Residential Energy Code Field Study Kick Off Meeting : Utah

September 2019

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Agenda

1. Team Members + Roles
2. Objectives
3. Tasks + Timelines
4. Methodology + Data Collection
5. Sampling Plan Review
7. Initial ETO Ideas + Feedback
8. QA on Project

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Project **Partners**

US Department of Energy

Pacific Northwest National Lab

Institute for Market Transformation

SWEEP

Utah Clean Energy

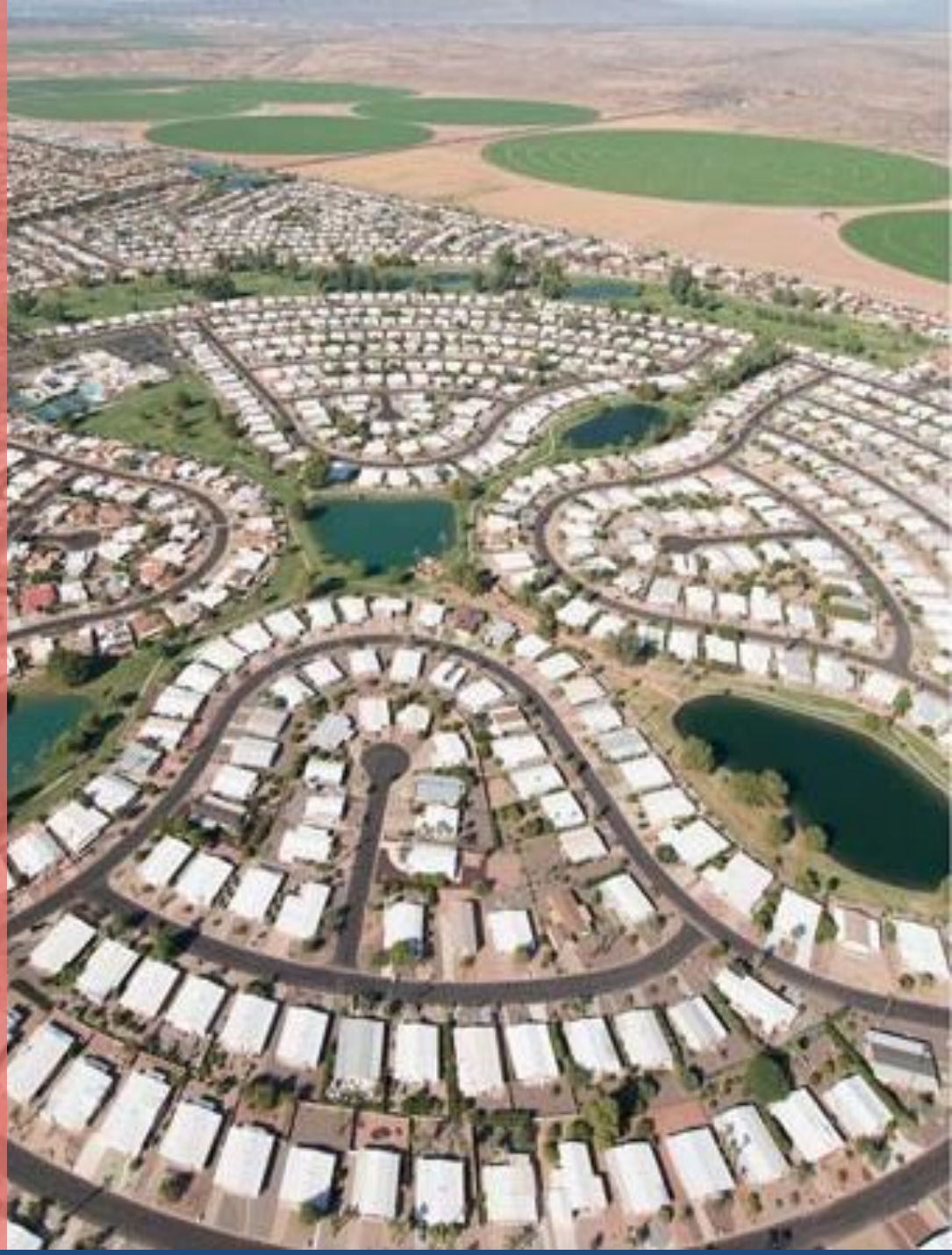
Nexant

WC3

Governor's Office of Energy Dev.

