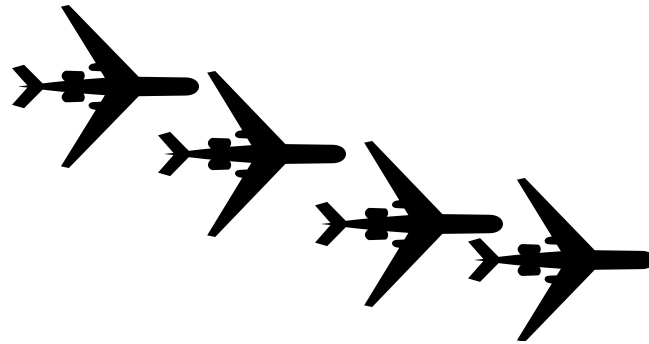




The Glide Path to Success



From Energy Code Verification to Ratings and Beyond

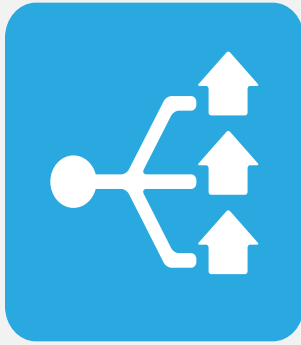
Presenter:
Mike Turns

Performance Systems Development

2018 National RESNET Conference
Wednesday, February 28
Orlando, FL



Programs



- ✓ Design
- ✓ Implementation
- ✓ Marketing
- ✓ QA/QC

Professional Services



- ✓ Technical Consulting
- ✓ Training
- ✓ Energy Engineering
- ✓ Rater Providership

Software



- ✓ TREAT
- ✓ Field tools
- ✓ Program Management Applications
- ✓ M&V





- US DOE Residential Energy Code Field Study (Pennsylvania)
- DEP/PCCA Energy Code Training (PA)
- NYSERDA (New York) Energy Code Training
- Massachusetts Codes and Standards Compliance and Support Initiative

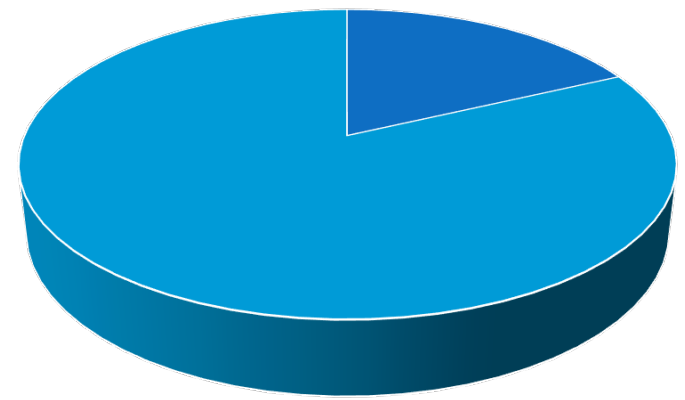


- Energy code overview/Rater opportunities
- Education of and communication with code officials
- Providing the right documentation



- Homes receiving HERS Ratings in 2017:
~227,840 (18%)¹
- Homes NOT receiving HERS Ratings:
>1,036,260 (82%)¹
- Homes required to meet code:
1,264,100 (100%)¹

¹Includes all multifamily. For SF only, 28% rated, 72% not rated.



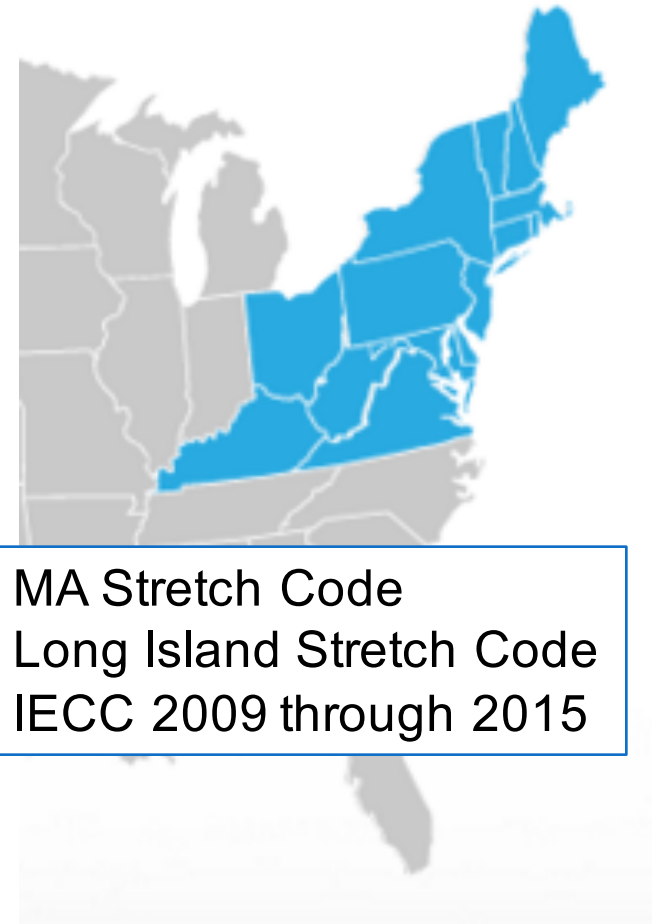
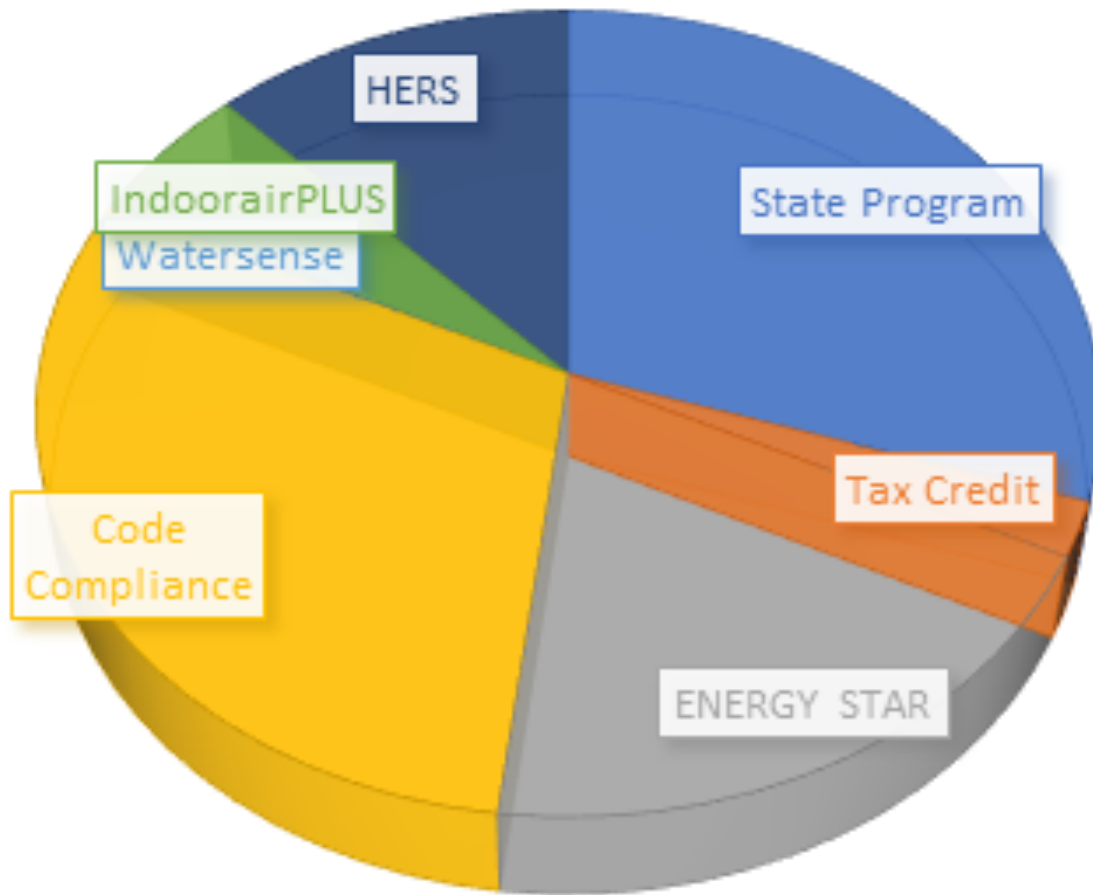
■ Rated ■ Not Rated





