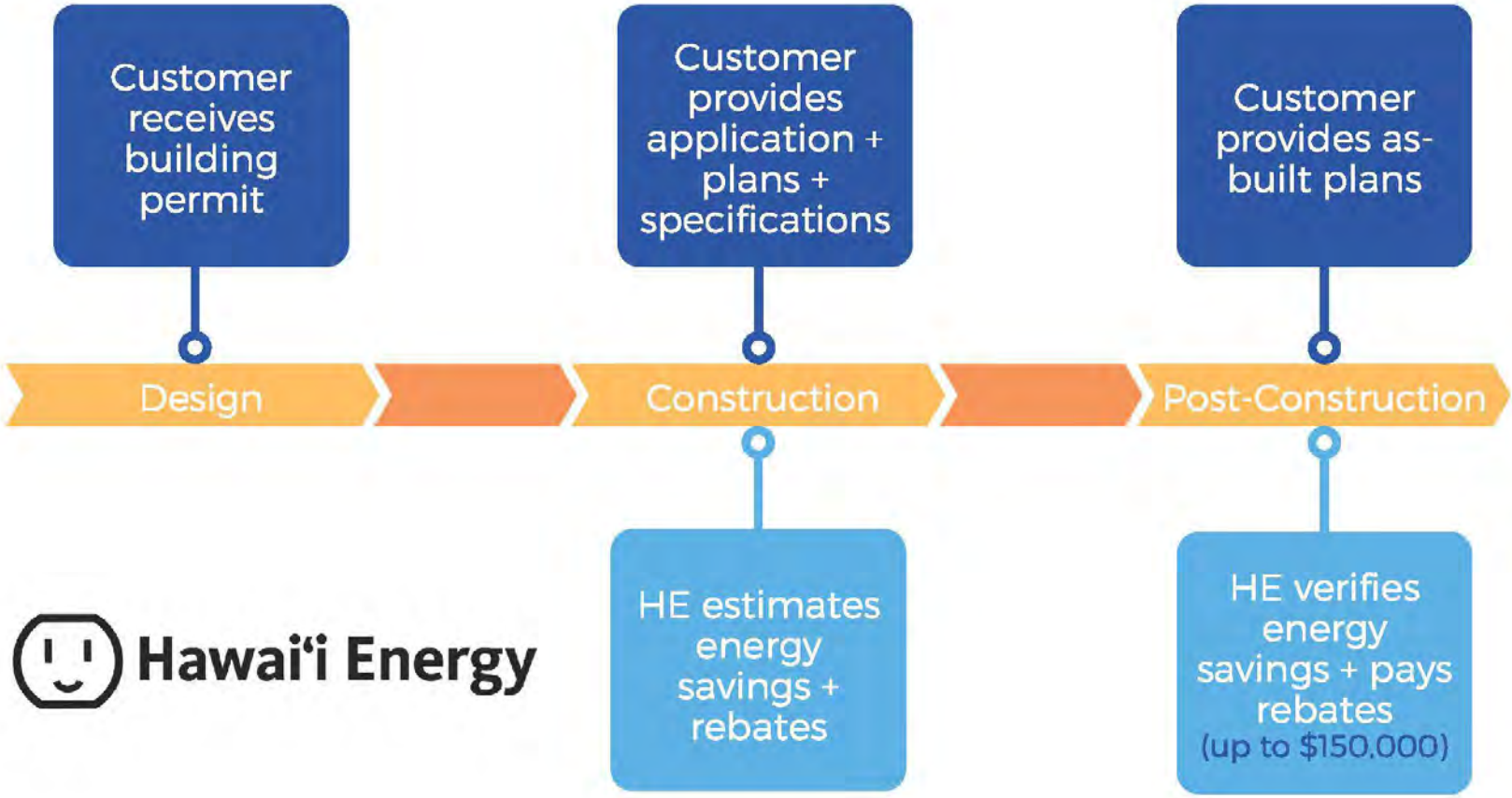
Lighting rebate

HVAC rebate

Appliances rebate

Total rebate capped at $150,000

Systems Approach



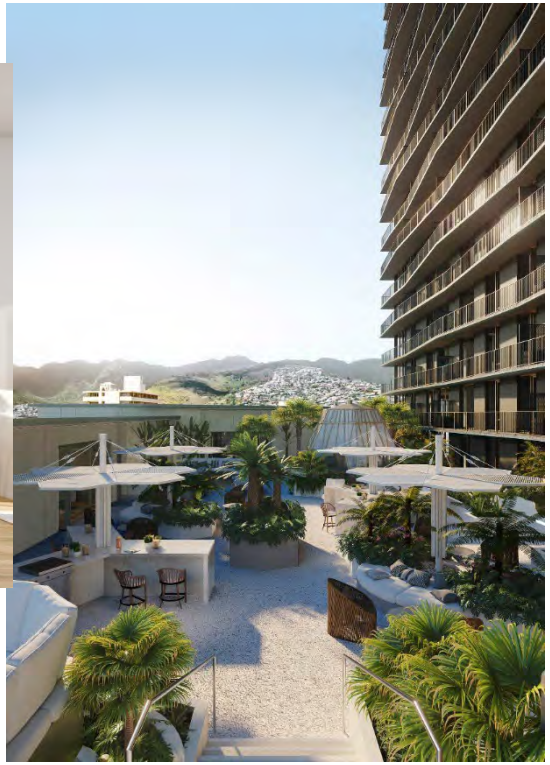
Hawai'i Energy

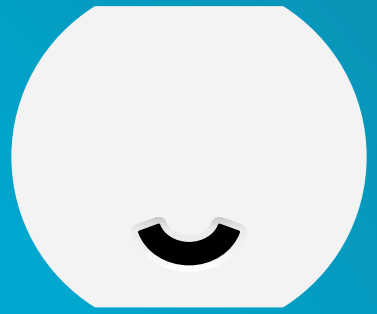
Keahumoa Place

- 320 affordable units
- LEED Platinum
- **$235,000 rebate** for lighting + appliances + solar water heating
- First year savings of **1,0412,000 kWh**

Lilia Waikiki

- 408 rental units
- **$281,560 rebate** for lighting + AC + appliances
- EV charging station rebate
- First year savings of **2,053,758 kWh** (about $450,000)





Mahalo!

Stay Connected

Oahu: 808-537-5577 (Residential) **808-839-8880** (Business)
Neighbor Islands: 1-877-231-8222 toll-free