Dominion Energy

Rocky Mountain Power



Institute for Market Transformation

Role

- Overall project management
- Stakeholder engagement
- Education coordination and oversight

Contact Info

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Utah Clean Energy

Role

- Coordination assistance in state
- Stakeholder engagement
- Education and outreach

Point Person

Kevin Emerson

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Southwest Energy Efficiency Project

Role

- Stakeholder engagement
- REEO Partner

Point Person

Jim Meyers

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Nexant

Role

- Baseline Assessment Data Collection

Point Person

Matt Meyer

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West Coast Code Consultants

Role

- Training Needs Assessment
- Curriculum Development
- Training Development
- Conduct Statewide Training

Point Person

Brent Ursenbach

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Additional Partners/Support From

Governor's Office of Energy Development

Dominion Energy

Rocky Mountain Power

US Department of Energy

Pacific Northwest National Labs

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Energy Code Stakeholder Group

Role

- Feedback on Sampling Plan
- Guide Curriculum Development
- Feedback on Education Implementation

Point Person

(Look to your left and right)

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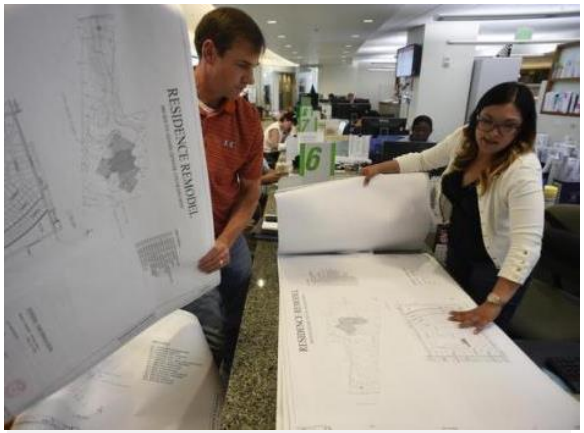
Goals of the Field Study

Collect field data to generate baseline compliance rate across two states (Arizona and Utah)

Develop targeted education programs to address key measures that will result in the largest savings



Pilot jurisdictional administrative enforcement mechanisms that may increase compliance without education

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Why Federal (DOE) Interest?

DOE's interest is energy—study seeks data to assess use

States and localities voiced need for additional support

Seeking a consistent approach

Testing a methodology that any interested state can implement

How projects selected—submissions, competitive process, review board

Why Utah? Dry Climate Zone

Establish empirical data set showing the amount of savings available

State and industry investments

Data Confidentiality

- No information that identifies people or individual homes will be submitted to DOE/PNNL
- Findings reported only on a statewide or climate zone basis
- Code officials will provide only addresses of qualifying homes—they will not be present for onsite data collection
- No owner-occupied homes will be included
- Blower door and duct testing results will be shared with builders upon request
- Each house visited only one time—not enough information to determine ‘compliance’ for an individual home or jurisdiction

Study **Benefits**

Consumers/Homebuyers: Lower energy bills—assurance that code-intended savings are realized

Builders & Code Officials: Level playing field, better market data (e.g. relative to existing homes), protected competitive advantage, free training, reduced burden/risk

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Study **Benefits**

Utilities: Cost & savings data to enable future investments, increased accuracy in forecasting, better connection to code implementation infrastructure

State & Local Governments: Federal tax dollars gives direct benefits to local businesses, enhanced ability to provide training & education programs, and may complement existing policies and energy goals