2017

WHY RATINGS ARE HAPPENING

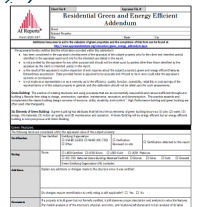
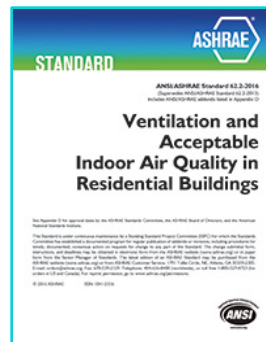
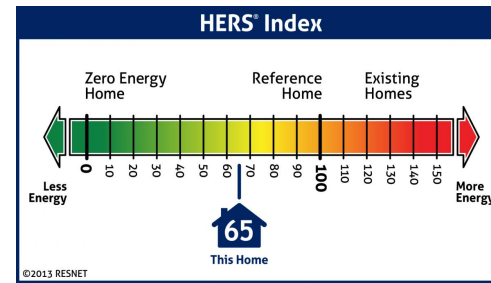
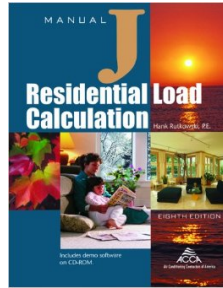
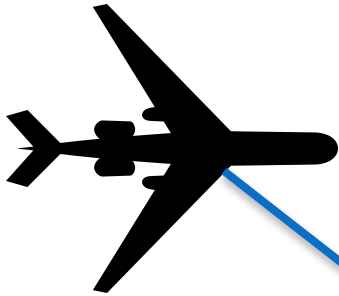


