

Housing Innovations in Energy Efficiency (HIEE) Funds - Performance and Documentation Requirements

Webinar

September 1, 2021

Noon – 1:00 pm

Announcement

- *If you or someone you know is having difficulty in making rent payments, please assess eligibility for the Virginia Rent Relief Program (RRP)*
- *To find out more details on RRP eligibility, please visit www.dhcd.virginia.gov/eligibility or dial 2-1-1 from any phone*

Agenda Outline

- I. Welcome and introductions
- II. Overview – RGGI, HIEE development and requirements
- III. DHCD Affordable and Special Needs Housing (ASNH) - Program updates and application timeline
- IV. HIEE new construction project requirements - Zero Energy Ready Homes (ZERH) program (presenter: Jamie Lyons, Newport Partners)
- V. HIEE substantial rehab and adaptive reuse project requirements (presenter: Matt Waring, Viridiant)
- VI. Q&A

What is HIEE funding?

- HIEE is DHCD's "brand" for the Regional Greenhouse Gas Initiative (RGGI) funds allocated to DHCD
- 50% of net revenues from quarterly RGGI auctions are allocated to DHCD to support increasing energy efficiency in affordable housing and reducing energy burdens for low-income Virginians per HB 981 (2020)
- Major investments of HIEE funds to date are in DHCD's Affordable and Special Needs (ASNH) program and Weatherization Deferral Repair (WDR) program

Regional Greenhouse Gas Initiative (RGGI)

- Regional market-based CO₂ reduction program, formed in 2005
 - Original 7 states (CT, DE, ME, NH, NJ, NY, VT)
 - MD, MA, and RI joined in 2007
- Cap-and-Invest
 - Fossil fuel power plants need an allowance for each ton of CO₂
 - Total # of allowances based on declining annual CO₂ budgets
 - First auction – Fall 2008
 - States determine how allowance revenues are invested
- January 1, 2021 – Virginia became 11th participating state in RGGI
- March 3, 2021 - First RGGI auction in which Virginia-based entities participated

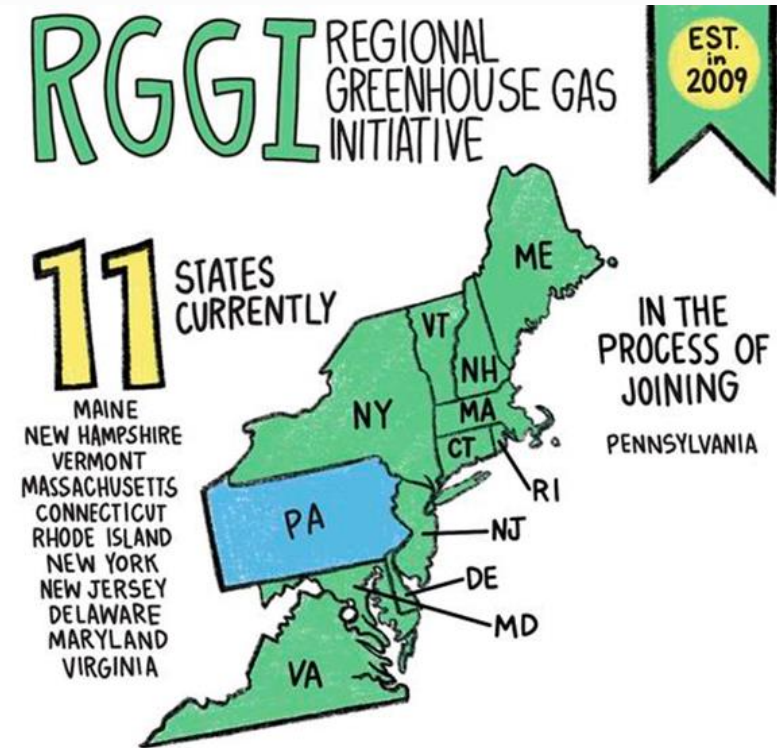


Image credit: Jessica Russo/NRDC. Used with permission

Virginia's Objectives for HIEE (RGGI) Funds

- Deep energy retrofits - Exceed code requirements in ways that complement existing affordable housing construction and rehabilitation programs, to ensure lowest-income population benefits from long-term cost savings
- Incorporate innovative approaches - Overcome traditional barriers to building and retrofitting affordable housing at scale
- Prioritize long-term sustainability/durability and occupant health - Improve ventilation and indoor air quality, prevent moisture issues, along with energy efficiency upgrades

HIEE Stakeholder Advisory Group

- Fifteen members, representing advocacy groups, affordable housing developers, housing development authorities, weatherization agencies and building energy consultants
- Seven Advisory Group meetings to date, starting in December, 2020
- Two Working Groups:
 - Historically Economically Disadvantaged Communities (HEDC)
 - Energy Data

HIEE Energy Workgroup Members

- KC Bleile, Virdiant
- Janaka Casper, Community Housing Partners
- Chelsea Harnish, VA Energy Efficiency Council
- Sunshine Mathon, Piedmont Housing Alliance
- Adam Stockmaster, TMA Development

Agency partners:

- Stephanie Flanders, Virginia Housing
- Bettina Bergoo, DMME

HIEE Requirements for ASNH

Project Type	VA Housing LIHTC Requirement	HIEE Requirement**
New Construction	ENERGY STAR v3.0	Zero Energy Ready Homes
Substantial Rehab	30% improvement in HERS index or HERS index 80 (or below)	40% improvement in HERS index, or average of HERS index of 70 or below across all units
Adaptive Reuse	HERS index 95 (or below)	Average of HERS index of 80 or below across all units

**Additional HIEE requirements: Green building certification; Manual J calculation for HVAC; fresh air ventilation; dehumidification; duct leakage testing and sealing; Architect cost certification; HERS Rater plan review and preliminary rating

Additional HIEE Requirements

- Green building certification: Same as LIHTC program requirements (LEED, Earth Craft Gold, National Green Building Standard, Enterprise Green Communities)
- Dehumidification strategy/equipment shall maintain interior RH in 40-60 percent range

For substantial renovation and adaptive reuse projects:

- If building/unit envelopes are tightened to new construction standards (5 ACH50), ventilation system(s) shall provide fresh air supply per most current version of ASHRAE 62.1 or 62.2, or the most current version of USBC, whichever is more stringent.
- Existing ductwork shall be sealed and tested to be ≤ 10 percent total duct leakage; if HVAC system/ductwork is newly-installed, duct leakage shall meet new construction USBC residential energy code requirements (≤ 4 percent total duct leakage).

ASNH Documentation for HIEE requirements

- Preliminary HERS Rating on representative sample of units, showing:
 - ZERH compliance for new construction
 - HERS 70 target for substantial rehab (or 40% improvement in HERS index)
 - HERS 80 target for adaptive reuse
- Green building certification checklist
- Brief narrative describing how project team will achieve HIEE performance requirements (ventilation/dehumidification, duct sealing) across building systems and dwelling units
- To extent feasible, provide additional incremental costs associated with meeting HIEE reqs.

HIEE Funds Offered through ASNH

- April 2021 ASNH round
 - \$7.2m in HIEE funds requested across 14 projects (out of \$8.7m available)
 - 11 projects received HIEE awards; about \$5.9m HIEE funds obligated; 705 dwelling units to be produced or preserved meeting HIEE requirements
- October 2021
 - \$27.0m in HIEE funding available
 - Includes 60% of June 2 and projected Sept. 8 revenue (~\$42m) plus \$2m carryover from Spring round

ASNH How-to-Apply Webinar

- September 14, 1:00pm to 3:00pm; link to be distributed soon
- Walk through application process in DHCD's Centralized Application Management System (CAMS)
- Other funding sources available include HOME, National Housing Trust Fund, and Virginia Housing Trust Fund
- Total ASNH funding for Fall 2021 round (applications due on October 31) will be \$84m
- Projects must achieve fundable score for VHTF, NHTF, or HOME funds to access HIEE funds

Today's Presenters

Jamie Lyons, Newport Partners

- Jamie conducts research and analysis on building performance and energy efficient design. In his role as the Technical Director for the U.S. Department of Energy's Zero Energy Ready Homes program, he supports builders, Raters, architects, building owners, and utilities to help them achieve solutions for high performance homes and buildings. He is a Professional Engineer in the state of Maryland.