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Daryl Takamiya

Castle & Cooke

HAWAIʻI STATE ENERGY OFFICE

RESIDENTIAL AFFORDABILITY

IN HAWAII

HAWAII HOUSEHOLDS PRICED OUT OF THE MARKET IN 2022

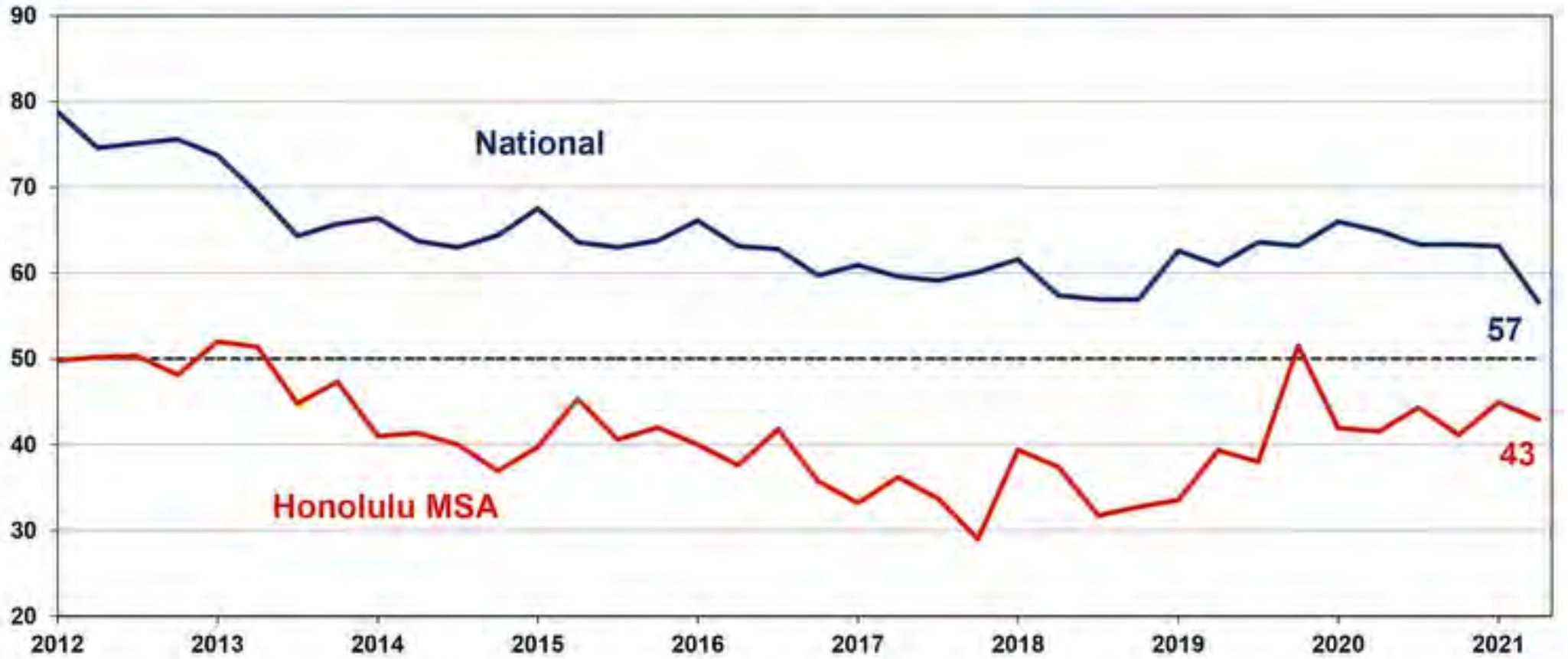
From NAHB Priced-Out Estimates for 2022

- 409,361 Hawaii households are not able to afford a new median priced home.
- A $1,000 home price increase would make 200 more Hawaii households disqualify for a new home mortgage.
- A 0.25% increase in mortgage rate means that a household would need an additional $2,445 in income to qualify for a 30 year mortgage.
- Current mortgage rates are now at 6.25%, up from an all time low of 3% in 2021. This 3.25% change means that a household needs an additional $31,785 of income to qualify for the same priced home.
- For the median priced home ($1,125,000) with a 20% down ($225,000), and 2 points ($18,000), the monthly payments will have increased roughly by $1,800.

IMPACT OF INFLATION ON AFFORDABILITY

- According to multiple sources, inflation in August hit 8.3%, raising household costs by an average of $3,984 and raising business production costs.
- Real Personal Income is projected to decline by 5.4% this year and recover only 1.2% in 2023 per UHERO.
- Home prices have adjusted downward recently, but the median price of a single family home as of August 2022 is still $27,500 higher than in January 2022 per the Honolulu Board of Realtors.
- Per the Honolulu Board of Realtors' May 2022 Monthly Housing Statistics, the median price of a single family home is $1,125,500, up 7.2% YoY (a $75,500 increase).
- The market is cooling, but the lack of housing is projected to prevent the housing drop off that's predicted for areas of the mainland.