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Overview of Tasks + Milestones

Convene Energy Stakeholder Group

- Identify stakeholders
- Convene introductory meeting
- Review results of baseline assessment

Anticipated Timeline:

- May 2019 (complete)
- We're Here!
- May 2020 (target)

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Overview of Tasks + Milestones

Baseline Field Study	Anticipated Timeline:
• Draft Sampling Plan	• May 2019 (complete)
• Sampling Plan accepted by Stakeholder Group	• We're Here!
• Data Collection begins	• September 2019
• Data Collection 50% complete	• December 2019
• Data Collection 100% complete	• March 2020
• All data transmitted to PNNL	• March 2020

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Overview of Tasks + Milestones

Develop Education and Training Program	Anticipated Timeline:

• Develop E&T approach
  • Types, attendance targets, distribution across state
  • Optional administrative enforcement program
	• Oct 2019 – March 2020 (first pass)

• Develop E&T materials
  • Review existing materials
  • Identify need for new materials
	• Oct 2019 – March 2020 (first pass)

• Convene Stakeholder Group for review of E&T approach + materials	• Summer 2020 (target)

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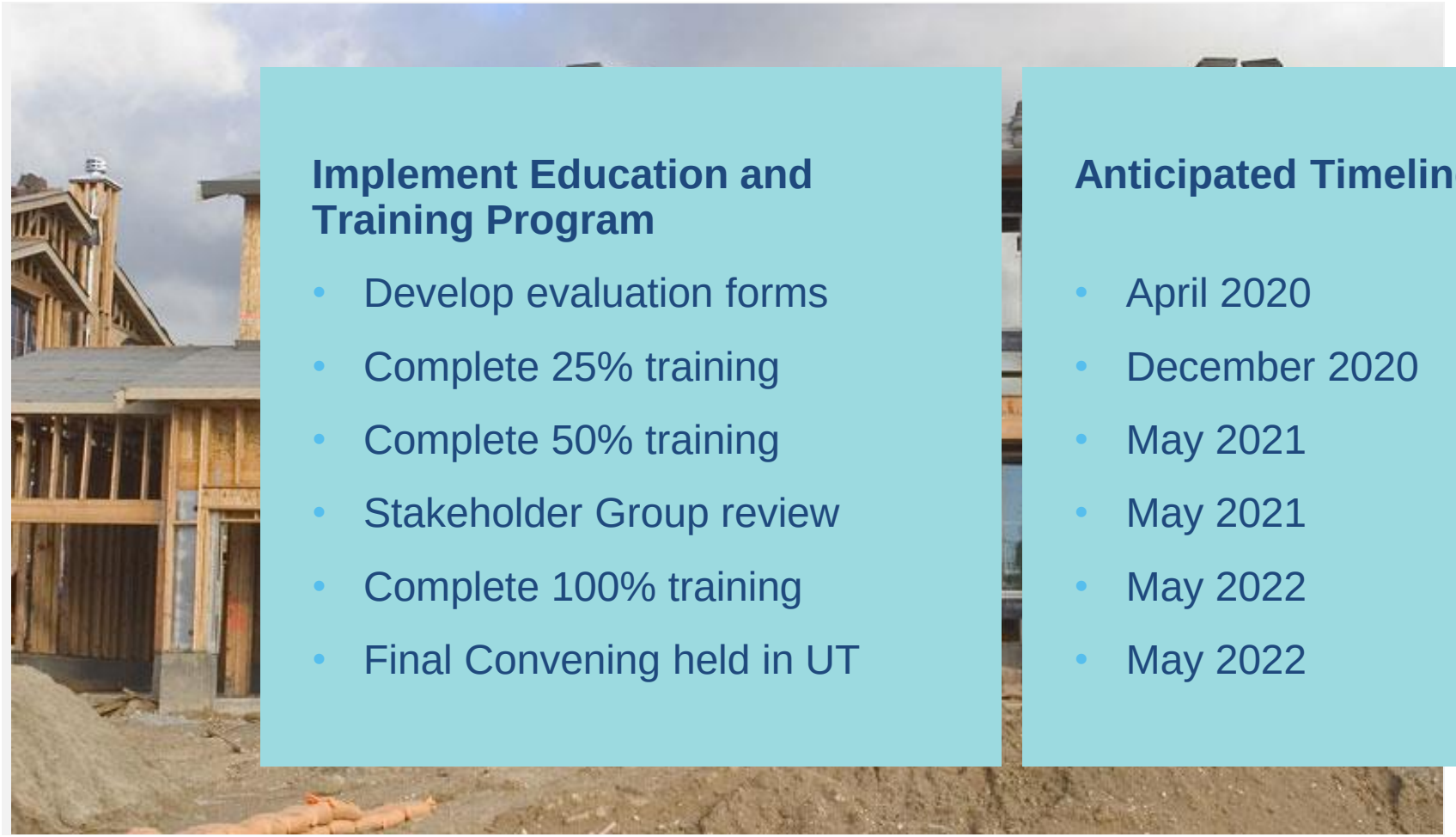
Overview of Tasks + Milestones