- MA Stretch Code
- Long Island Stretch Code
- IECC 2009 through 2015

The Glide Path – Codes to Passive House



Builder

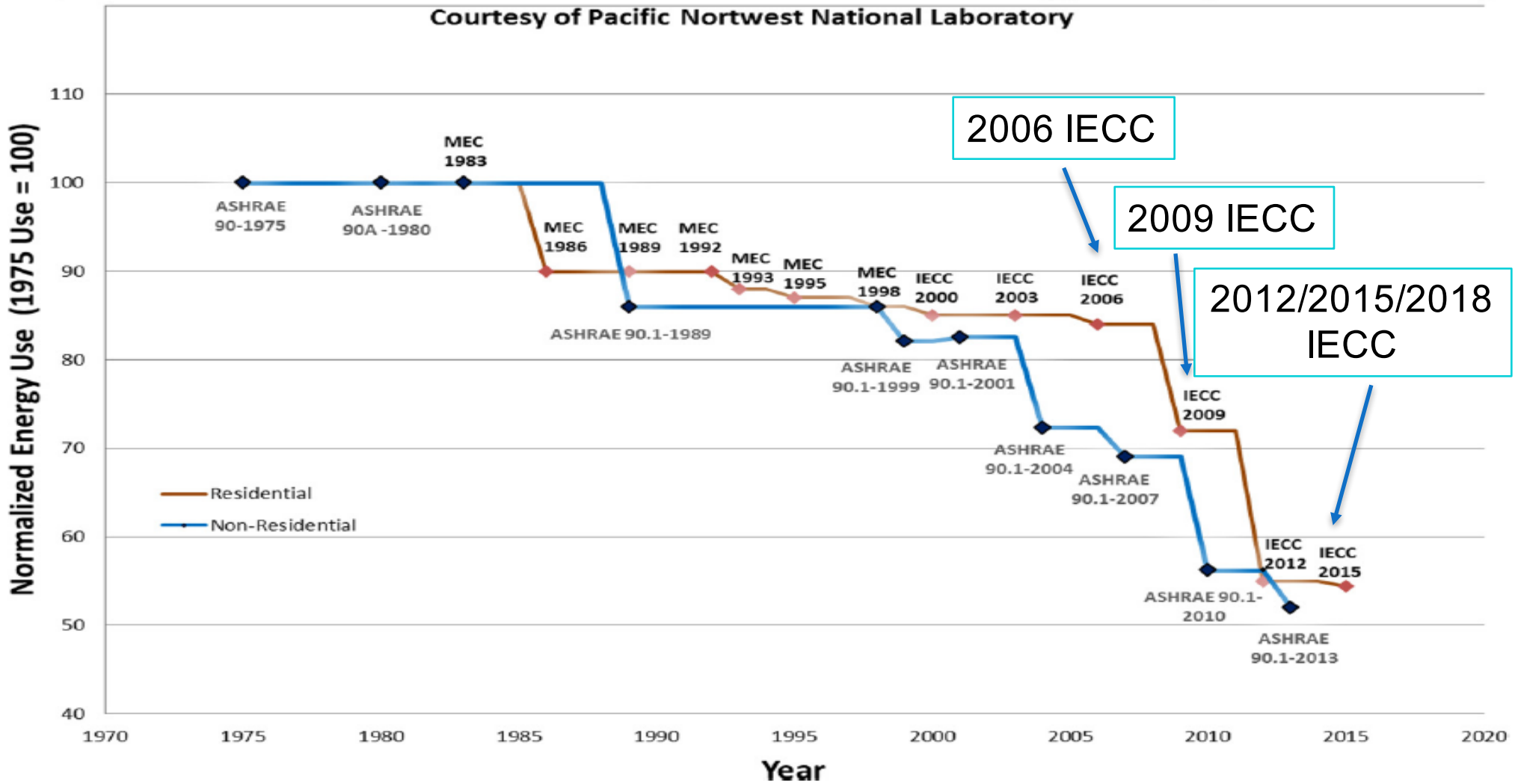


Model Codes through Time

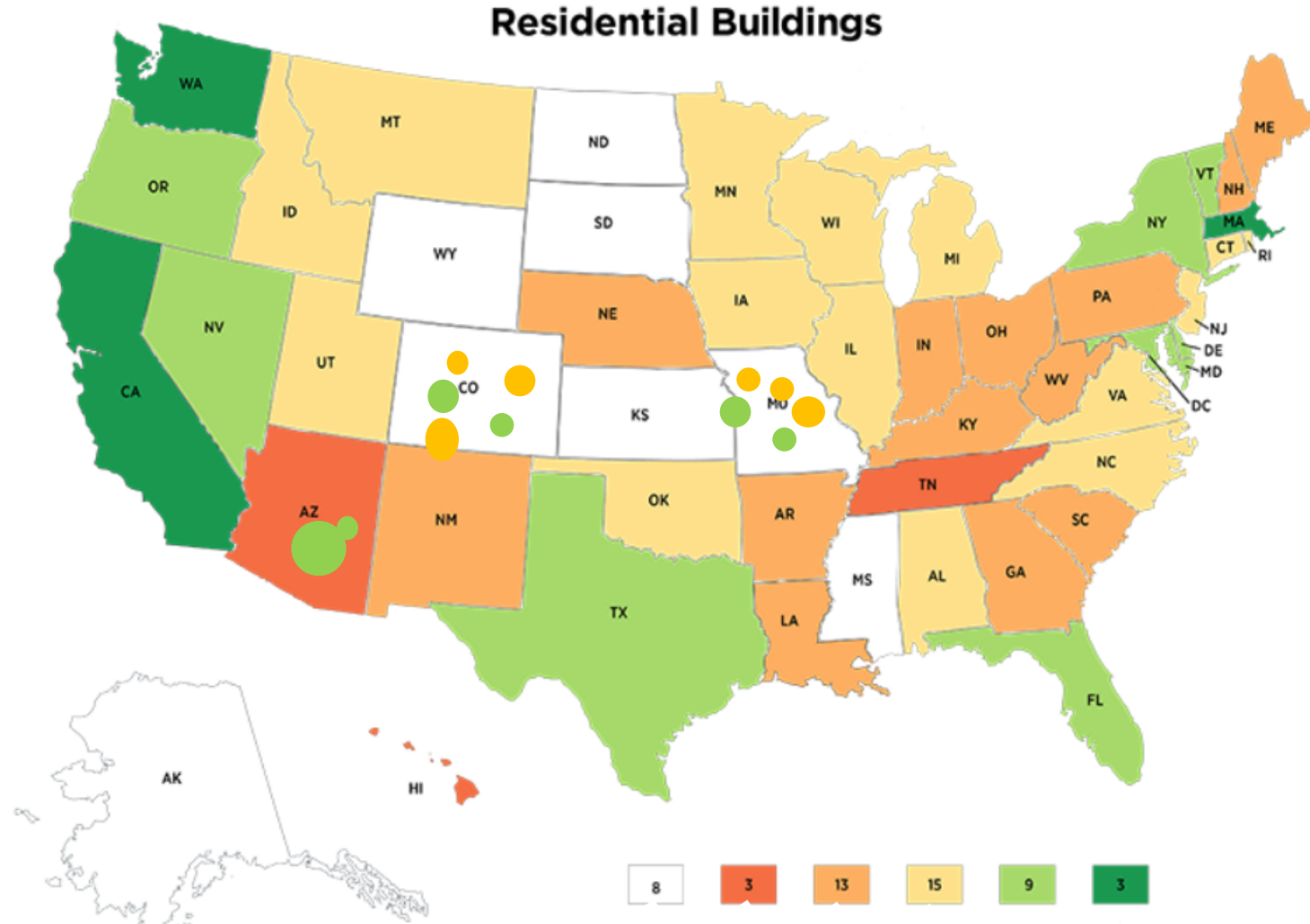


Improvement in Residential and Non-Residential Model Energy Codes (Year 1975-2015)

Courtesy of Pacific Northwest National Laboratory



Code Adoption Status by State



Updated as of December 15, 2017

No statewide code
Less efficient than 2009 IECC
2009 IECC
Between 2009 and 2012/2015
2012/2015 IECC
More efficient than 2012/2015



Performance-Related Code Requirements - Timeline



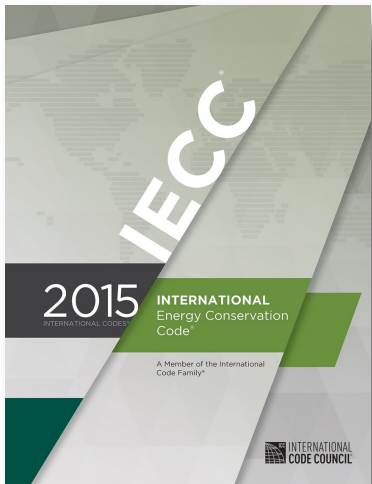
- Air sealing list
- UA Tradeoff
- Equipment sizing/select
- Simulated Performance Alternative

- Above-code programs
- UA Tradeoff
- Equipment sizing/select
- **Blower door (optional)**
- **Air sealing & insulation criteria**
- **Duct testing**
- **Simulated Perf. Alt.**

- Above-code programs
- UA Tradeoff
- Equipment sizing/select
- Blower door **(mandatory)**
- Air sealing & insulation criteria
- **Whole-house vent.**
- Duct testing
- Simulated Perf. Alt.