Matt Waring, Viridian

- Matt is Technical Director for Viridian. Matt has been working in the construction field for more than a decade. He has experience as a superintendent on both single family and multifamily construction projects in both Virginia and South Carolina. Matt has served in several roles for Viridian, and is now on the Technical Management team overseeing Viridian's Technical Advisors and Project Managers working with a broad array of clients. He has been a Certified Home Energy Rater since 2011.



U.S. DOE Zero Energy Ready Homes for the Virginia HIEE Program

September 2021

JAMIE LYONS, P.E.

Newport Partners (DOE Contractor)



Specifications: The Easy Lift from ENERGY STAR

DOE ZERH V1 – Eligible Building Types



- SFD and SFA dwellings



- MF buildings up to 5 stories
- Central HVAC & DHW allowed



- For 4-5 story MF buildings, dwelling units must occupy \geq 80% of the occupiable square footage of the building

ENERGY STAR Multifamily New Construction (ESMFNC) program eligible building types:

- Any MF building with dwelling or sleeping units that is ***not*** a two-family dwelling;
- Mixed-use buildings (see limits on common space)
- Townhouses meeting specific requirements

ESMFNC can serve as the ENERGY STAR Prerequisite for DOE ZERH

Note: DOE ZERH will release Multifamily-specific program requirements mid- to late-2022. There will be a transition period to move projects to this new spec.

DOE ZERH Compared to Code & ENERGY STAR Homes



Energy Efficiency & Renewable Energy

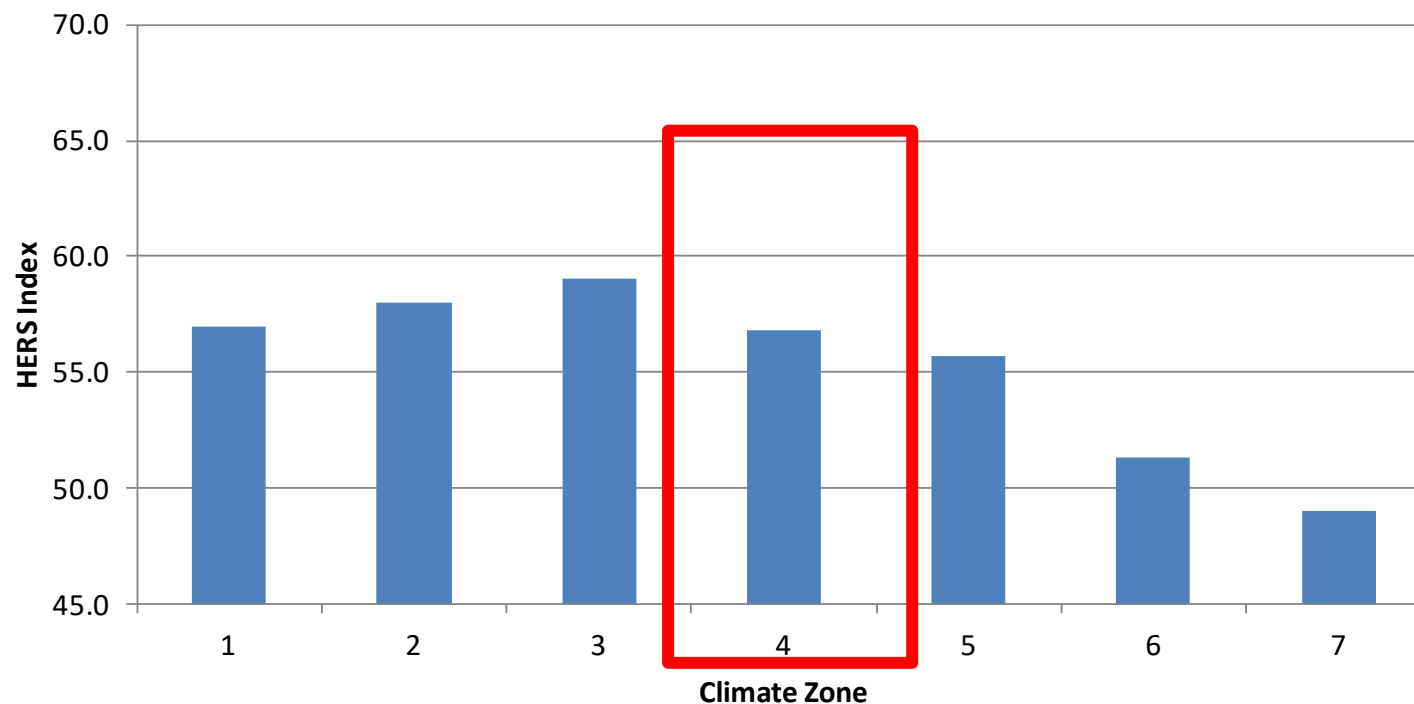
			Solar Ready
			Eff. Comps.& H ₂ O Distrib.
			EPA Indoor Air Package
			Optimized Duct Location
	HVAC QI with WHV	HVAC QI with WHV	HVAC QI with WHV
	Water Management	Water Management	Water Management
	Independent Verification	Independent Verification	Independent Verification
IECC 2012 Enclosure	IECC 2009 Enclosure	IECC 2012 Enclosure	IECC 2015 Enclosure
HERS 70-80	HERS 65-75	HERS 55-65	HERS 48-55
IECC 2012	ENERGY STAR v3	ENERGY STAR v3.1	ZERH

Stepping up to ZERH...

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			Eff. Comps.& H ₂ O Distrib.
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Typical DOE ZERH-Compliant HERS Index by Climate Zone



Based on 1800, 2400, and 3600 ft² prototypes on climate-appropriate foundations.

- **299,000+** HERS Ratings
- **58** Avg. HERS Index
- **~10,000s** Homes Ready for ZERH



Source: *RESNET*
Data for CY2020

Stepping up to ZERH...



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	CZ 4	CZ 5
Walls	R-20 or R-13+5	
Ceiling	R-49	
Floor	R-19	R-30
Basement	R-10/13	R-15/19
Crawl Space	R-10/13	R-15/19
Slab	R-10 for 2' Deep	

High Performance Windows

ENERGY STAR Window Specs to Apply to DOE Zero Energy Ready Home Projects ¹	Hot Climates IECC CZ 1-2		Mixed Climates IECC CZ 3-4 except Marine		Cold Climates IECC CZ 5-8 and 4 Marine ²	
	U-Value	SHGC	U-value	SHGC	U-Value	SHGC
	0.40	0.25	[CZ 3] 0.30 [CZ 4] 0.30	[CZ 3] 0.25 [CZ 4] 0.40	0.30 0.31 0.32	Any ≥0.35 ≥0.40

1. DOE Zero Energy Ready Home offers multiple compliance paths including area weighting and allowances for passive solar design. See the National Program Requirements, Exhibit 1 with footnotes, for details.

2. These U & SHGC values are based on the ENERGY STAR v5.0 Window Specifications. DOE ZERH will review the feasibility of adopting ENERGY STAR v6.0 Window Specifications, which entail lower U values, periodically. Any program update to require the v6.0 window specs will be announced with a minimum 1-year phase-in.

Stepping up to ZERH...