Implement Education and Training Program

- Develop evaluation forms
- Complete 25% training
- Complete 50% training
- Stakeholder Group review
- Complete 100% training
- Final Convening held in UT

Anticipated Timeline:

- April 2020
- December 2020
- May 2021
- May 2021
- May 2022
- May 2022

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QUESTIONS?

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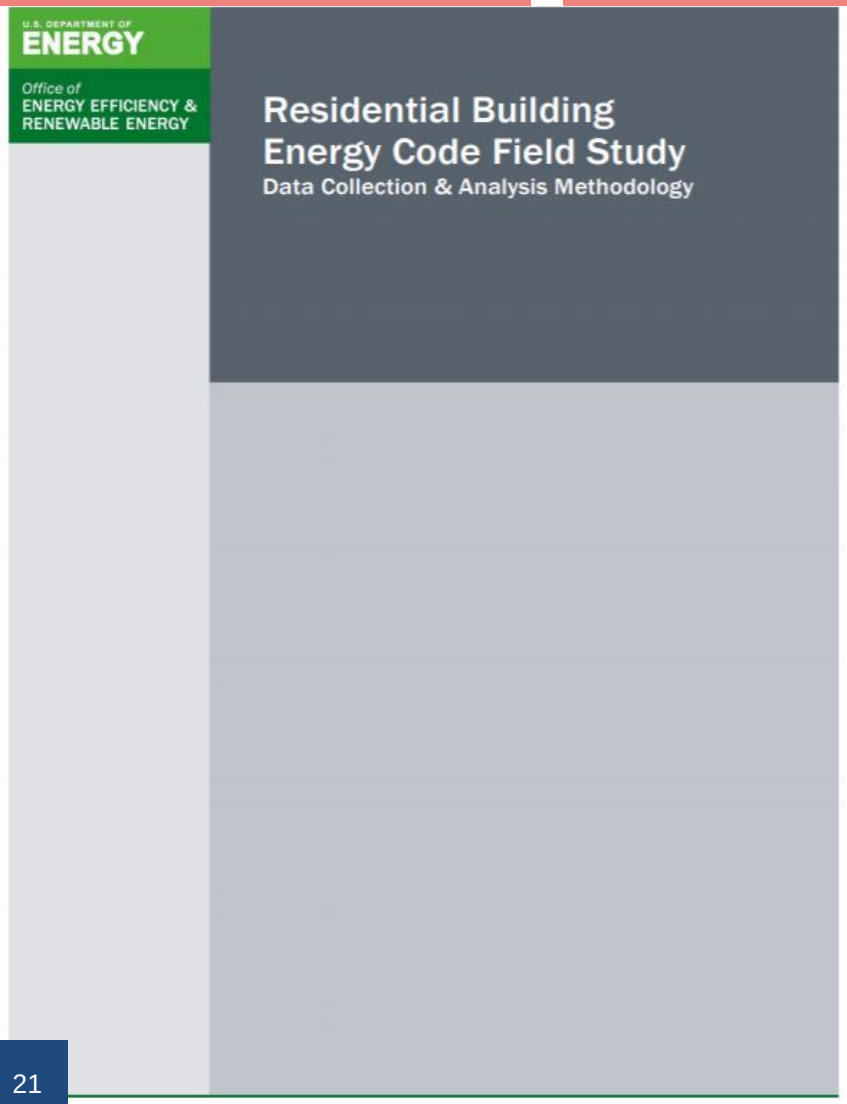
Field Study **Background**