- Above-code programs
- UA Tradeoff
- Equipment sizing/select
- Blower door (mandatory)
- Air sealing & insulation criteria
- Whole-house vent.
- Duct testing
- Simulated Perf. Alt.
- **Energy Rating Index Path**

- Above-code programs
- UA Tradeoff
- Equipment sizing/select
- Blower door (mandatory)
- Air sealing & insulation criteria
- Whole-house vent.
- Duct testing
- Simulated Perf. Alt.
- Energy Rating Index Path **(easier)**



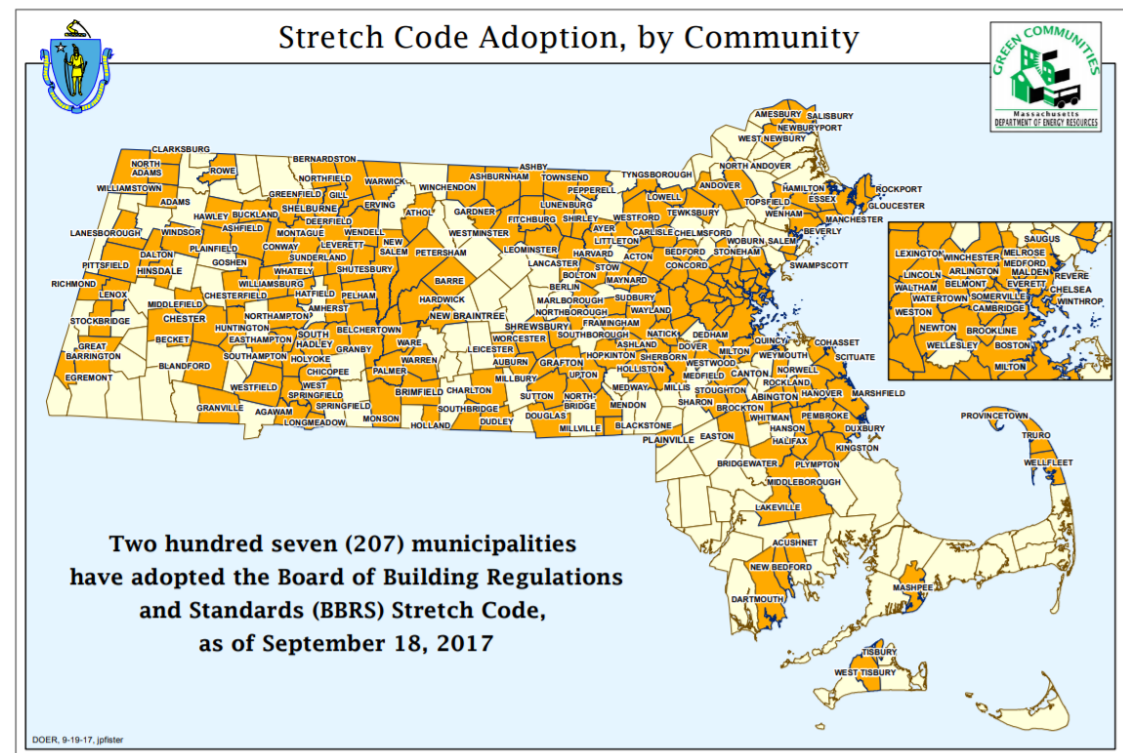


- Blower door testing standards referenced – changes 2015 to 2018
- Credentials for blower door testing
 - Where required by the code official, testing shall be conducted by an approved third party. (2012/2015/2018)
- Credentials for duct leakage testing
 - No code language (2012/2015/2018)

What is a Stretch Code?



- A “stretch” or “reach” code allows progressive municipalities or jurisdictions to adopt more stringent energy codes within a larger jurisdiction
- Often similar to the next version of code
- **ENERGY STAR**, additional prescriptive requirements, HERS Index option
- Prep the market, drive savings, allow trade offs





- Massachusetts
 - An energy rating index (“ERI”) approach
 - Certified RESNET HERS rating (HERS 55)
 - Certified Energy Star Homes, Version 3.1
 - Certified Passive House

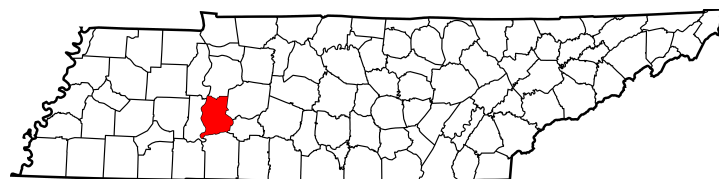
Know Your State and Local Codes



- Statewide code vs. home rule
- Statewide amendments
- Local amendments
- Stretch codes



Home Rule





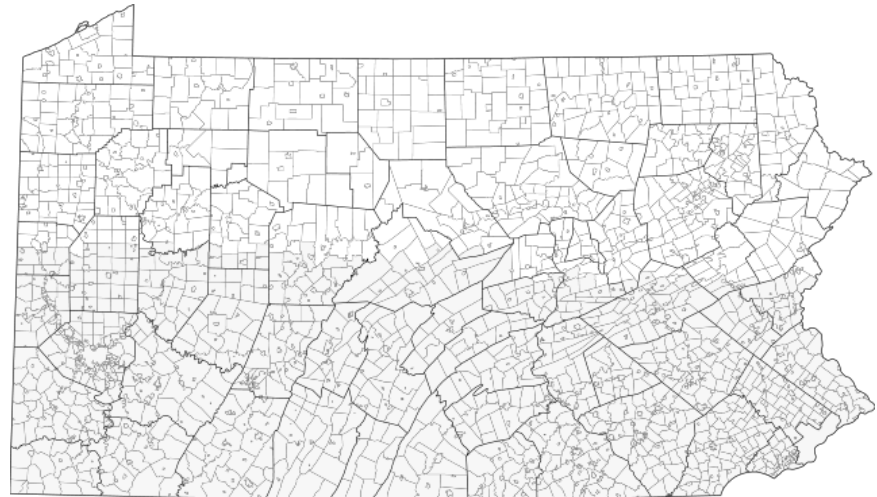
Statewide code:

Uniform Construction Code



Local enforcement:

Uniform compliance?





