Updating Vermont's Residential Energy Code

Stakeholder Input Meetings

March 12 and 14, 2014

http://publicservice.vermont.gov/topics/energy_efficiency/code_update

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Welcome and Purpose

- To get stakeholder input on policy and process issues in the residential energy code (RBES)
- To get stakeholder input on initial assumptions about residential compliance thresholds

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Agenda

- 9:00 Introductions and purpose
- 9:15 Background
- 9:25 Process & Policy Issues
- 10:30 Break
- 10:45 Process and Policy continued
- 11:00 Technical Issues
- 11:45 Wrap-up
- 12:00 Adjourn

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Introductions–Update Team

- Kelly Launder and Barry Murphy, *Vermont Public Service Department*
- Richard Faesy and Jim Grevatt, *Energy Futures Group*
- Stu Slote and Tim Guiterman, *Navigant*
- Eric Makela, *Britt Makela Group*
- Jim Edelson, *New Buildings Institute*
- Mike DeWein, *Consultant*

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Introductions–Attendees

- Who are you?
- What organization do you represent?
- What is your stake in the codes update?

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Background

- Energy code update required by Vermont Law
- Residential Building Energy Standards (RBES)
- Commercial Building Energy Standards (CBES)
- Every 3 years
- Process managed by Public Service Department

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Background

- Act 89–
  - Town administrator requirements
    - Provide information
    - Certificate of Occupancy tied to code certificate
  - Stretch code for residential
    - Adoption by local jurisdictions; optional
    - Act 250

Schedule for Update Process

- Effective early 2015
- Stakeholder meetings Spring 2014
- Legislative Committee on Rulemaking (LCAR) early fall, 2014 in order to meet January 1 target

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Objectives and Approach

- Keep up with national energy code trend towards systematically reducing energy use
- Comprehensive Energy Plan suggests VT should establish a "…clear path to achieve a goal of having all new buildings built to net zero design by 2030."
- Balance reduced energy use with modest construction cost increases and construction/technology changes

Process and Policy Issues

- HERS, Fast-track prescriptive, RES*check*
- Blower door testing
- Mechanical ventilation
- Renovation and remodeling
- Occupant behavior and home size
- Log homes
- Cost-effectiveness
- Codes coalition

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Process and Policy Issues

- Others issues to discuss?
- Any specific areas to note that have been a problem with the current code?

Compliance Options

- What is HERS?
  - Background
  - Role of HERS in Code
- Questions:
  - What are the challenges to using a HERS approach?
  - Is HERS a path that you would be likely to use?

Compliance Options

- Fast-Track Prescriptive packages
  - Why have them?
  - Code should specify level of efficiency required, but allow some flexibility both in how that is achieved and in how it is demonstrated
  - DOE requirement for one min. equipment efficiency package

Compliance Options

- Current "Fast Track" Requirements

Performance Requirements

Single-Family and Multi-Family Homes ~ *Fast-Track Method*

Component	*Package 1*	*Package 2*	*Package 3*	*Package 4*
1. Ceiling R-Value	R-49	R-38	R-38 or R-30+10	R-28 cont.
2. Above-Grade Wall R-value	R-20 or R-13+5	R-20+5 or R-13+7.5	R-20 or R-13+5	R-21 cont.
3. Floor R-value	R-30	R-30	R-30	R-30
4. Basement/Crawl Space Wall R-value	R-15/20	R-15/20	R-20 cont.	R-15/20
5. Slab Edge R-value	R-15, 4ft.	R-15, 4ft.	R-15, 4ft	R-15, 4 ft
6. Heated Slab R-value (Edge and Under)	R-15	R-15	R-15	R-15
7. Window and Door U-value	0.32	0.32	0.30	0.32
8. Skylight U-value	0.55	0.55	0.55	0.55