Original FOA

- DOE funded 8 states
- Methodology was tested and refined
- Studies were see-do-see – testing if education could close compliance gaps

Current studies (UT/AZ and CO/NV)

- Expansion into dry climate zones and home rule states
- See-do only – no repeat assessment at the end

Methodology **Highlights**

- Only new, site-built single-family homes
- Single site visit per home
- Focus on review of individual code requirements rather than homes
- Sample size of 63 observations of key items
- Energy savings metric

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Methodology **Activities**

Step	Activity	Responsibility
1	**Develop initial sampling plan**	PNNL
2	**Conduct stakeholder meeting**	Project Team
3	**Develop final sampling plan**	PNNL
4	**Contact jurisdictions and identify homes to sample**	Project Team
5	**Collect field data**	Project Team
6	**Analyze and report field data**	PNNL
7	**Conduct education, training and outreach**	Project Team
8	**Re-evaluate**	PNNL and Project Team

Identified **Key Measures**

1. Envelope tightness (ACH50)
2. Window SHGC
3. Window U-factor
4. Exterior wall insulation
5. Ceiling insulation
6. High-efficiency lighting
7. Foundation insulation
8. Duct leakage

QUESTION:

Are there other measures we want to add for Utah?

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ID	Code Section	Description	Meets Requirement	Does Not Meet Requirement	Not Applicable	Not Observable	Field Observation	REScheck or HERS Value*	Format	Units	Comments
Envelope Wall All Walls (Does not include knee walls)											
Wall1	NA	Are the walls predominantly frame walls or mass walls?							Text		
IN4	303.2	Wall insulation is installed per manufacturer's instructions							Check Box		
Envelope Wall Frame (Does not include knee walls)											
IN3a	402.1.1, 402.2.5	Frame Wall insulation R-value (cavity insulation)							Number	R-value	
IN3b	402.1.1, 402.2.5	Frame Wall insulation R-value (continuous insulation)							Number	R-value	
M2	NA	What is the wall framing material wood or steel?							Text		
Wall2	NA	What is the predominant wall framing depth? (2 inch, 4 inch, 6 inch, 8 inch, etc.)							Number	inches of framing depth	
IQ3	NA	What is the frame wall insulation quality? (I,II,III) - see INFO - Insulation Grading tab									
Envelope Wall Mass (Does not include knee walls)											
FR10a	402.1.1	Mass wall insulation R-value							Number		

State-Specific Data Collection Form

Combination of

- RES*check* checklists (essentially all of the applicable code requirements),
- Any items added or subtracted for state-specific codes, and
- Additional items needed for energy simulation (including key items)

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Details of the **Data Collection Form**

Project team will perform blower door tests

Project team will perform duct leakage tests

Observation of frame cavity insulation installation grade will be done

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2009 IECC Residential Data Collection Form - Envelope

KEY ITEM

IN3a	402.1.1, 402.2.5	Frame Wall insulation R-value (cavity insulation)

2009 IECC Residential Data Collection Form - Envelope

Code Requirement

IN4	303.2	Wall insulation is installed per manufacturer's instructions

2009 IECC Residential Data Collection Form - Envelope

Simulation Input

Wall1	NA	Are the walls predominantly frame walls or mass walls?