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			Optimized Duct Location	←
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IECC 2012	ENERGY STAR v3	ENERGY STAR v3.1	ZERH	



Pre-requisite
for DOE ZERH

Duct Performance Importance

95% Condensing Furnace

X

60% Efficient Duct
Distribution

57% System Efficiency

80% Furnace

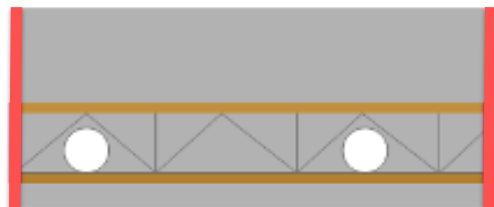
X

90% Efficient Duct
Distribution

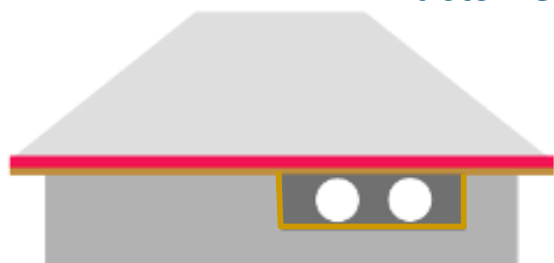
72% System Efficiency

Optimized Duct Location Options

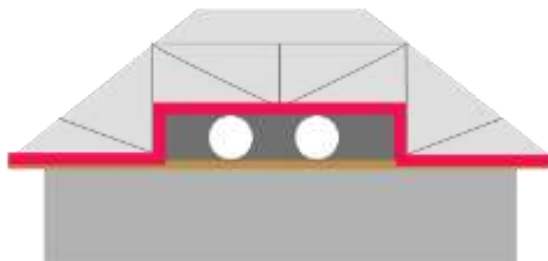
Ducts in Conditioned Space



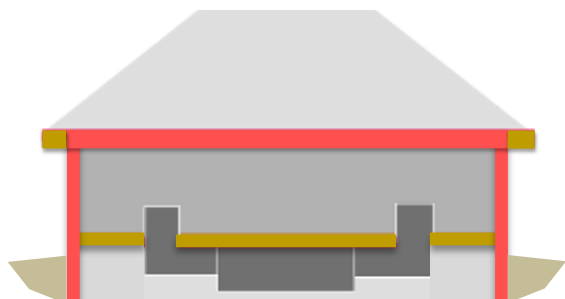
Ducts Between Floors



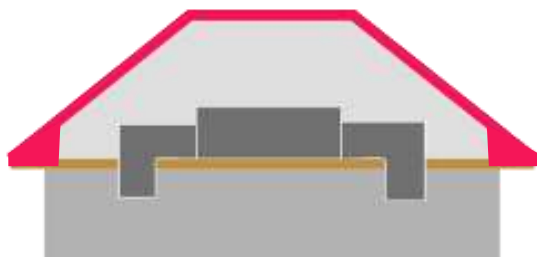
Dropped Ceiling



Modified Attic Truss

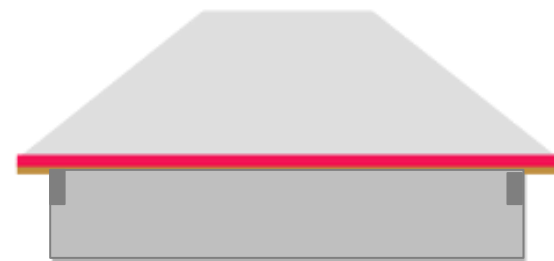


Unvented Crawl Sp./Basement



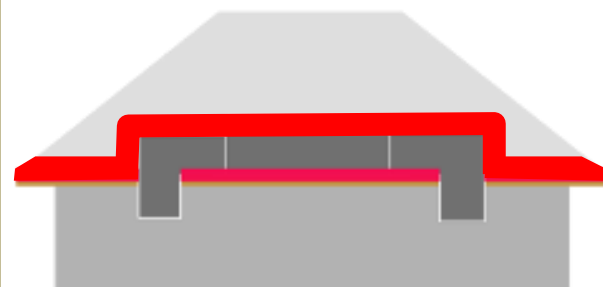
Ducts in Unvented Attic

Ductless Systems



Mini-split Systems

Buried Ducts



Ducts in *Vented* Attic

Stepping up to ZERH...