Understanding the IECC

And Where Rater Service Are
Needed



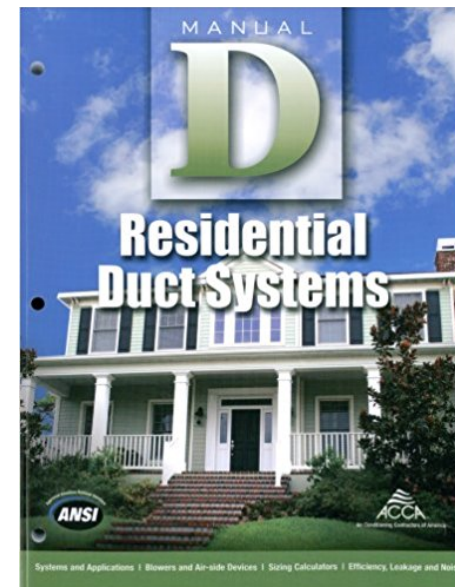
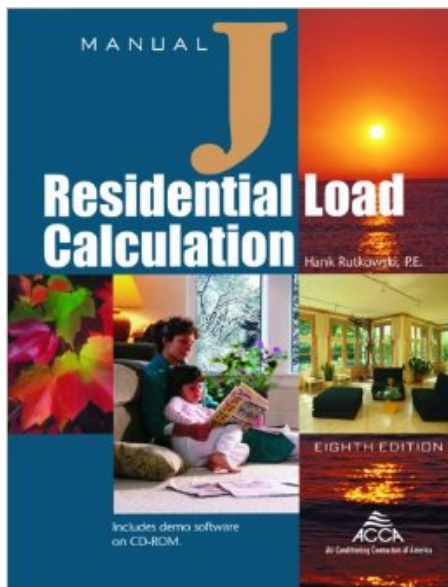
IECC 102.1.1. Above code programs.

- The code official shall be permitted to deem national, state or local energy efficiency program to exceed this code
- Buildings approved in writing by such a program shall be considered in compliance with this code
- “Mandatory” requirements shall be met



IECC 403.7

- Equipment selected per Manual S, based on calculations performed using Manual J



IRC Chapter 14





IECC 402.4 Air Leakage

- Building envelope air tightness and insulation installation shall be demonstrated by:

- Blower door test
- Visual inspection



2009: One or the other

2012: Both

2015: Both

2018: Both

Know the Code – Building Envelope Leakage Limits

ASTM E 799 or 1827

RESNET/ICC 380...

2009



7 ACH50

2012



2015



2018



Climate zones 1-2:
5 ACH50

Climate zones 3-8:
3 ACH50





IECC 402.4 Air Leakage

- Blower door testing credentials
 - ...shall be demonstrated to comply... (2009)
 - Where required by the code official, testing shall be conducted by an *approved third party* (2012/2015/2018)

Know the Code – Air Barrier and Insulation Inspections



**TABLE 402.4.2
AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA**

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks of Air-perm Air-perm
Ceiling/attic	Air barrier gaps are Attic acc
Walls	Corners a Junction
Windows and doors	Space be
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawl space walls	Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or uncondi
Narrow cavities	Batts in insulati
Garage separation	Air seal
Recessed lighting	Recessed Excepti
Plumbing and wiring	Insulati and plu
Shower/tub on exterior wall	Shower from the exterior wall.

Air barrier and thermal barrier

External envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier

Shower/tub on exterior wall

Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall





- **IECC 402.4.1.1 Air leakage - Installation**
 - Where required by the code official...
 - An **approved party independent from the installer of the insulation** shall inspect the air barrier and insulation (2009)
 - An *approved third party* shall inspect all components and verify compliance (2012/2015/2018)



Maximum CFM25 per 100 sq. ft. conditioned floor area

	2009	2012	2015	2018
Post-construction test				
Leakage to Outdoors	8	NA ¹	NA	NA
Total Leakage	12	4	4	4
Rough-in test				
Total Leakage	6	4	4	4
Total w/o air handler	4	3	3	3

¹Leakage to outdoors option eliminated.

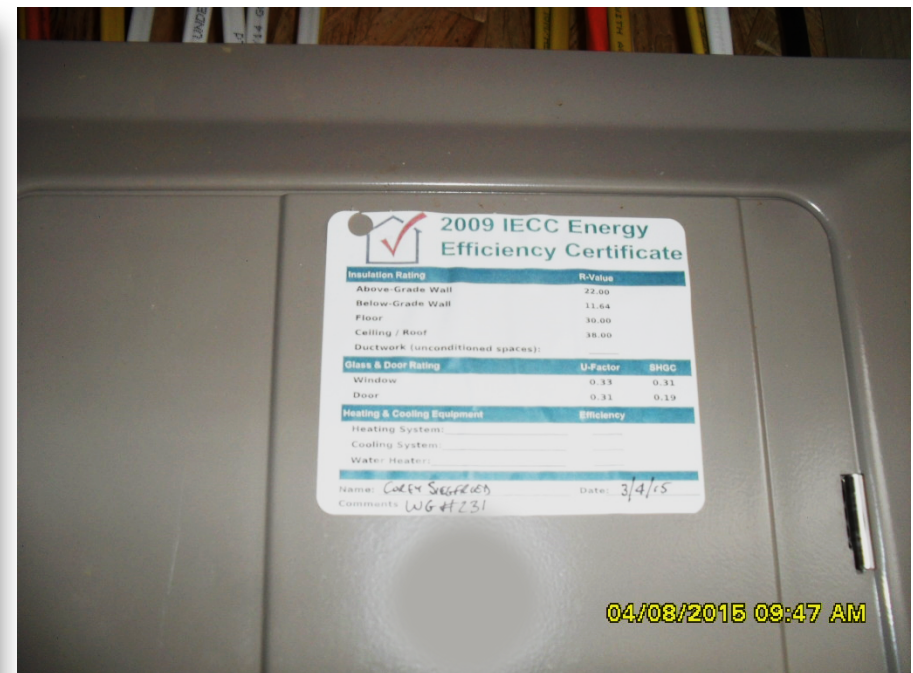




- Use building envelope tradeoffs to help builders find cost-effective solutions

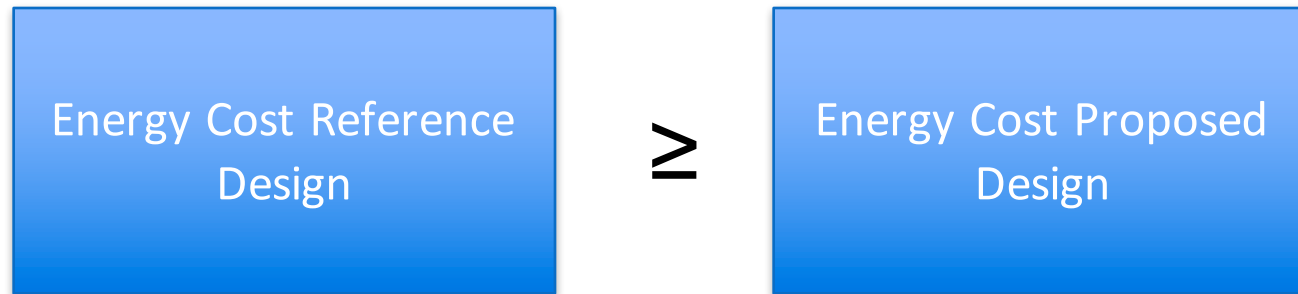
2009 IECC Energy Efficiency Certificate

Insulation Rating		R-Value	
Ceiling / Roof		38.00	
Wall		19.00	
Floor / Foundation		30.00	
Ductwork (unconditioned spaces):		_____	
Glass & Door Rating		U-Factor	SHGC
Window		0.35	0.60
Door		0.23	NA
Heating & Cooling Equipment		Efficiency	
Heating System:	_____	_____	
Cooling System:	_____	_____	
Water Heater:	_____	_____	
Name: _____		Date: _____	
Comments: _____			