PNNL National **Prototype**

Observations are used to model full homes and calculate compliance rates by key measures and overall across the state

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PNNL National **Prototype**

Table 2.1. Single-Family Prototype Characteristics

Parameter	Assumption	Notes
Conditioned floor area	2,400 ft^2 (plus 1,200 ft^2 of conditioned basement, where applicable)	Characteristics of New Housing, U.S. Census Bureau
Footprint and height	30-ft-by-40 ft, two-story, 8.5-ft-high ceilings	
Area above unconditioned space	1,200 ft^2	Over a vented crawlspace or unconditioned basement
Area below roof/ceilings	1,200 ft^2, 70% with attic, 30% cathedral	
Perimeter length	140 ft	
Gross exterior wall area	2,380 ft^2	
Window area (relative to gross wall area)	Fifteen percent equally distributed to the four cardinal directions (or as required to evaluate glazing-specific code changes)	
Door area	42 ft^2	
Internal gains	91,436 Btu/day	2006 IECC, Section 404
Heating system	Natural gas furnace, heat pump, electric furnace, or oil-fired furnace	Efficiencies will be based on prevailing federal minimum manufacturing standards.
Cooling system	Central electric air conditioning	Efficiency will be based on prevailing federal minimum manufacturing standards.
Water heating	Natural gas, or as required to evaluate domestic hot water-specific code changes	

Btu = British thermal units.
IECC = International Energy Conservation Code.

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Construction **Methods**

Are there construction practices that are different in the west/southwest that we didn't see in the first set of studies that are important/prevalent enough to drive focus on?

STANDARD:

Wood frame cavity insulation construction.

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QUESTIONS?

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Study Area : **Utah**

Sampling Plan	
Stage	# Required
Insulation	63
Final	63
Total	126
“Full Homes”	63

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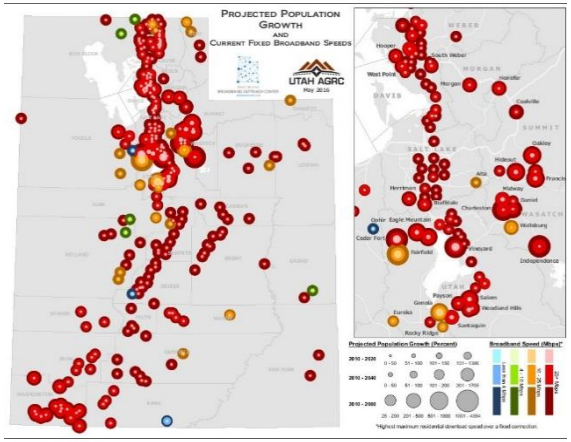
Sample Size **Bottom Line**

63

observations of each key item in each state

Think # of observations rather than # of homes

State-Specific **Sampling Plan**



Initial sampling plan based on Census Bureau permit database using latest 3 years of permit data by place within the state

Final sampling plan developed after Project Team and Stakeholder meetings in case any changes or additions to the sampling plan are needed

63 observations will require visiting more than 63 homes per state due to practical limitations of being able to observe all key items in a single site visit