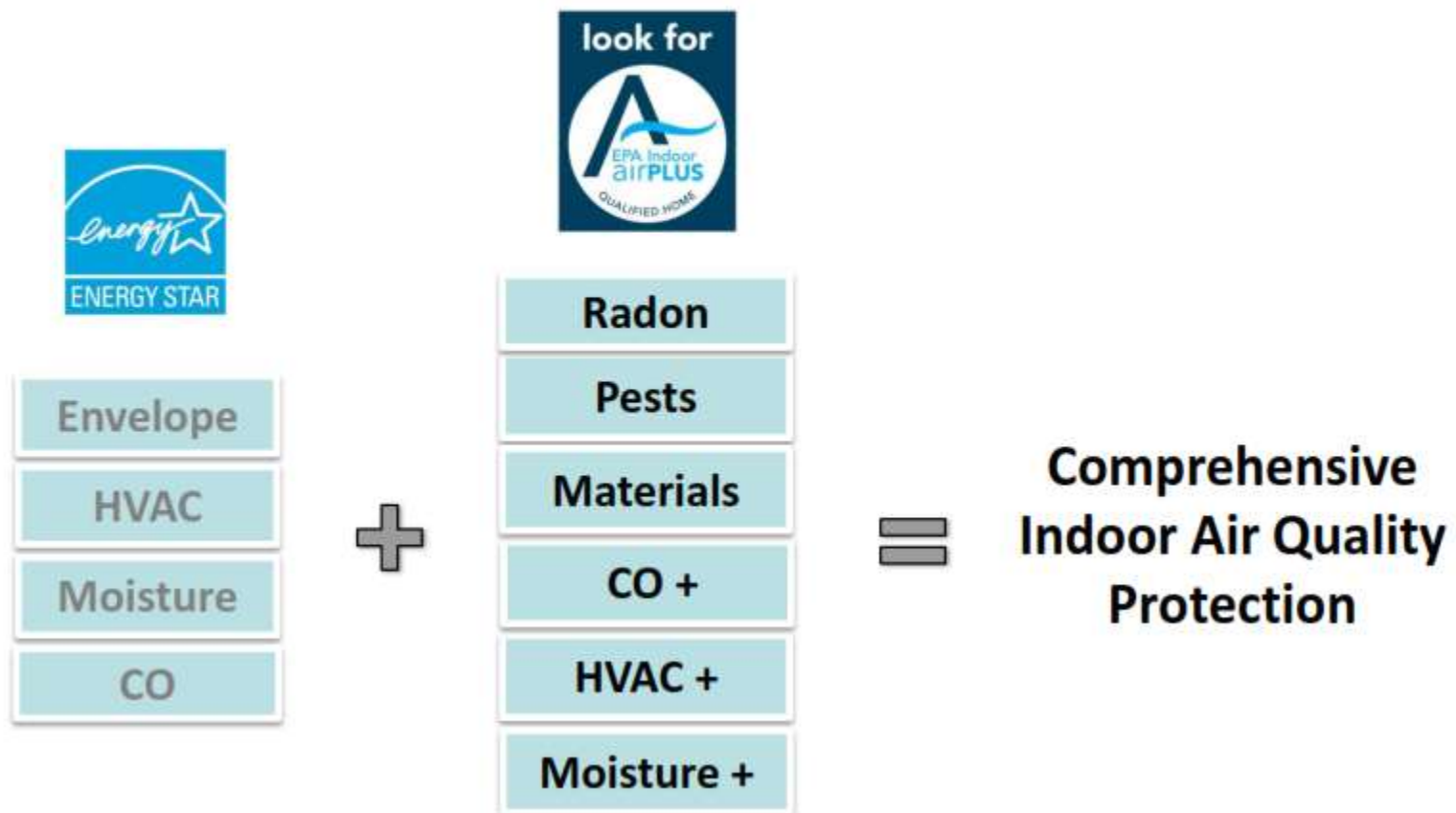


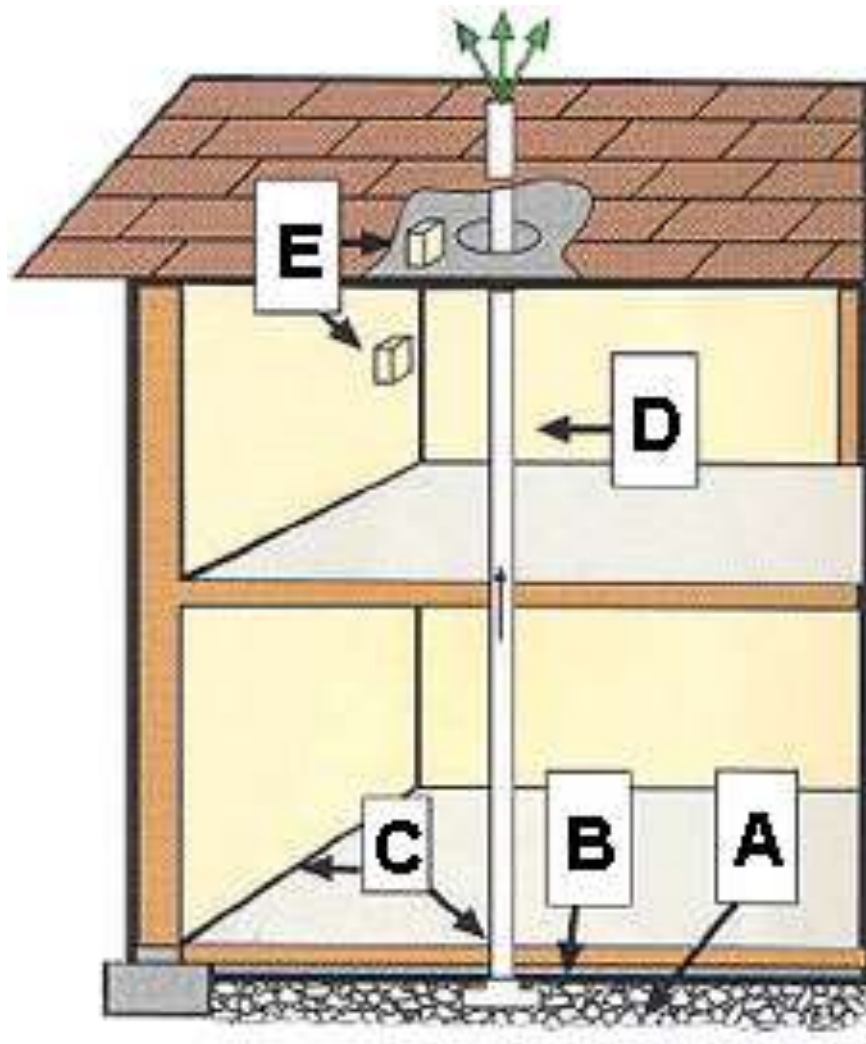
			Solar Ready	
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Pre-requisite
for DOE ZERH

ENERGY STAR + Indoor airPLUS





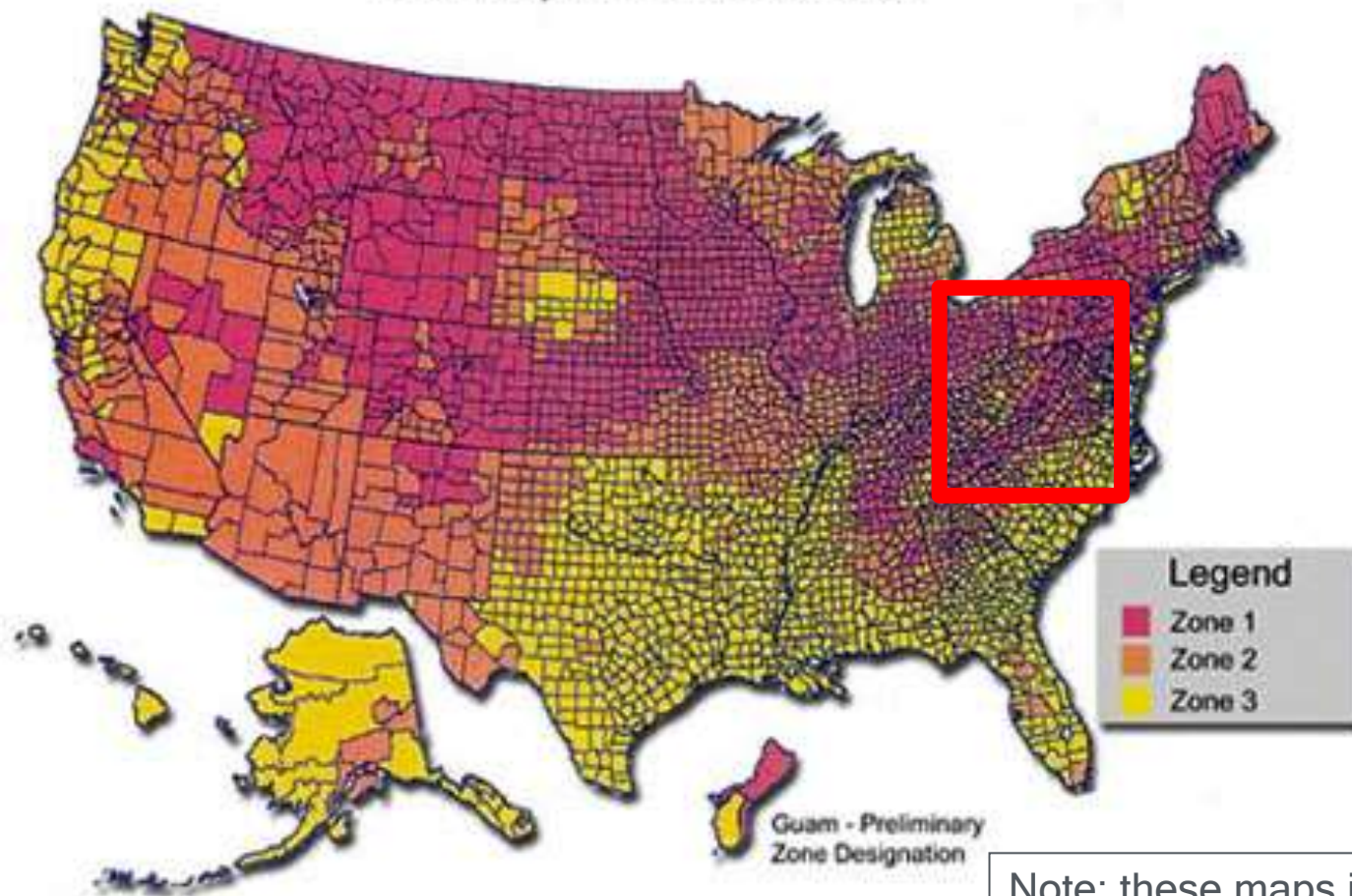
Required for Moisture Control:

- A. Gas Permeable Layer
(min. 4" clean gravel)
- B. Plastic Sheetting
(under slab)
- C. Sealing and Caulking
(all openings in concrete floor)
- D. Vent Pipe
(3 or 4 inch PVC pipe)
- E. Junction Box
(if fan needed later)

Radon Test Kits Not Required

Radon Zones in U.S.

EPA Map of Radon Zones



**Surgeon General's Warning:
Radon Causes Lung Cancer**

Note: these maps indicate average risk by county. However, High levels of Radon can be found in any home.

Screened Openings for Pests



Corrosion-proof rodent/bird screens for openings
(e.g., copper or stainless steel mesh)


Exception: clothes dryer vent

Low Emission Materials

- Low formaldehyde pressed wood
- Low formaldehyde cabinets
- Low VOC paints
- Low VOC carpet, padding, adhesives




- Low emission materials and products are rapidly evolving
- Labels & certifications can be challenging to navigate
- To help partners identify sources and spec products, a new IAP resource is available:




How to Find Indoor airPLUS Compliant Low-Emission Products

Cabinetry

Requirement: Use Cabinetry made with component materials (plywood, particleboard, MDF) that are certified to comply with the appropriate standards above; **OR** registered brands or products produced in plants certified under the Kitchen Cabinet Manufacturers Association's (KCMA) Environmental Stewardship Certification Program (ESP 05-12); **OR** GREENGUARD or GREENGUARD Gold Certification for Cabinetry.



Meet at least one standard below	How to find compliant products
<p><i>KCMA's Environmental Stewardship Program (ESP 05-12)</i></p>	<p>Look for the KCMA-ESP label on cabinets (often sink bases), product packaging, and/or spec sheets.</p> <p>For a list of KCMA certified manufacturers that produce compliant cabinets, visit: http://www.kcma.org/Members/ESP_Certified_Manufacturers</p> <p><i>Note: Manufacturers listed in the link above can be used as a resource, but partners should request confirmation from the manufacturer or supplier that the product lines they are using are indeed compliant.</i></p> 

CO Alarm in each bedroom area



CO Alarm



Combined CO
& Smoke Alarm



Enforceable policy in
Multi-family buildings

No Air Handler in the Garage



No Building Cavity Ducts



High-MERV HVAC Filter



8 MERV Filter Minimum

Stepping up to ZERH...