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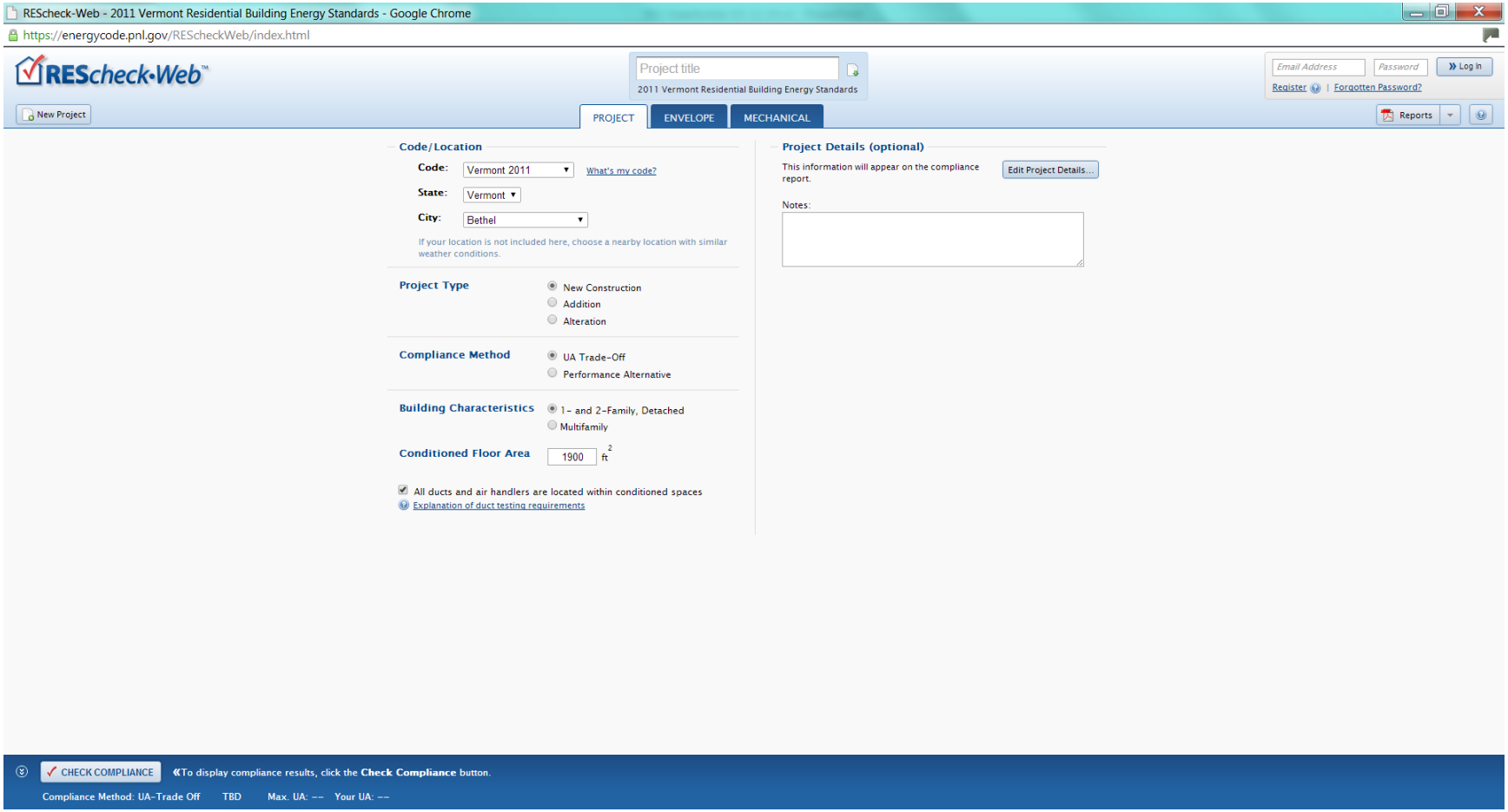
Compliance Options

- Fast-Track Prescriptive packages
  - How important are they?
  - Which trade-offs are important?

Compliance Options

- RES*check*
  - Background
  - Issues for 2015 IECC
    - DOE update uncertain
    - Treatment of renewables

RES*check*



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Compliance Options

- RES*check*
  - Is this an option that you use?
  - Are there aspects that could be improved?
  - How important would it be to be able to print out Vermont RBES Certificate?

Blower Door Testing

- Requirement in 2012 and 2015 IECC
- Was not required in last RBES update
- Tightness levels can't be verified by visual inspection
- HERS Path always does the test
- What about Prescriptive and RES*check*?

Blower Door Testing

- Questions:
  - What are the obstacles to a blower door testing requirement?
  - Builder self-testing- is there demand for this option?
  - Independent business market opportunity?
  - Should 3rd party tester be required?
    - If yes, who?
    - Certifications
    - BPI/RESNET/Other
    - QA/QC

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Mechanical Ventilation

- RBES has had mechanical ventilation since 2005
- 2012 IRC references ASHRAE 62.2
- Questions:
  - Should we maintain the current RBES requirement?
  - Reference the national standard?
  - Do something different?