Housing Affordability – NAHB/Wells Fargo HOI

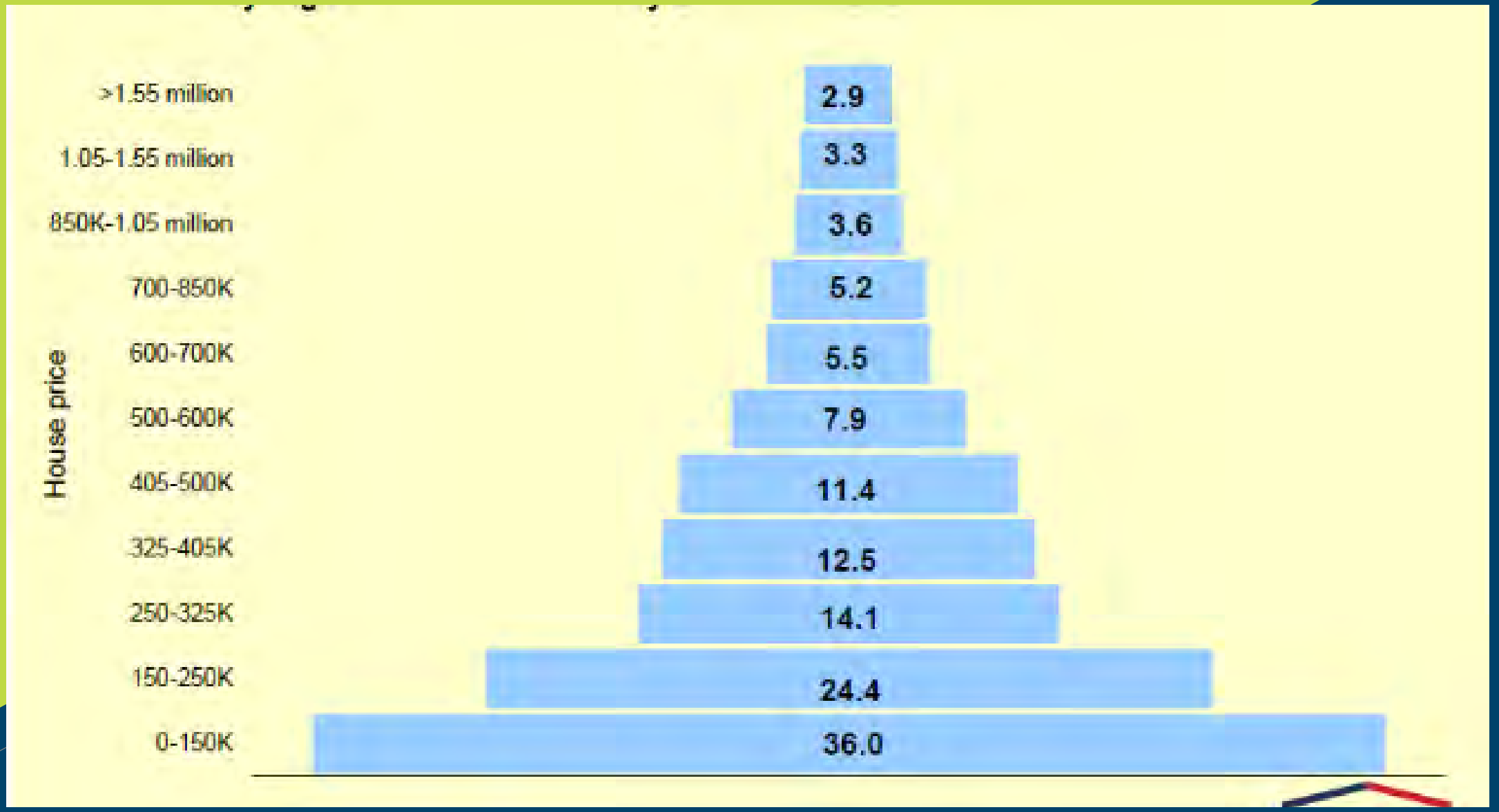


Source: NAHB/Wells Fargo Housing Opportunity Index (HOI).