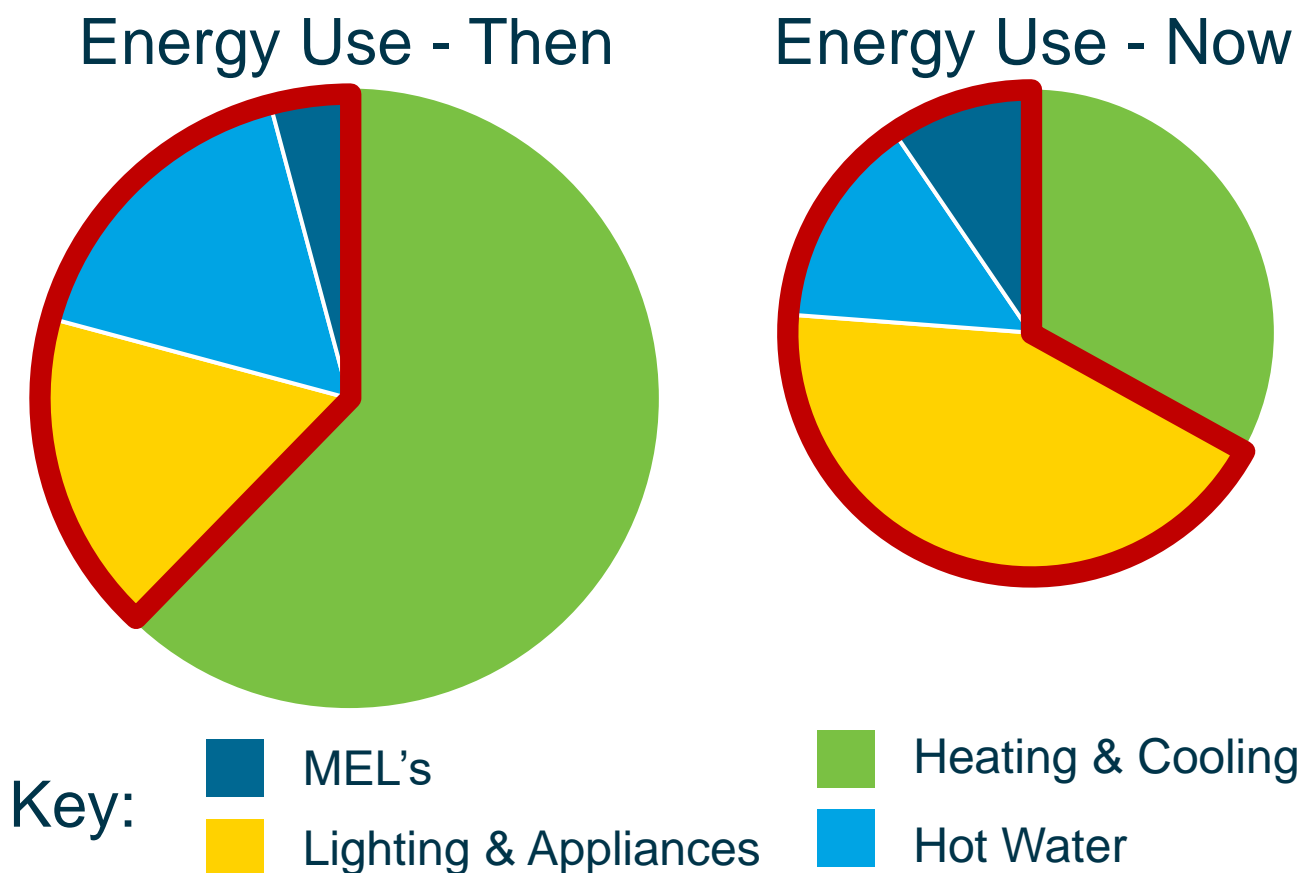


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IECC 2012	ENERGY STAR v3	ENERGY STAR v3.1	ZERH		



Pre-requisite
for DOE ZERH

Components and MEL's are increasingly larger part of total energy use in low-load homes (~50%).



Zero Energy Ready Home requires:

- **ENERGY STAR Certified Appliances:***
refrigerators, dishwashers, clothes washers
- **ENERGY STAR Certified Fans*:**
bathroom ventilation, ceiling fans
- **ENERGY STAR Certified Lighting:**
Min. 80% of fixtures or lamps (CFL or LED)
- **Efficient Hot Water Systems:**
 - **A. Efficient Distribution**
...or...
 - **B. Efficient Water Heater + Fixtures**

*Only where installed by builder

Option A: Efficient Hot Water Distribution

- Mandatory
- Based on EPA WaterSense Specifications:
 - ≤ 0.5 gallons of water in any piping/manifold between hot water source and any hot water fixture.
 - By the time the flow at the furthest fixture has + 10F temp increase, no more than 0.6 gallons of water has been delivered

1. Core Plumbing Layout (wet wall)
2. Manifold System
3. Demand Pumping System

In multifamily with central domestic hot water:

- On-demand recirculation based on loop temp and a demand indicator
- Storage volume ≤ 1 gallon recommended

Option B: Efficient Water Heater & Fixtures

High Efficiency Water Heater

- Gas water heater with an Energy Factor ≥ 0.90 or a Uniform Energy Factor ≥ 0.87
- Electric water heater with an Energy Factor ≥ 2.2 or a Uniform Energy Factor ≥ 2.2

Water Efficient Fixtures

- All showerheads and bathroom sink faucets shall be WaterSense labeled

Stored Hot Water Volume

- Hot water distribution system stores ≤ 1.2 gallons between the hot water source and the furthest fixture

Stepping up to ZERH...



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Pre-requisite
for DOE ZERH

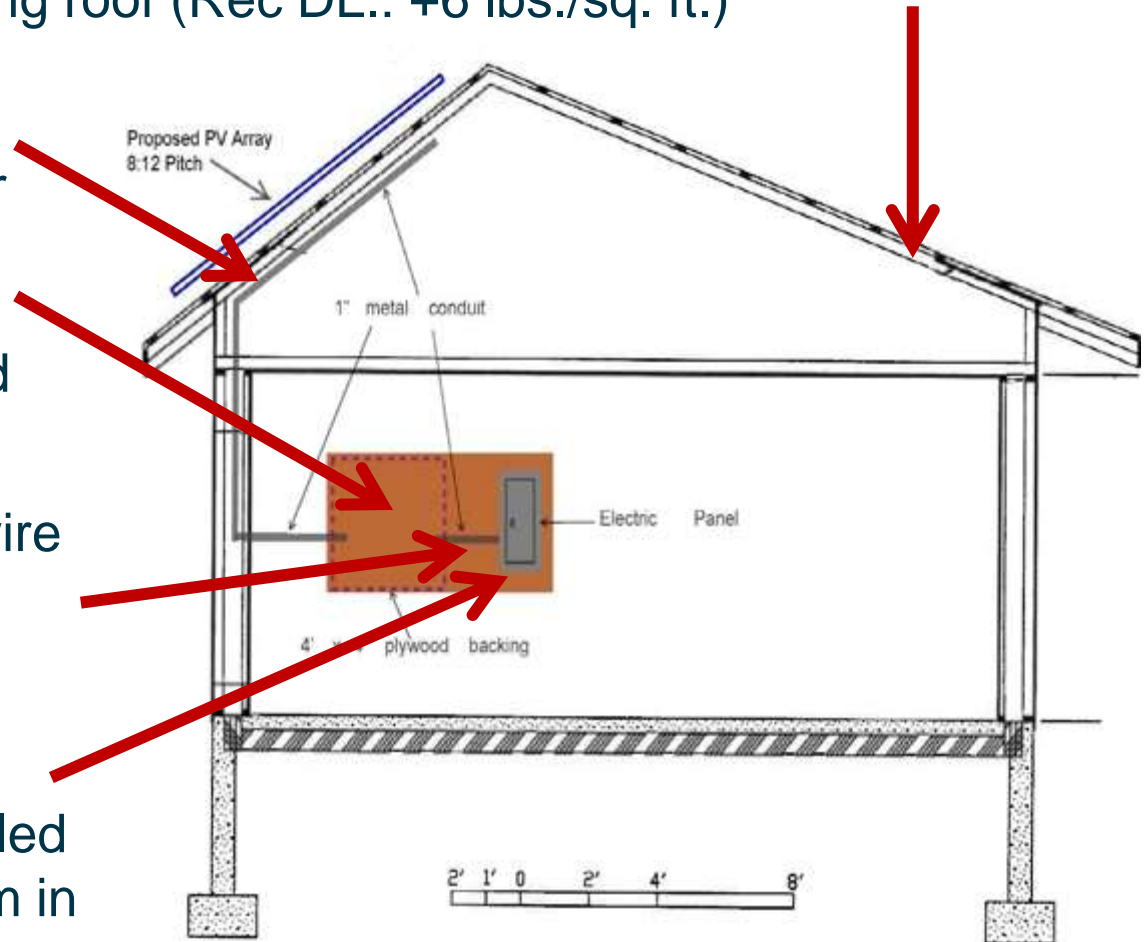
Documentation of the maximum allowable dead load and live load ratings of the existing roof (Rec DL.: +6 lbs./sq. ft.)