IECC Section 405



- Thermal envelope tradeoffs
 - Air tightness credit
 - Duct tightness and insulation credit
- Basically a Rating – choose a different report

RESNET Accredited IECC Performance Verification Tools
(not a code requirement)



Ekotrope, HERS Module v2.0

Ekotrope

Website: ekotrope.com

Date of Expiration: December 31, 2016

EnergyGauge® USA V 5.0

Florida Solar Energy Center

Website: www.energygauge.com/usares

Date of Expiration: December 31, 2016

IC3 v4.01

Energy Systems Laboratory

Website: ic3.tamu.edu/

Date of Expiration: December 31, 2016

REM/Rate REM/Design 14.6.2

NORESCO

Website: www.remrate.com

Date of Expiration: December 31, 2016

Right-Energy® IECC

Wrightsoft Corporation

Website: www.wrightsoft.com

Date of Expiration: December 31, 2016



	2015	2018
Climate Zone	Energy Rating Index	
1	52	57
2	52	57
3	51	57
4	54	62
5	55	61
6	54	61
7	53	58
8	53	58



- 2015
 - Verification by an *approved* third party
- 2018
 - Verification by an *approved* third party
 - ERI shall be determined in accordance with RESNET/ICC 301
 - Building thermal envelope not worse than 2009 IECC prescriptive
 - When using on-site renewables, building thermal envelope not worse than 2015 prescriptive



Educating the Code Official



- HERS Raters are not Code Officials
- Code Officials are not HERS Raters
- Acknowledge this
- You are a resource for code officials
 - They see you as an energy expert, call you for advice
 - The code official is happy to have that
- The code official is a resource for you, and can be an advocate for you



- Sometimes you will disagree about a requirement or standard
- The Code Official is the emperor of their own territory, what they say is right
- Don't challenge that
- It might be different than what another code official says a town over
- What Helps?
 - Ask "Can you tell me where that's written in the standards?" (MA)
 - Ask for their interpretation of a specific standard (PA)
 - Inform them of what you can do, or what you've seen done in other places (NY)
 - Get creds, and show them (They want a certificate or credential, HERS Rater, ICC verifier)



- IBTS/Cadmus/PSD pilots
 - 3 residential trainings/info gathering
 - Open to 3rd-party energy pros?
- Energy Code Field Study
- Code officials:
 - Were generally OK with concept
 - Want trusted credentials
 - Want standardized documentation



- The code official may see the rater as a threat, taking some of their job
 - This is rarely the case in our experience
 - The code officials are BUSY and are often not paid on a per inspection basis
 - They may not understand how to meet a criteria (“appropriate” certification or document)
- The code official may not want to deal with the HERS Rater
 - Let them know how you can help
 - They may have to deal with you anyway



- Not all alike
- Be sensitive to job security/turf issues
- Top priorities: Life + health + safety
- Energy – Many site lack of time and resources
 - Raters can help



- Have conversations with heads of building departments or an ally within the dept.
 - When are energy inspections and testing required, benefits, cost(?)
 - Refer to specific code sections
 - Show examples of documentation (ACH50, CFM25, inspection checklist, IECC performance report)
 - Lay groundwork for ERI Path



- Other ideas:
 - Attend energy code trainings in your area and network with code officials
 - Join your local ICC chapter and attend events
 - Give seminars for building department staff and ICC chapters



Providing the Right Documentation



- What is the code official looking for?
 - Do they already have standard forms?
 - Any specific info not directly spelled out in the code?
- If they don't know, give them examples



- Certificate
- Signed checklist of “mandatory” items

Met-Ed®
Penelec®
Penn Power®
West Penn Power®
FirstEnergy Companies

**Pennsylvania Energy Efficient
New Homes Program**


**THIS HOME USES
35% LESS
ENERGY
THAN A
STANDARD NEW HOME
BUILT TO CODE**

Home Address:
1776 Independence Place
Anytown, PA
16801

Builder:
Harry Homebuilder

Rater:
Ralph's Ratings

Date of Rating:
6/1/2013

 This is an ENERGY STAR® Qualified Home

**Your First Source for
Energy Savings**





2009 IECC Certificate

124 Rater Way, Herstown, PA 06053

Building Envelope Insulation

Ceiling	NA
Above Grade Walls	R-29.0
Foundation Walls	NA
Exposed Floor	NA
Slab	R-10.0 Edge, R-0.0 Under
Infiltration	Htg: 5.10 Clg: 5.10 ACH50
Duct	NA
Duct Leakage to Outside	32.00 CFM @ 25 Pascals

Window Data

	U-Factor	SHGC
Window	0.310	0.400

Mechanical Equipment

HEAT: Fuel-fired air distribution, Natural gas, 96.5 AFUE.

COOL: Air conditioner, Electric, 14.2 SEER.

DHW: Conventional, Natural gas, 0.91 EF, 6.0 Gal, R-10 wrap.