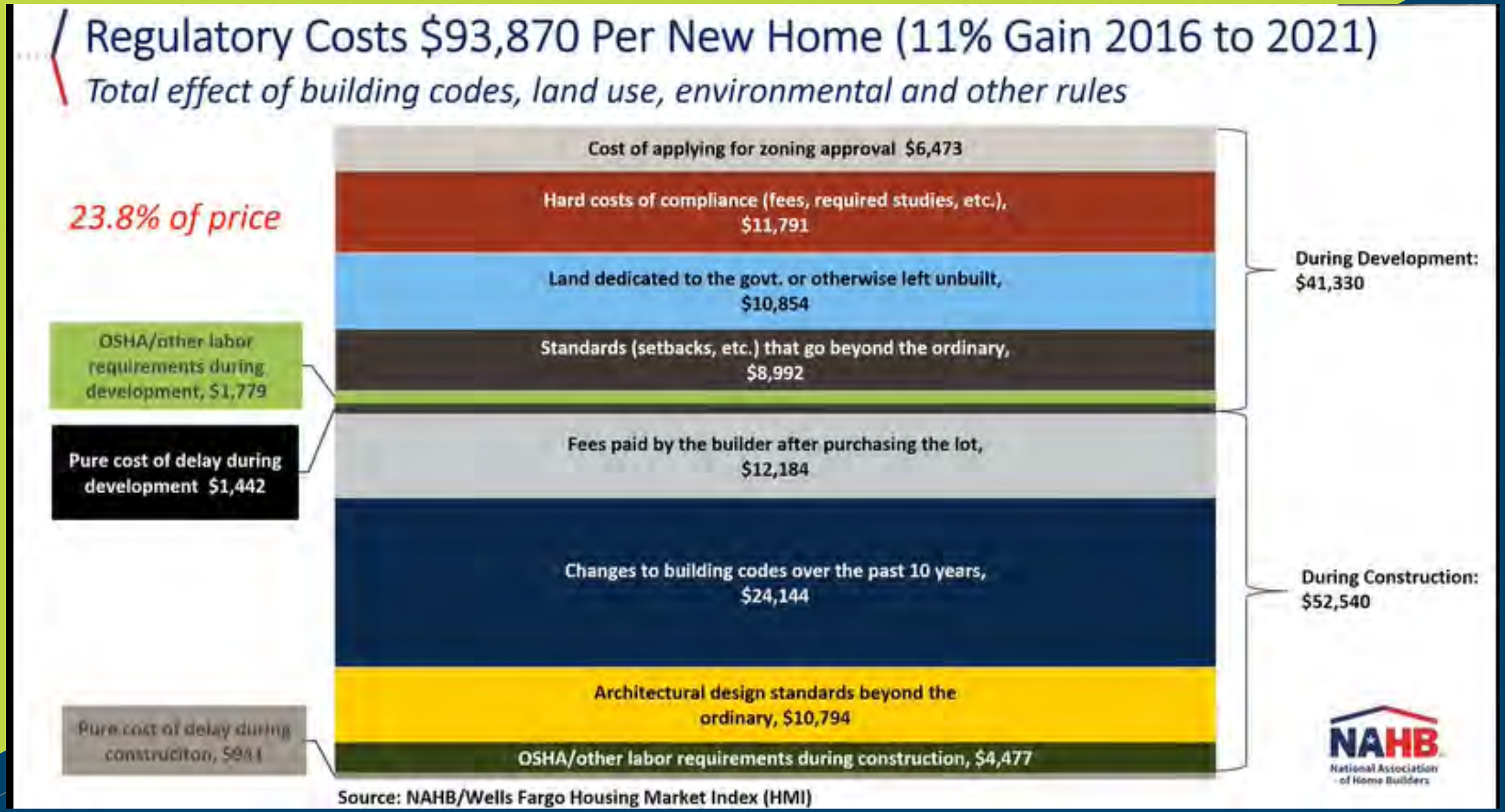
NAHB
National Association of Home Builders

2022 Economic Forecast, Presentation Given by Ken Simonson, AGC & Dr. Robert Dietz, NAHB
Analysis showing % of New & Existing Home Sales That Are Affordable to Households with Midrange Income Distribution