Conduit to run DC wire from roof to inverter

Dedicated Area for installing inverter and balance of system

Conduit to run AC wire from inverter location to electric panel

Circuit Breaker designated and/or installed for use by the PV system in the electric panel

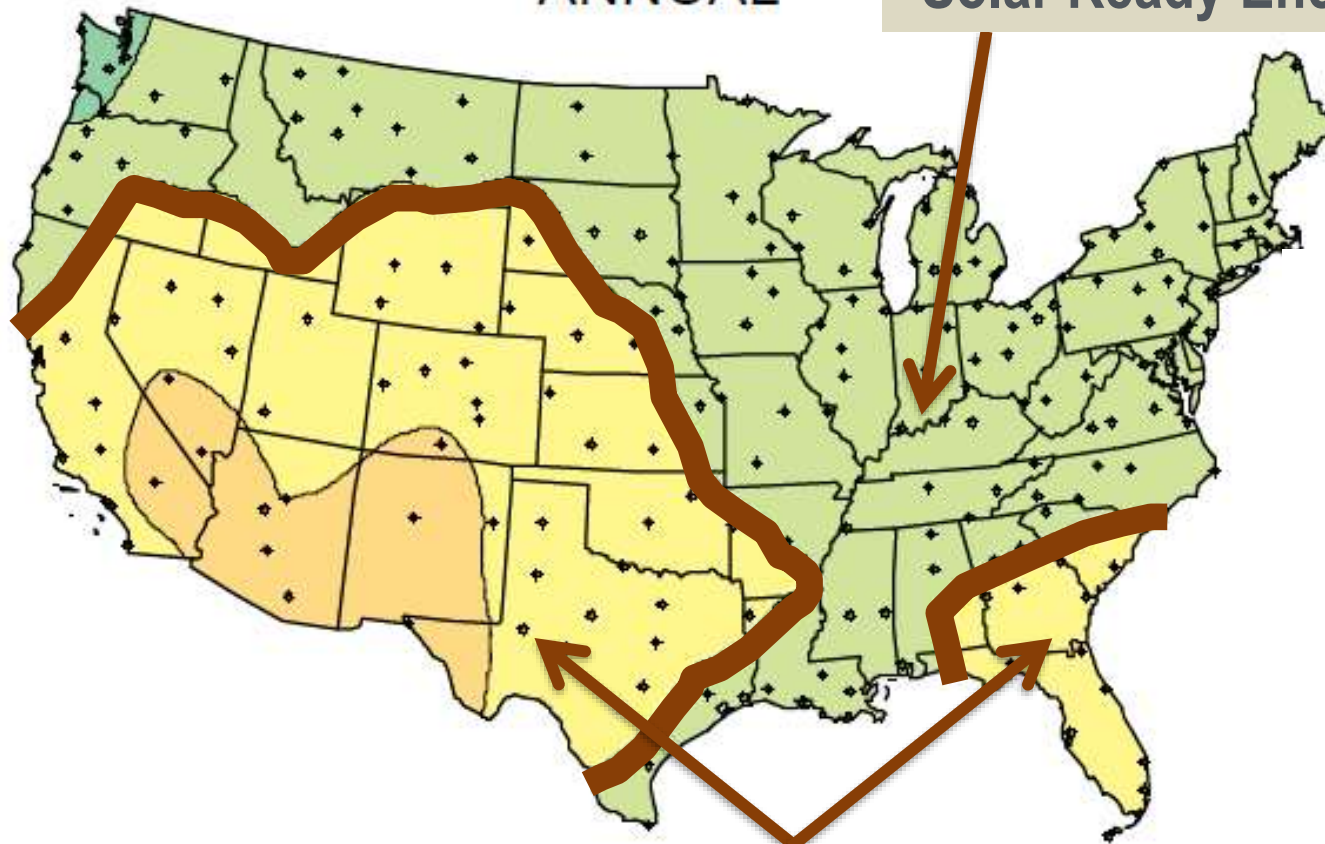


PV-Ready Checklist Applicability

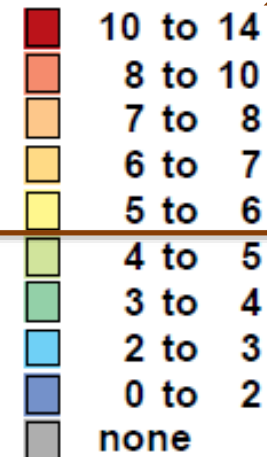
Average Daily Solar Radiation Per Month

ANNUAL

Solar Ready Encouraged



kWh/m²/day



Solar Ready Required

PV Ready features are not required if solar resources are limited:

- Tree Shading
- Tall Buildings
- Not enough South Facing Roof area

Projects using an exception to the PV Ready features may still be ZERH certified

Multifamily Building Allowances:

- PV-ready features may be provided for the common space instead of at the dwelling level



Stepping up to ZERH...



			Solar Ready	✓
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IECC 2012	ENERGY STAR v3	ENERGY STAR v3.1	ZERH	



Pre-requisite
for ZERH



Relationship to Green and Efficiency Programs

Enterprise Green Communities Criteria 2020 Version:

- New Construction projects must meet Mandatory criteria & gain 40 “optional” points to achieve EGC Certification
- DOE ZERH qualifies a project for **12** optional points under 5.2B in the Energy Efficiency section
- DOE ZERH also assures that SF and low-rise MF projects achieve the Mandatory ENERGY STAR Homes certification
- DOE ZERH certification automatically qualifies a project for **Enterprise Green Communities Plus**



DOE ZERH*:

- **26.5 points min.**
For ZERH (and Indoor airPLUS)
- **Most prerequisites**
for Energy and Atmosphere and
Indoor Environmental Quality
- **Additional points**
with HERS Index ≤ 56 typ. for
ZERH
- **40 points min.**
to meet LEED Certified level.

* ZERH points explained in LEED
Interpretation ID# 10431.





Why Zero Energy Ready Home is Affordable

Getting Started

- Same rater network
- Same modeling software (at least 3 different options)
- Same plan review & site inspection protocol



- Become a partner online (builder/developer or rater)
- Identify potential verifier partners at ZERH website
- No pre-registration of projects
- No program certification fees
- Recommend integrated design process (MEPs)
- Rater: plan review & site inspections
- Project Certification – generated by the Rater's modeling report, once it is uploaded to the RESNET Registry
- Builder credited with certified home on DOE website

www.buildings.energy.gov/zero/

- Become a Partner
- Program Specs
- DOE Tour of Zero (project examples)
- 24+ Recorded Webinars
- Marketing Tool Kit



Thank You!