Builder or Design Professional

Signature _____

REM/Rate - Residential Energy Analysis and Rating Software
v14.6.2.1

Home Energy Rating Certificate



Home Energy Rating Certificate

Property

Bary Better
124 Rater Way
Herstown, PA 06053

HERS

Rating Type: Confirmed
Rating Date: 1/22/2014
Registry ID: [REDACTED]

Certified Energy Rater: Herby Rate
Rating Number:

HERS Index: 60

General Information

Conditioned Area	643 sq. ft.	House Type	Apartment, inside unit
Conditioned Volume	5204 cubic ft.	Foundation	Slab
Bedrooms	1		

Mechanical Systems Features

Heating:	Fuel-fired air distribution, Natural gas, 96.5 AFUE.
Cooling:	Air conditioner, Electric, 14.2 SEER.
Water Heating:	Conventional, Natural gas, 0.91 EF, 6.0 Gal, R-10 wrap.
Duct Leakage to Outside	32.00 CFM25.
Ventilation System	Exhaust Only: 34 cfm, 3.8 watts.
Programmable Thermostat	Heat=No; Cool=No

Building Shell Features

Ceiling Flat	NA	Slab	R-10.0 Edge, R-0.0 Under
Sealed Attic	NA	Exposed Floor	NA
Vaulted Ceiling	NA	Window Type	U-Value: 0.310, SHGC: 0.400
Above Grade Walls	R-29.0	Infiltration Rate	Htg: 5.10 Cfg: 5.10 AC H50
Foundation Walls	NA	Method	Blower door test

Lights and Appliance Features

Percent Interior Lighting	100.00	Range/Oven Fuel	Electric
Percent Garage Lighting	0.00	Clothes Dryer Fuel	Natural gas
Refrigerator (kWh/yr)	408	Clothes Dryer EF	2.67
Dishwasher Energy Factor	0.46	Ceiling Fan (cfm/Watt)	0.00

Estimated Annual Energy Cost

Use	MMBtu	Cost	Percent
Heating	3.0	\$32	7%
Cooling	4.0	\$32	7%
Hot Water	1.8	\$36	8%
Lights/Appliances	11.4	\$222	50%
Photovoltaics	-0.0	\$-0	-0%
Service Charges		\$120	27%
Total	20.2	\$443	100%

Criteria

This home meets or exceeds the minimum criteria for the following:
2009 International Energy Conservation Code

Performance Systems Development
124 Brindley Street
Ithaca, NY 14850

Certified Energy Rater: _____

REMRate - Residential Energy Analysis and Rating Software v14.6.2.1

This information does not constitute any warranty of energy cost or savings. © 1985-2015 Noresco, Boulder, Colorado.
The Home Energy Rating Standard Disclosure for this home is available from the rating provider.





- Manual J and S reports

Project Information

For: Sample Customer
1234 E. Adams Street
Phone: (520) 955-1234

Design Conditions

Location: Tucson, AZ, US Elevation: 2556 ft Latitude: 32°N		Indoor: Indoor temperature (°F) Design TD (°F) Relative humidity (%) Moisture difference (gr/lb)	Heating 70 38 30 13.0	Cooling 75 30 50 -28.6
Outdoor: Dry bulb (°F) Daily range (°F) Wet bulb (°F) Wind speed (mph)	Heating 32 - - 15.0	Cooling 105 24 (M) 66 7.5	Infiltration: Method: Simplified Construction quality: Semi-tight Fireplaces: 1 (Semi-tight)	

Heating

Component	Btuh/R²	Btuh	% of load
Walls	2.7	5962	19.2
Glazing	12.1	3859	12.4
Doors	15.0	669	2.2
Ceilings	0.8	1613	5.2
Floors	3.5	6836	22.0
Infiltration	2.1	4438	14.3
Ducts		5347	17.2
Piping		0	0
Humidification		0	0
Ventilation		2309	7.4
Adjustments		0	0
Total		31032	100.0

Cooling

Component	Btuh/R²	Btuh	% of load
Walls	1.7	3705	16.1
Glazing	20.6	6575	28.6
Doors	15.5	894	3.0
Ceilings	0.8	1594	6.9
Floors	0	0	0
Infiltration	0.8	1673	7.3
Ducts		1924	8.4
Ventilation		1822	7.9
Internal gains		5000	21.8
Blower		0	0
Adjustments		0	0
Total		22988	100.0

Latent Cooling Load = 0 Btuh
Overall U-value = 0.079 Btuh/ft²-°F
Data entries checked.

wrightsoft

Manual S Compliance Report
Entire House
CORE Mechanical LLC

Job: Sample Project
 Date: 01/01/2015
 By: Josh

10478 E. Dusky Willow Dr., Tucson, AZ 85747 Phone: (520) 955-1256 Email: corehvactucson@gmail.com Web: http://www.corehvactucson.com

Project Information

For: Sample Project
1234 E. Adams Street, Tucson, AZ 85705

Cooling Equipment

Design Conditions
 Outdoor design DB: 105°F
 Outdoor design WB: 66.0°F
 Indoor design DB: 75.0°F
 Indoor RH: 50%

Sensible gain: 31723 Btuh
 Latent gain: 7510 Btuh
 Total gain: 39266 Btuh
 Estimated airflow: 1400 cfm

Entering coil DB: 76.8°F
 Entering coil WB: 62.5°F

Heating Equipment

Design Conditions
 Outdoor design DB: 31.6°F
 Indoor design DB: 70.0°F

Heat loss: 29739 Btuh
 Entering coil DB: 68.6°F

Manufacturer's Performance Data at Actual Design Conditions
 Equipment type: Gas furnace
 Manufacturer: Lennox
 Actual airflow: 1400 cfm
 Output capacity: 72000 Btuh
 Model: EL180UH090E60C
 Temp. rise: 50 °F
 242% of load





IECC 402.4.1.2

- Documentation for blower door test
 - A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. (2012/2015/2018)


IECC403.2.2

- Documentation for duct leakage test
 - A written report of the results of the test shall be signed by the party conducting the test and provided to the code official (2015/2018)

Documentation – Blower Door Testing



- Recommended data:
 - ACH50
 - CFM50
 - Conditioned volume
 - Pass
 - Name/signature

 Department of Permitting Services
Customer Service
255 Rockville Pike, 2nd Floor
Rockville, MD 20850-4166
Phone: 311 in Montgomery County or (240)777-0311
Fax: (240)777-6262
<http://www.montgomerycountymd.gov/permittingservices>

DPS

WHOLE BUILDING BLOWER DOOR TEST REPORT

BLOWER DOOR TEST REPORT

The building thermal envelope has been constructed to limit air leakage and tested in accordance with Sections R402.4.1 through R402.4.4 and Table 402.4.1.1 of the 2012 International Energy Conservation Code (IECC).