US Households (in Millions) by Highest Priced Home They can Afford



REGULATORY IMPACTS



2022 Economic Forecast, Presentation Given by Ken Simonson, AGC & Dr. Robert Dietz, NAHB

REGULATORY COSTS IN HAWAII

- According to UHERO's April 14, 2022 report, Hawaii's regulatory burden is the highest in the country by a significant margin. It's about 50% more than the next highest state, New Jersey, double that of Connecticut, Indiana and Wisconsin, and almost triple that of Alaska.
- The NAHB regulatory costs per new home was based on a national average price. Hawaii's regulatory cost per home is closer to $192,185.
- Per UHERO, "Reforming or removing regulatory barriers to new housing production could significantly contribute to new housing production and ultimately reduce the burden that high housing costs place on local households and improve affordability in the state."
- Regulatory costs are effectively a regressive tax as it disproportionately burdens lower income families.

CODE CHANGES AND LEGISLATION OFTEN HAVE UNINTENDED CONSEQUENCES

- Proposed code changes and legislation often do not take into account cost impacts to housing. Code changes almost always increase the cost of housing.
- Low hanging fruit have already been plucked resulting in diminishing returns. New homes are already safe and extremely efficient. A cost-benefit analysis for all proposed changes should be required.
- New legislation and code changes often only look at one item and do not consider impacts on the entire system resulting in unforeseen costs.
- Death by a thousand cuts: People only focus on the bill or code change at hand, forgetting about all the other changes passed previously.
- Incentives not Mandates. If adequate incentives are offered, developers and contractors will find a way while avoiding or factoring in the unintended consequences.

Thank You

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Q&A

Daryl Takamiya, Castle & Cooke

McKibbin Mist, D.R. Horton

Jayson McCullough, Gentry Homes

Daniel Sandomire, Stanford Carr Development

Denise Nakamura, Hawaii Energy

Howard Wiig, State Energy Office

Erik Kolderup, Kolderup Consulting

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Wrap Up

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Closing remarks

- Efficiency's role in clean energy goals
- Building beyond code
- Training to support workforce development
- Building energy code updates
  - Honolulu. 2018 IECC with amendments by end of 2022.
  - 2021 IECC. State Building Code Council considering amendments, Fall 2022.
  - 2021 IECC training coming Spring 2023.

HAWAIʻI STATE ENERGY OFFICE

Training series

Available online, PDF and recording

Workshop 1 - 4/7/2022
Building Energy Education Fundamentals and Energy Code Basics
4/7/2022

Workshop 2 - 4/14/2022
Comfort, Air Quality and Lighting
4/14/2022

Workshop 3 - 4/21/2022
Beyond Code, Net Zero Energy and Existing Buildings

https://energy.hawaii.gov/what-we-do/energy-efficiency/hawaii-energy-building-code-iecc-updates/

TRAININGS

October 12, 2022 – Energy Efficient Homes of the Future

Leading edge Hawai'i builders Castle & Cooke, D.R. Horton, Gentry Homes and Stanford Carr share their expertise in delivering efficient, comfortable and affordable homes. Take advantage of their experience and support the State's transition to 100% clean energy.

Register for the Event

April 21, 2022 – Beyond Code, Net Zero Energy and Existing Buildings

This was the third in a series of three webinars covering building energy efficiency and the energy code in Hawai'i. This final session covered the topics of designing to exceed energy code requirements, efficiency strategies in both new and existing buildings, and incentives that are available for energy efficiency measures.

- Presentation: Beyond Code, Net Zero Energy and Existing Buildings
- Video: Workshop 3 Beyond Code, Net Zero Energy and Existing Buildings

April 14, 2022 – Ventilation, Air Quality and Lighting

This was the second in a series of three webinars covering building energy efficiency and the energy code in Hawai'i. This session focused on thermal comfort and indoor air quality, and covered fundamentals of building systems, including lighting, air conditioning, ventilation, and air filtration. The emphasis was on residential building systems.