Contact: zero@newportpartnersllc.com

HOUSING INNOVATIONS IN ENERGY EFFICIENCY

FUNDING REQUIREMENTS 2021 – REHAB/ADAPTIVE REUSE



viridiant

SEPTEMBER 1ST, 2021

INTRODUCTION

Matt Waring

Technical Director
Viridian

► *Former Superintendent*

► *Certified Home Energy Rater since 2011*

► *PHIUS+ Verifier*

► *Former RESNET QAD*



Baseline QAP Requirements for Renovations



Renovation:

30% improvement in
HERS

or

$\text{HERS} \leq 80$

Adaptive reuse:

$\text{HERS} \leq 95$

Baseline HIEE Requirements

Renovation:

40% improvement in HERS

or

HERS \leq 70 across *ALL*
Units

Adaptive reuse:

HERS \leq 80 across *ALL*
Units

Optional QAP - 10 points, chose 1

Renovation



HIEE Requirements – Green Building Program

1.  - Gold / 30% HERS Improvement / Points and Requirements



- Energy and Water, Prescriptive or Performance, 15% - 45% Improvement



- HERS 80 for Moderate and Substantial Rehabs, Required and Recommended Items



LEED v4.1 Residential: Multifamily
Project Checklist

- Pathway for Historic Building Reuse, Required and Optional Credits

HIEE Requirements - HVAC Load Calculations

ACCA Manual J calculations for heating/cooling loads

- ACCA Approved Software

Rhvac - Residential & Light Commercial HVAC Loads		Elite Software Development, Inc.			
The Energy Consortium Inc. Doswell, VA 23047		Sweetbriar Craftsman Style SW-R Page 2			
Project Report					
General Project Information					
Project Title:	Sweetbriar Craftsman Style SW-R				
Designed By:	[REDACTED]				
Project Date:	Tuesday, September 30, 2008				
Client Name:	People Incorporated				
Client Address:	1173 West Main St				
Client City:	Abingdon, VA 24210				
Client Phone:	(276) 619-2285				
Client Fax:	(276) 628-2931				
Company Name:	[REDACTED]				
Company Representative:	[REDACTED]				
Company Address:	[REDACTED]				
Company City:	Blacksburg, VA 24060				
Company Phone:	540-818-[REDACTED]				
Company Fax:	540-552-[REDACTED]				
Company E-Mail Address:	[REDACTED]				
Design Data					
Reference City:	Roanoke, Virginia				
Daily Temperature Range:	Medium				
Latitude:	37 Degrees				
Elevation:	1193 ft.				
Altitude Factor:	0.958				
Elevation Sensible Adj. Factor:	1.000				
Elevation Total Adj. Factor:	1.000				
Elevation Heating Adj. Factor:	1.000				
Elevation Heating Adj. Factor:	1.000				
	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	16	0	30	70	24
Summer:	91	72	50	75	25
Check Figures					
CFM Per Square ft.:				0.458	
Square ft. Per Ton:				934	
TOTAL COOLING CAPACITY					
Total Cooling Required Including Ventilation Air:		17,144 Btuh	1.43 Tons (Based On Sensible + Latent)	1.67 Tons (Based On 75% Sensible Capacity)	
Notes					
Calculations are based on 8th edition of ACCA Manual J. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads.					

Additional HIEE Reqs - HVAC Load Calculations

<i>Total Building Summary Loads</i>					
Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
.28/.26: Glazing-, outdoor insect screen with 50% coverage, U-value 0.28, SHGC 0.26	114.2	1,664	0	2,046	2,046
11P: Door-Metal - Polyurethane Core, U-value 0.29	21	317	0	171	171
12D-0bw: Wall-Frame, R-15 insulation in 2 x 4 stud cavity, no board insulation, brick finish, wood studs, U-value 0.086	988.8	4,423	0	1,192	1,192
18A1-21o: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Spray Foam Insulation, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, R-21 open cell 1/2 lb. spray foam, 5.5 inches in 2 x 6 joist cavity, 1 inch on joist, U-value 0.047	977	2,389	0	1,286	1,286
19C-0sp-v: Floor-Over enclosed crawl space, R-11 insulation on exposed walls, sealed crawl space, passive, no floor insulation, carpet or hardwood, vinyl covering, U-value 0.368	977	1,234	0	403	403
Subtotals for structure:		10,027	0	5,098	5,098
People:	4		800	920	1,720
Equipment:			0	1,200	1,200
Lighting:	0			0	0
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 6, Summer CFM: 0		315	0	0	0
Ventilation: Winter CFM: 40, Summer CFM: 40		2,274	1,059	744	1,803
Total Building Load Totals:		12,616	1,859	7,962	9,821

If they oversize in NC, then....



RG-30

1015 CFM

1 BEDROOM UNIT

765 SQ. FT.

2.5 TON SYSTEM SPEC'D

306 SQ. FT. PER TON

1.5 TON UNIT = 510 SQ. FT.
PER TON, STILL
SIGNIFICANTLY OVERSIZED

① UNIT - 1K - MECHANICAL
1/4" = 1'-0"

VIRIDIANT | 2021

HIEE Requirements - Fresh Air Ventilation

For renovations and adaptive reuse projects, if building/unit envelopes are tightened to new construction standards (5 ACH50), ventilation system(s) shall provide fresh air supply per the most current version of ASHRAE 62.1 or 62.2, or the most current version of USBC, whichever is more stringent.



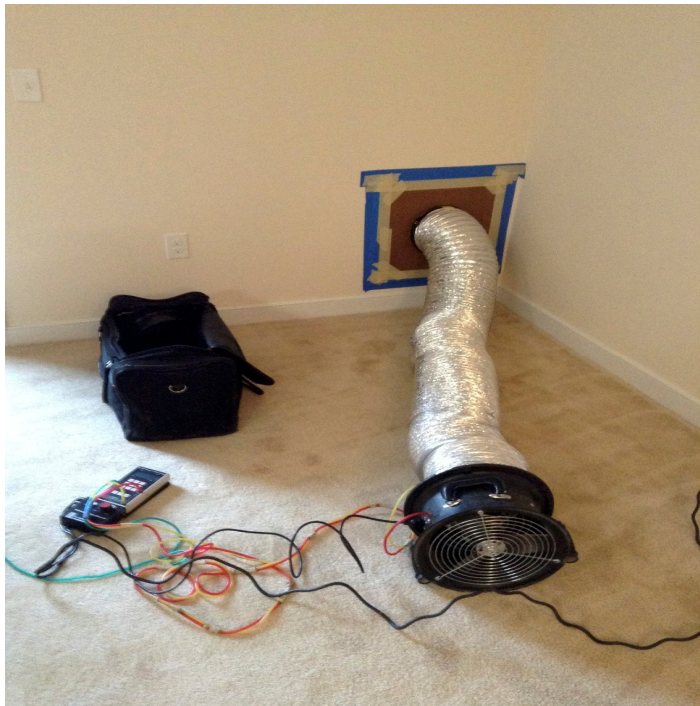
HIEE Requirements - Dehumidification

Dehumidification strategy/equipment shall provide for occupant comfort and health by maintaining interior RH in 40-60 percent range.

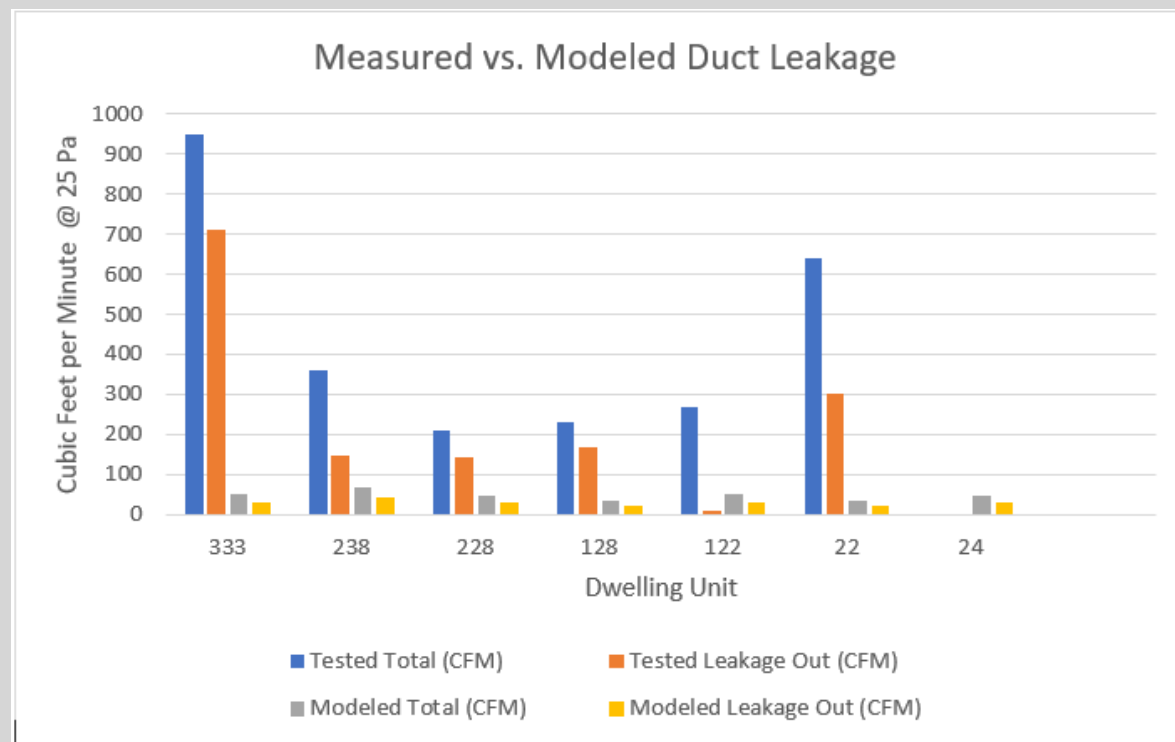


HIEE Requirements - Duct Testing

Existing ductwork shall be sealed and tested to be ≤ 10 percent total duct leakage; if HVAC system/ductwork will be newly-installed, duct leakage shall meet new construction energy code requirements (≤ 4 percent total duct leakage).