Renovation and Remodeling

- Do you know about RBES requirements for Renovation and remodeling?
- Have you tried to comply? What are the issues?
- New section on R & R in 2015 IECC
- Practical considerations:
  - How much to focus on compliance?
  - Is there a threshold that determines when to apply code?
  - Blower door testing- when, and who tests?

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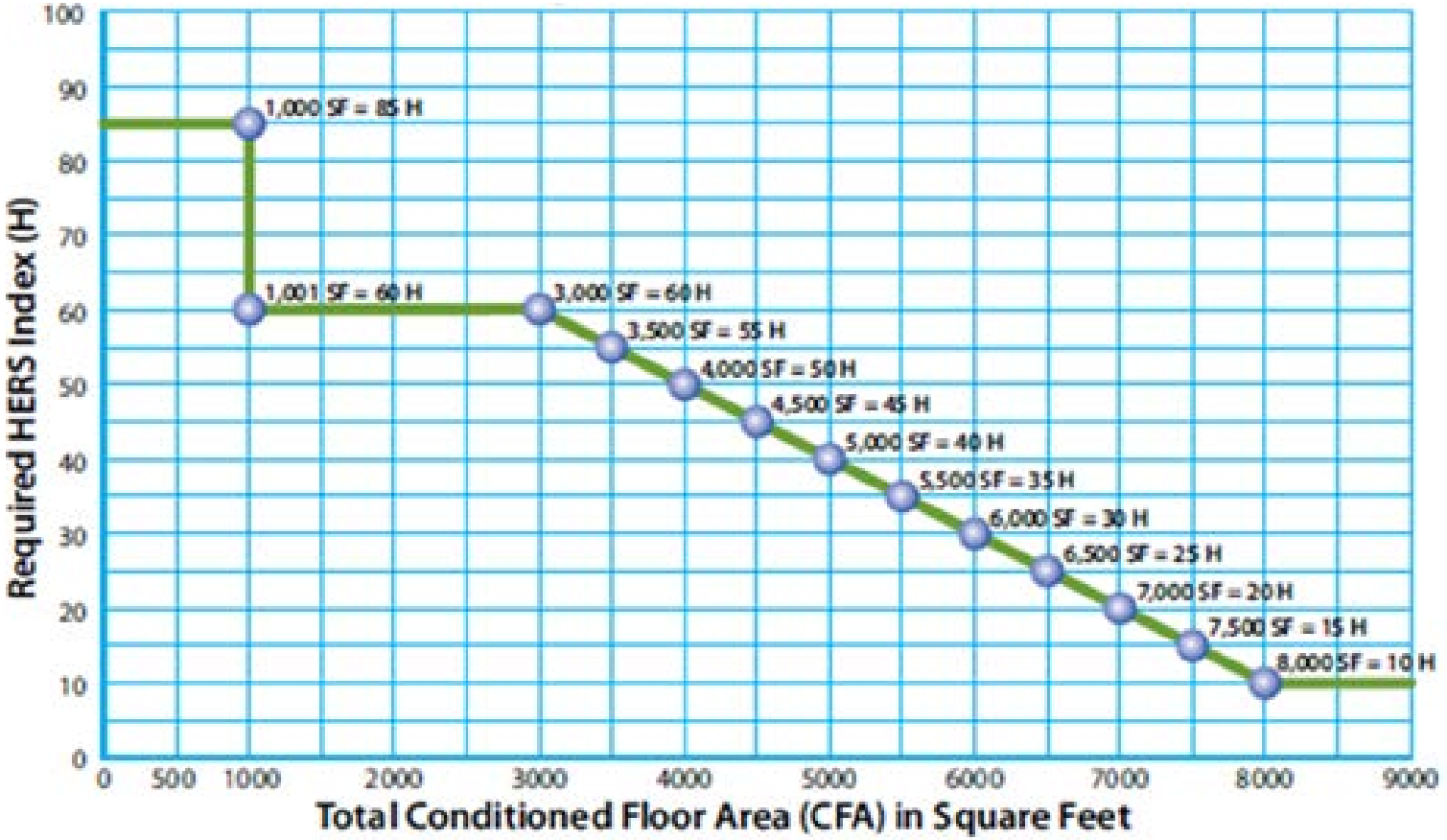
Behavior and Home Size

- Behavior has a huge effect on energy use—but is there a practical way to address it in codes?
- Should a 1500 square foot home be treated the same as a 7500 square foot home?