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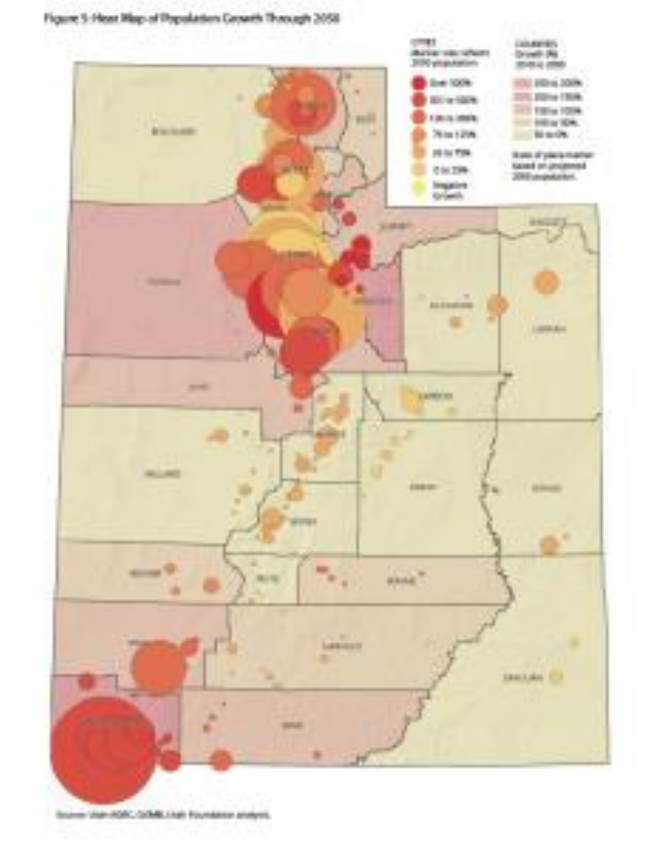
State-Specific Sampling Plan (cont'd)



Proportional random sample

Substitutions that do not introduce bias into the sample are allowed

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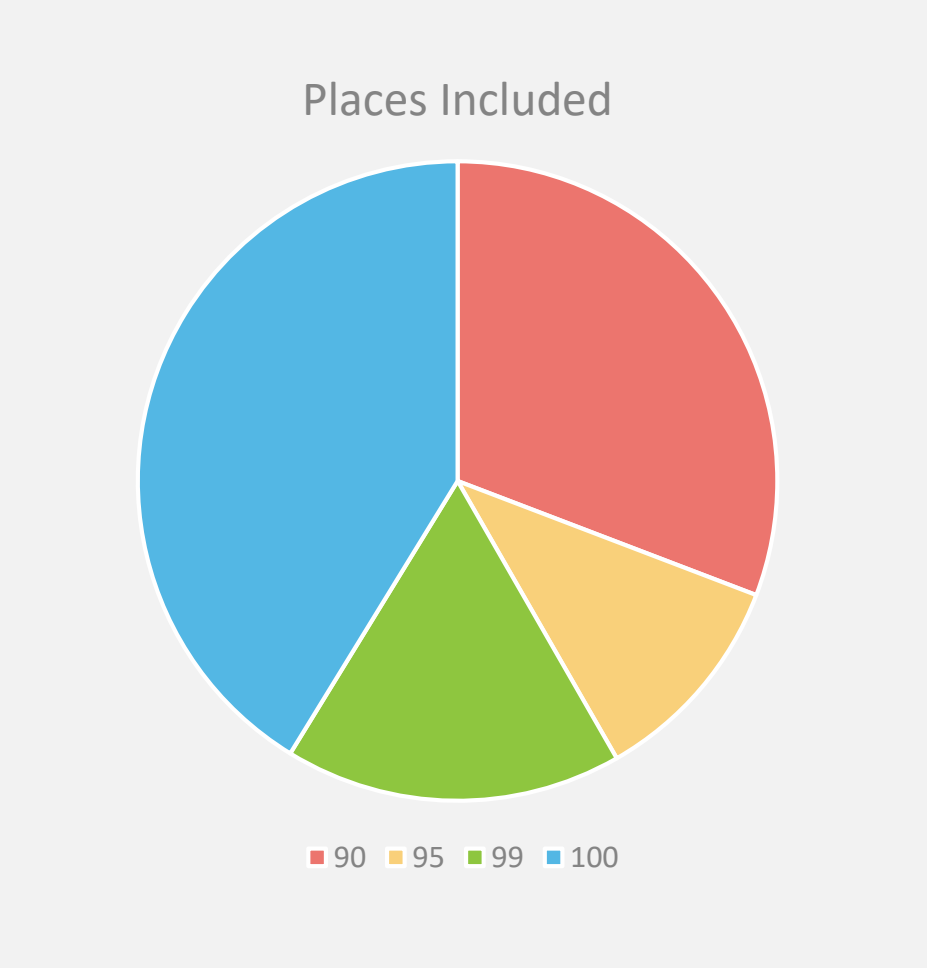
Distribution of **Places**