HIEE Requirements - Duct Sealing



HIEE Requirements – Plan Review & Prelim Rating

Pre-Review

- Online project registration
- Preliminary Spec Sheet
- Drawings
- Flat Review Fee

Pre-Construction

- Online Registration for Scheduling Design Review
- Submit ECMF workbook, plans, HVAC load calcs
- Design Review Meeting

Construction

- Kick-Off Meeting with TA
- TA makes regular site visits to verify program items & test units
- Team coordinates documentation with TA

Project Closeout

- TA completes final diagnostic testing
- TA submits documentation package Viridiant
- PM & QAD review
- Certification

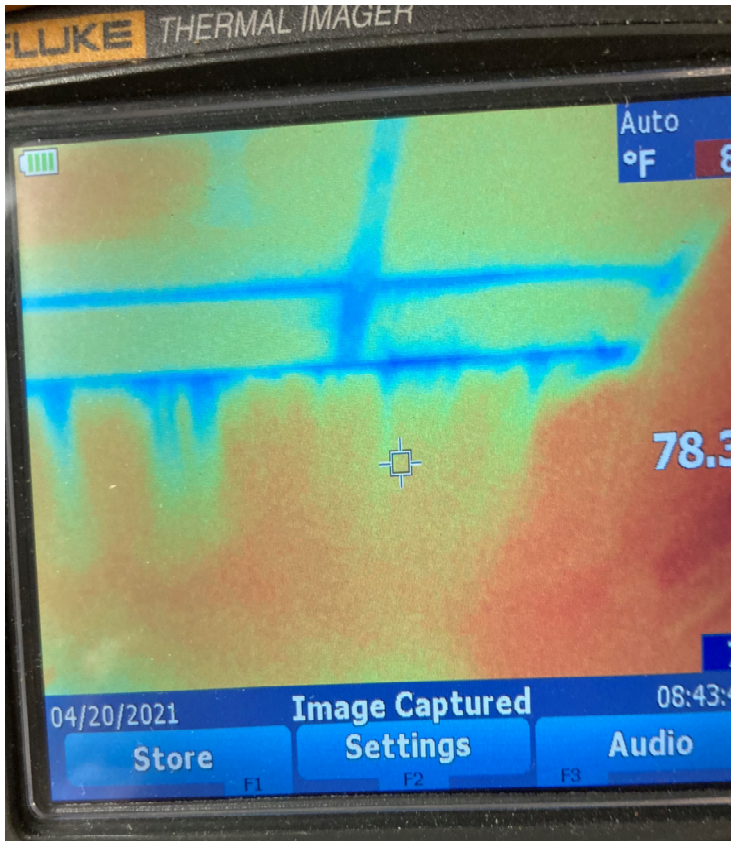
Pre-Review

Pre-Construction

Construction

Project Closeout

Additional Considerations - Getting On Site



ADDITIONAL CONSIDERATIONS - O&M

- Operations and Maintenance
 - High Performance Buildings need Careful, Consistent Maintenance



Modeling Scenarios

Average Energy Cost and HERS Savings	Average % Improvement	Average HERS	Projected Avg. Annual Energy Costs	Projected Avg Annual Savings
Target: HERS 40% Improvement				
Measure	% Improvement	HERS	Annual Energy Costs	Annual savings
Baseline Condition	N/A	160	\$ 1,449.14	-
Fresh Air Ventilation (Exhaust - 50 CFM / 17.5 W / 12 hr. per day)	-3.9%	154	\$ 1,476.14	\$ (27.00)
Dehumidification - Ultra Aire MD33 (req. by HIEE)	-0.7%	159	\$ 1,451.57	\$ (2.43)
9 ACH50	-9.3%	145	\$ 1,333.86	\$ 115.29
7 ACH50	-11.8%	141	\$ 1,306.29	\$ 142.86
5 ACH50	-12.1%	141	\$ 1,278.71	\$ 170.43
8% Total/5% Duct Leakage to Outside (% of CFA)	-6.5%	151	\$ 1,376.29	\$ 72.86
U-Value 0.36 / SHGC .51 - Interior/Exterior Storm	-11.8%	141	\$ 1,380.71	\$ 68.43
New Baseline	-30.3%	112	\$ 1,231.57	\$ 217.57
.93 UEF 50 Gal. Electric Water Heater (Unit & Laundry)	-33.1%	107	\$ 1,180.00	\$ 269.14
.93 UEF 50 Gal (Unit) & .88 UEF Demand Gas (Laundry)	-34.1%	105	\$ 1,188.86	\$ 260.29
16 SEER / 10 HSPF (SEZ-KD12NA4 / SUZ-KA12NA)	-39.3%	97	\$ 1,138.29	\$ 310.86
18 SEER / 12.1 HSPF (SVZ-KP18NA / SUZ-KA18NA2)	-41.5%	93	\$ 1,119.57	\$ 329.57
26 SEER / 12.5 HSPF (MSZ-FS12NA & MUZ-FS12NA)	-45.3%	88	\$ 1,086.86	\$ 362.29
.93 UEF 50 Gal (Unit) & .88 UEF Demand Gas (Laundry), 16 SEER / 10 HSPF (SEZ-KD12NA4 / SUZ-KA12NA), 7 ACH50, 8% Total / 5% Duct Leakage to Outside (% of CFA), U-Value 0.36 / SHGC .51 - Interior/Exterior Storm, Exhaust Ventilation, Unit Level Dehumidification	-45.0%	88	\$ 1,078.86	\$ 369.29
*All Measures below 'New Baseline' Assume: 7 ACH50, 8% Total/5% Leakage to Outside (where applicable), window U-Value 0.36 / SHGC 0.51, Exhaust Mechanical Ventilation and Unit Level Dehumidification				

SO WHAT'S THE

- Additional soft loan cap of 5 percent of Total Construction Costs (TCC), or \$7,000 per dwelling unit (whichever is greater, up to \$1.5 million)
- Reduced Operational costs for central/common spaces
- Better IAQ and Health for
- Utility Allowance Incentives

Families Served in 2019

EarthCraft House
64 HOMES

EarthCraft House
with ENERGY STAR®
6 HOMES

ENERGY STAR®
3 HOMES

Certified
HERS® only
42 HOMES

EarthCraft
New Construction
2,120 UNITS

EarthCraft
Renovation
986 UNITS

EarthCraft
New Construction
23 PROJECTS

EarthCraft
Renovation
8 PROJECTS

EQUATES TO ELIMINATION OF

10.5 OR 4,167
GIGAWATT HOURS OF ENERGY TONS OF CARBON DIOXIDE

OR

4,591,462 POUNDS OF COAL BURNED

158,303 INCANDESCENT LAMPS SWITCHED TO LEDS

68,902 TREE SEEDLINGS GROWN FOR 10 YEARS

9,647 BARRELS OF OIL CONSUMED

900 PASSENGER VEHICLES DRIVEN FOR ONE YEAR

705 HOMES' ELECTRICITY USE FOR ONE YEAR

\$1,429,815
TOTAL ANNUAL SAVINGS

SINGLE FAMILY



115

TOTAL HOMES IN 2019

3,143

TOTAL HOMES THROUGH 12/31/19

MULTIFAMILY



3,106

TOTAL UNITS IN 2019

24,741

TOTAL UNITS THROUGH 12/31/19



31

TOTAL PROJECTS IN 2019

346

TOTAL PROJECTS THROUGH 12/31/19

3,221

FAMILIES SERVED IN 2019

27,884

FAMILIES SERVED THROUGH 12/31/19