Boulder County, CO



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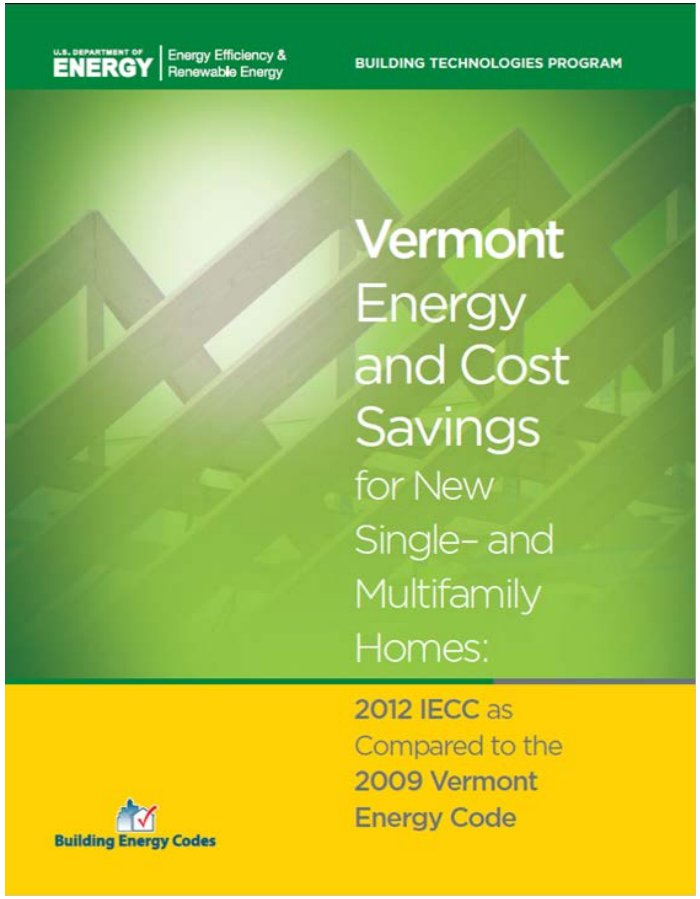
Log Homes

- RBES current exemption
- How to address in Code update- different than other constructions?
- What about stretch code?

Cost-effectiveness

- Incremental cost study for 2012 IECC
  - Clear, significant benefits that are cost-effective
  - Estimated incremental costs are $2503 for 2400 ft2 house



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Cost-effectiveness

Table 2. Impacts to Consumers' Cash Flow from Compliance with the 2012 IECC Compared to the Vermont Energy Code

	Consumers' Cash Flow (Average)	2012 IECC
A	Down payment and other up-front costs	$249
B	Annual energy savings (year one)	$705
C	Annual mortgage increase	$135
D	Net annual cost of mortgage interest deductions, mortgage insurance, and property taxes (year one)	-$1
E = [B-(C+D)]	Net annual cash flow savings (year one)	$571
F = [A/E]	Years to positive savings, including up-front cost impacts	1

Will update cost-effectiveness analysis for 2015 IECC stretch code

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Codes Coalition

- Advisory board to provide regular attention to code issues related to updates and compliance
- Value for stakeholders?
- Interest in volunteering?
- We'll know more at the May update

Other Policy or Process Issues

Break!

Technical Issues

- Arriving at:
  - HERS 60 for Base code
  - HERS 54 for Stretch code
- Approach to Renewable Energy
- Open Q & A on technical issues

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Technical Issues

- HERS 54 and 60
  - Modeling of real homes in Vermont
  - Past Efficiency Vermont participants

RBES 2011 vs 2012/2015 IECC

Efficiency Level/Tier	HERS Index	Notes
2012-2013 Program Homes - Batch-Modeled with Various Envelope Configurations		
Program Homes As Built	***52***	Actual HERS score from homes and multifamily buildings as-built and rated
Baseline	***70***	Modeled with 2011 NMR Market Assessment Study average features
RBES 2011 (2009 IECC)	***71***	Modeled with minimal RBES features
Energy Code Plus	***65***	Modeled with minimal Code Plus features
ENERGY STAR 3.0	***62***	Modeled with ENERGY STAR v. 3.0 features
2012 IECC	***63***	Modeled with minimal 2012 IECC features