- Presentation: Ventilation, Air Quality and Lighting
- Video: Comfort, Air Quality and Lighting

April 7, 2022 – Building Energy Efficiency Fundamentals and the Energy Code Basics

This was the first in a series of three webinars covering building energy efficiency and the energy code in Hawai'i, with a focus on residential buildings. This session introduced a set of education modules that cover a range of building efficiency topics and then focused on the topics of building energy fundamentals and an overview of Hawai'i's building energy code.

- Presentation: Building Energy Efficiency Fundamentals and the Energy Code Basics
- Video: Building Energy Efficiency Fundamentals and Energy Code Basics

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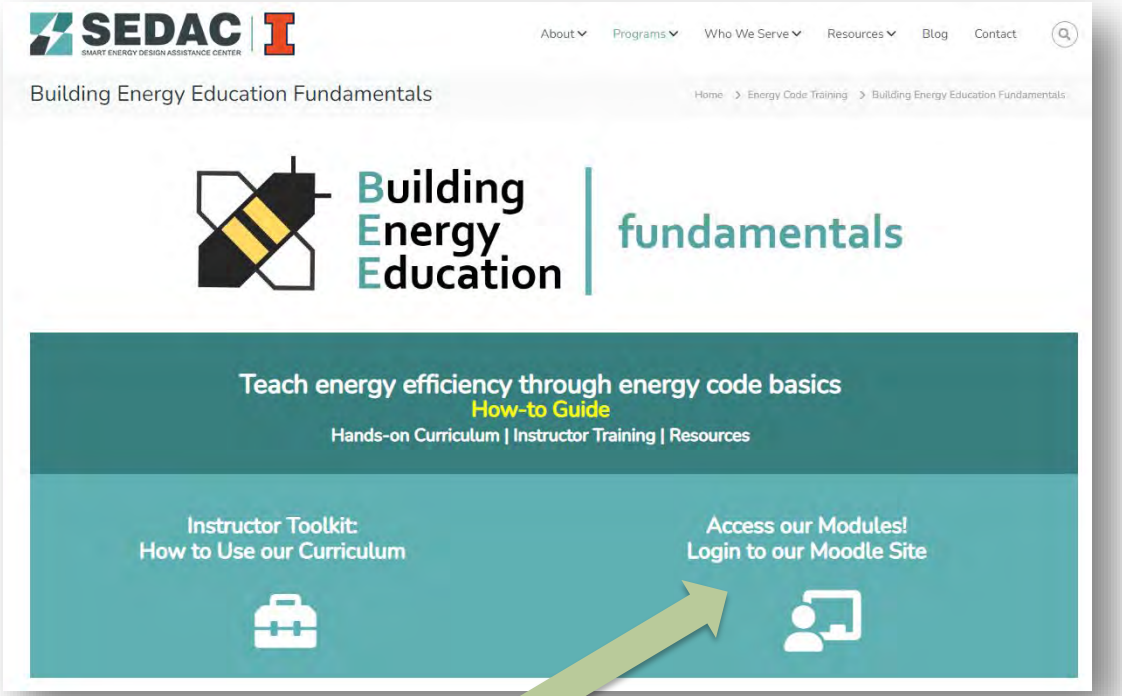
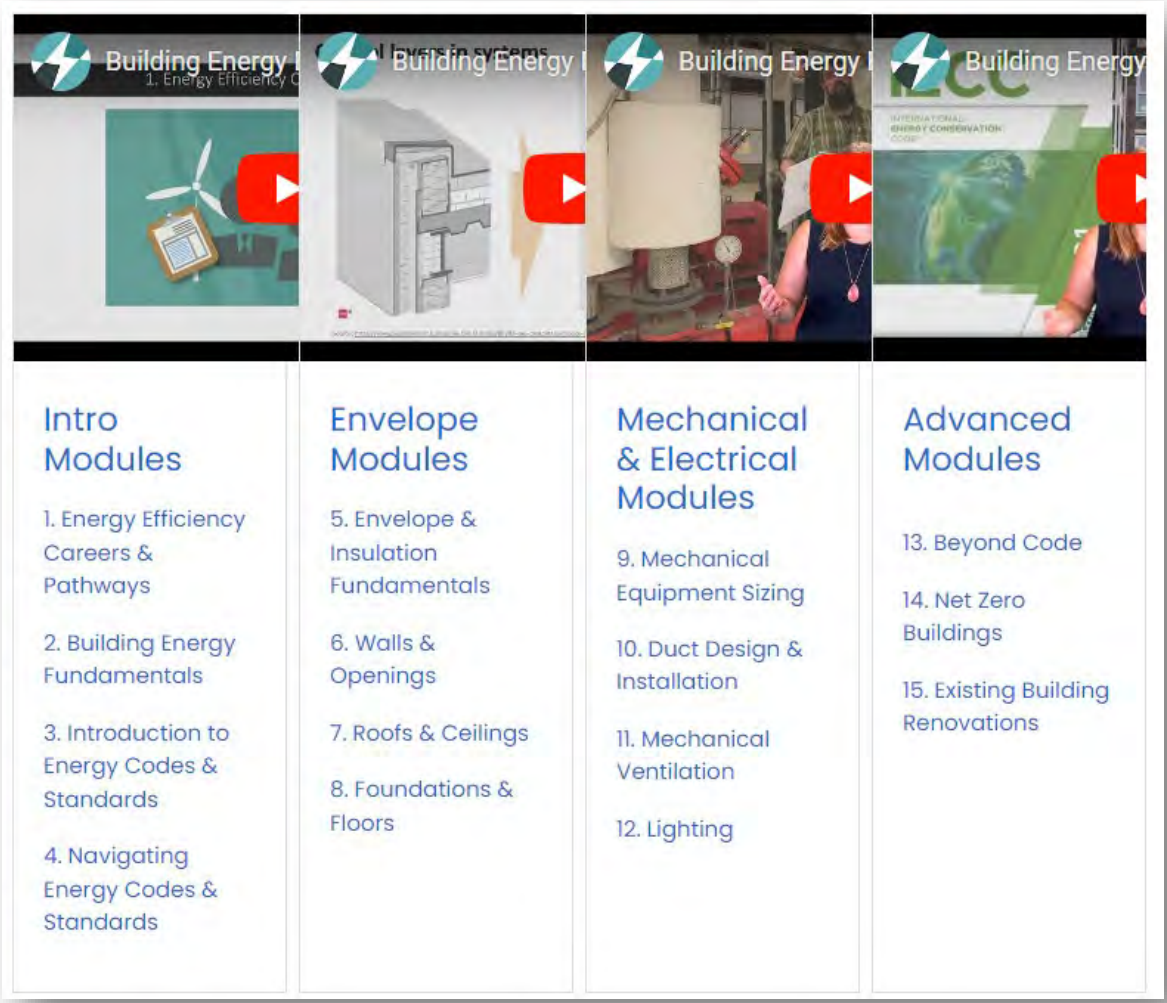
BEE Fundamentals Program Webpage

https://smartenergy.illinois.edu/bee_fundamentals/



Free registration

- Videos
- Slides
- Exercises



Evaluation Survey

https://www.surveymonkey.com/r/6RJC68H

Future training suggestions?

Hawai'i Energy

https://www.zippys.com/

Complete the survey by October 14
for a chance to receive one of three $25 Zippy's gift cards,
courtesy of Hawaii Energy

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Acknowledgements

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Building Energy Education Fundamentals
- https://smartenergy.illinois.edu/bee_fundamentals/

2018 IECC available
- http://iccsafe.org/publications
- https://codes.iccsafe.org/content/iecc2018

State Energy Code Website
- https://energy.hawaii.gov/what-we-do/energy-efficiency/hawaii-energy-building-code-iecc-updates/

Hawaii Energy Code Website
- https://hawaiienergy.com/codes

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