Tested at Rough-in: Tested Post-construction:

Weather Conditions/Temperature: _____ Wind: _____

Company Performing Test: _____

Company Address: _____

Person Performing Test: _____ Signature: _____

Phone: _____

Email: _____

Volume (ft³) of Area Within Thermal Envelope: _____ Number of Floors: _____

ACH₅₀ - Air changes per hour at 50 Pascal
Q₅₀ - Airflow at 50 Pascal (CFM)
V_b - Building volume (ft³)

Q₅₀ X 60 ÷ V_b = _____ ACH PASS FAIL

Maximum of 3 air changes per hour at 50 Pascal (ACH₅₀)



Documentation – Air Barrier and Insulation Inspection



Air Barrier and Insulation Inspection Checklist (Table 402.4.2)

Component	Criteria	Complies	Does not Comply
Air barrier and thermal barrier	Exterior Thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier.	<input type="checkbox"/>	<input type="checkbox"/>
	Breaks or joints in the air barrier are filled or repaired.	<input type="checkbox"/>	<input type="checkbox"/>
	Air-permeable insulation is not used as a sealing material.	<input type="checkbox"/>	<input type="checkbox"/>
	Air-permeable insulation is inside of an air barrier.	<input type="checkbox"/>	<input type="checkbox"/>
Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.	<input type="checkbox"/>	<input type="checkbox"/>
	Attic access (except unvented attic), knee wall door, or drop down stair is sealed.	<input type="checkbox"/>	<input type="checkbox"/>
Walls	Corners and headers are insulated.	<input type="checkbox"/>	<input type="checkbox"/>
	Junction of foundation and sill plate is sealed.	<input type="checkbox"/>	<input type="checkbox"/>
Windows and doors	Space between window/door jams and framing is sealed.	<input type="checkbox"/>	<input type="checkbox"/>
Rim joints	Rim joints are insulated and include an air barrier.	<input type="checkbox"/>	<input type="checkbox"/>
Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking.	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is installed at any exposed edge of insulation.	<input type="checkbox"/>	<input type="checkbox"/>
[Unvented] Crawl space walls	Insulation is permanently attached to walls.	<input type="checkbox"/>	<input type="checkbox"/>
	Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.	<input type="checkbox"/>	<input type="checkbox"/>
Shafts/penetrations	Duct shafts, utility penetrations, knee walls, and flue shafts opening to exterior or unconditioned space are sealed	<input type="checkbox"/>	<input type="checkbox"/>
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.	<input type="checkbox"/>	<input type="checkbox"/>
Garage separation	Air sealing is provided between the garage and conditioned spaces.	<input type="checkbox"/>	<input type="checkbox"/>
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception- fixtures in conditioned space.	<input type="checkbox"/>	<input type="checkbox"/>
Plumbing and wiring	Insulation is placed between outside and pipes.	<input type="checkbox"/>	<input type="checkbox"/>
	Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.	<input type="checkbox"/>	<input type="checkbox"/>
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.	<input type="checkbox"/>	<input type="checkbox"/>
Electrical/phone box on exterior wall	Air barrier extends behind boxes or air-sealed-type boxes are installed.	<input type="checkbox"/>	<input type="checkbox"/>
Common wall	Air barrier is installed in common wall between dwelling units.	<input type="checkbox"/>	<input type="checkbox"/>
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.	<input type="checkbox"/>	<input type="checkbox"/>
Fireplace	Fireplace walls include an air barrier.	<input type="checkbox"/>	<input type="checkbox"/>

Name of inspector: _____ Signature: _____
 Name of Company: _____ Rater #: _____



Documentation – Duct Leakage



 **PUBLIC PROTECTION CABINET**
Department of Housing, Buildings and Construction
Division of HVAC
101 Sea Hero Road, Suite 100
Frankfort, Kentucky 40601-5412
Phone: 502-573-0395, Fax: 502-573-1401
www.dhbc.ky.gov



Kentucky Residential Energy Code Duct Testing Results

Unless all ducts are located within conditioned space, one of the following must be verified (indicate one):

- Post-construction duct leakage to outdoors is ≤ 8 cfm per 100 ft² @ 25 Pa
- Post-construction total duct leakage is ≤ 12 cfm per 100 ft² @ 25 Pa
- Rough-in total duct leakage with air handler installed is ≤ 6 cfm per 100 ft² @ 25 Pa
- Rough-in total duct leakage without air handler installed is ≤ 4 cfm per 100 ft² @ 25 Pa

Rough-in total duct leakage without air handler installed is ≤ 4 cfm per 100 ft² @ 25 Pa

Square footage of conditioned floor area served by HVAC system: _____ ft²

Test leakage measurement at 25 Pa: _____ cfm

Formula: $\text{cfm}_{25} \times 100 / \text{ft}^2$ of conditioned floor area served = Duct Leakage Result

_____ $\text{cfm}_{25} \times 100 /$ _____ ft^2 of conditioned floor area served = _____ cfm leakage/100 ft²





- Certificate from software submitted with plans
- Plan review/inspection checklist
- Blower door and duct leakage results

2009 IECC Energy Cost Compliance

Property
Builder's Lot
123 Main St.
Anytown, USA

Organization
Rachel's Ratings
555-555-5555
RachelSmthh

Builder
Barry's Buildings

Annual Energy Cost	\$/yr	
	2009 IECC	As Designed
Heating	1356	957
Cooling	151	108
Water Heating	491	491
SubTotal - Used to Determine Compliance	1999	1557
Lights & Appliances	885	871
Photovoltaics	-0	-0
Service Charge	120	120
Total	3004	2547

Mandatory Requirements

Duct Insulation R-Value Check (per Section 405.2)		
Minimum Duct Insulation (Design must be equal or higher)	6.0	8.0
Window U-Factor Check (Section 402.5)		
Window U-Factor (Design must be equal or lower)	0.480	0.298
Home Infiltration (Section 402.4.2)		PASSES
Duct Leakage (Section 403.2.2)		PASSES

This home MEETS the annual energy cost requirements of Section 405 of the 2009 International Energy Conservation Code based on a climate zone of 5A. In fact, this home surpasses the requirements by 22.1%.

Name	RachelSmith	Signature	
Organization	Rachel's Ratings	Date	19 February 2015

Mechanical Systems

Heating	Fuel-fired air distribution, 66.5 kBtu/h, 95.0 AFUE.
Cooling	Air conditioner, 24.0 kBtu/h, 13.0 SEER.
Water Heating	Conventional, Elec, 0.88 EF.
Window-to-Floor Area Ratio:	0.11
Blower door test	Htg: 1144 Clg: 1144 CFM50

REM/Rate - Residential Energy Analysis and Rating Software v14.5.1
This information does not constitute any warranty of energy cost or savings.
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- Become certified via your state
 - This doesn't give you jurisdiction, just demonstrates knowledge and commitment
- Become an ICC-Certified Residential Energy Inspector/Plans Examiner (79)
 - Buy a code book (also available online)
 - Study the code
 - Pass the ICC Certification Exam (2 hours)
 - Continuing education (15 hours per 3 years)
- Get approved as a continuing education provider in your state
- Work with local ICC Chapters



Summary



- Not all builders ready to be EnergySmart builders
- All homes must meet the energy code
- Raters have skills to provide energy code consulting and verification
- Know the code
- Know the code official
- Educate the code official
- Get out there and market your skills/services