Proposed Base & Stretch Levels

Base Code		
Code Efficiency Sub-Target (A)	***65***	Max. threshold with EE only.
Renewables/Efficiency Adder (B)	***5***	Builder can choose to achieve 5 HERS points between 65 and 60 with EE, RE or combination to reach ultimate code target of 60.
Ultimate Base Code Target (C) = (A) – (B)	***60***	Max. target HERS including EE and RE for single-family homes and multifamily buildings.
Stretch Code		
Code Efficiency Sub-Target (D)	***65***	Max. threshold with EE only.
Renewables/Efficiency (E)	***11***	Builder can choose to achieve 11 HERS points between 65 and 54 with EE, RE or combination to reach ultimate code target of 54.
Ultimate Stretch Code Target (F) = (D) – (E)	***54***	Max. target HERS including EE and RE. Aligns with HERS index in 2015 IECC for zone 6.

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Example Home Features – HERS 60

	HERS 75	HERS 60
Envelope	**RBES 2011 - Fast Track Package 1**	
Windows	U-.032	U-.032
Insulation Installation	N/A	Grade I
Ceiling Insulation (flat & slope)	R-49	R-49
Wall Insulation	R-20	R-20
Foundation Wall Insulation	R-15 cont. or R-20 cavity	R-15 cont. or R-20 cavity
Floor Insulation (exposed)	R-30	R-30
Slab Edge Insulation	R-15	R-15
Air Leakage	5 ACH50	3 ACH50
Mechanicals		
Heating & Cooling	Boiler @ 80% AFUE Furnace @ 78% AFUE	ENERGY STAR or equivalent *Boiler @ 85 AFUE *Furnace @ 95 AFUE
Ventilation	RBES Ventilation & Combustion Safety Requirements	ASHRAE 62.2
Lighting & Appliances		
Efficiency Lighting	50%	80%
Renewables		
PV	n/a	n/a

Note: Final packages to include one NAECA minimum efficiency compliant equipment package

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Example Home Features – HERS 54

	HERS 75	HERS 54	
Envelope	**RBES 2011 - Fast Track Package 1**	**Energy Efficiency Path**	**Renewable Energy Path**
Windows	U-.032	U-.030	U-.032
Insulation Installation	N/A	Grade I	Grade I
Ceiling Insulation (flat & slope)	R-49	R-60	R-49
Wall Insulation	R-20	R-20	R-20
Foundation Wall Insulation	R-15 cont. or R-20 cavity	R-15 cont. or R-20 cavity	R-15 cont. or R-20 cavity
Floor Insulation (exposed)	R-30	R-30	R-30
Slab Edge Insulation	R-15	R-15	R-15
Air Leakage	5 ACH50	2 ACH50	3 ACH50
Mechanicals			
Heating & Cooling	Boiler @ 80% AFUE Furnace @ 78% AFUE	ENERGY STAR *Boiler @ 85 AFUE *Furnace @ 95 AFUE	ENERGY STAR *Boiler @ 85 AFUE *Furnace @ 95 AFUE
Ventilation	RBES Ventilation & Combustion Safety Requirements	Balanced ventilation with ≥80% efficiency	ASHRAE 62.2
Lighting & Appliances			
Efficiency Lighting	50%	90%	80%
Renewables			
PV	n/a	n/a	~5 HERS pts/kW

Note: Final packages to include one NAECA minimum efficiency compliant equipment package

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HERS 60 and 54

- Are there other things we should look at?
- Is the stringency enough? Too much?
- Is the increase between base and stretch the right amount?

Renewable Energy

- Proposed: Must meet energy efficiency minimums before getting credit for renewables
- Questions:
  - Is this the right balance between EE and RE?
  - Are there better alternatives?

Other issues

- Q & A
- Identify areas for further consideration

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Reminder: Stakeholder Input

- Public stakeholder meetings:
  - 9:00am–12:00pm for Residential Code
  - March 12 – Vermont College, Montpelier
  - March 14 – Vermont Fire Academy, Pittsford
  - May 7 – Burlington Electric Department
  - May 9 – Windsor Welcome Center
- Questions and comments to:
  - Barry Murphy, Public Service Department
    802-828-3183
    barry.murphy@state.vt.us

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Thank you!

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