Cut Off	Places	% Places
90%	65	31%
95%	88	42%
99%	124	58%
100%	212	100%

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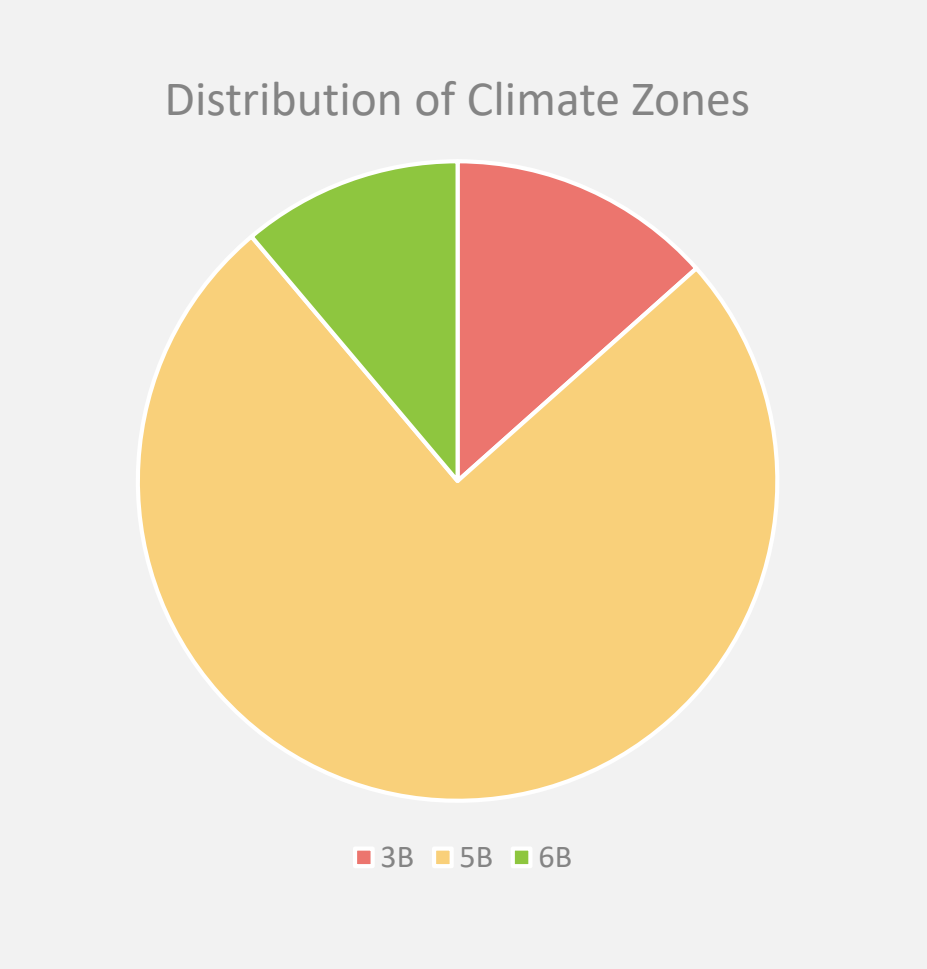
Distribution of **Climate Zones**



CZ	Permits	% Permits
3B	2315	13%
5B	13,009	75%
6B	1923	11%

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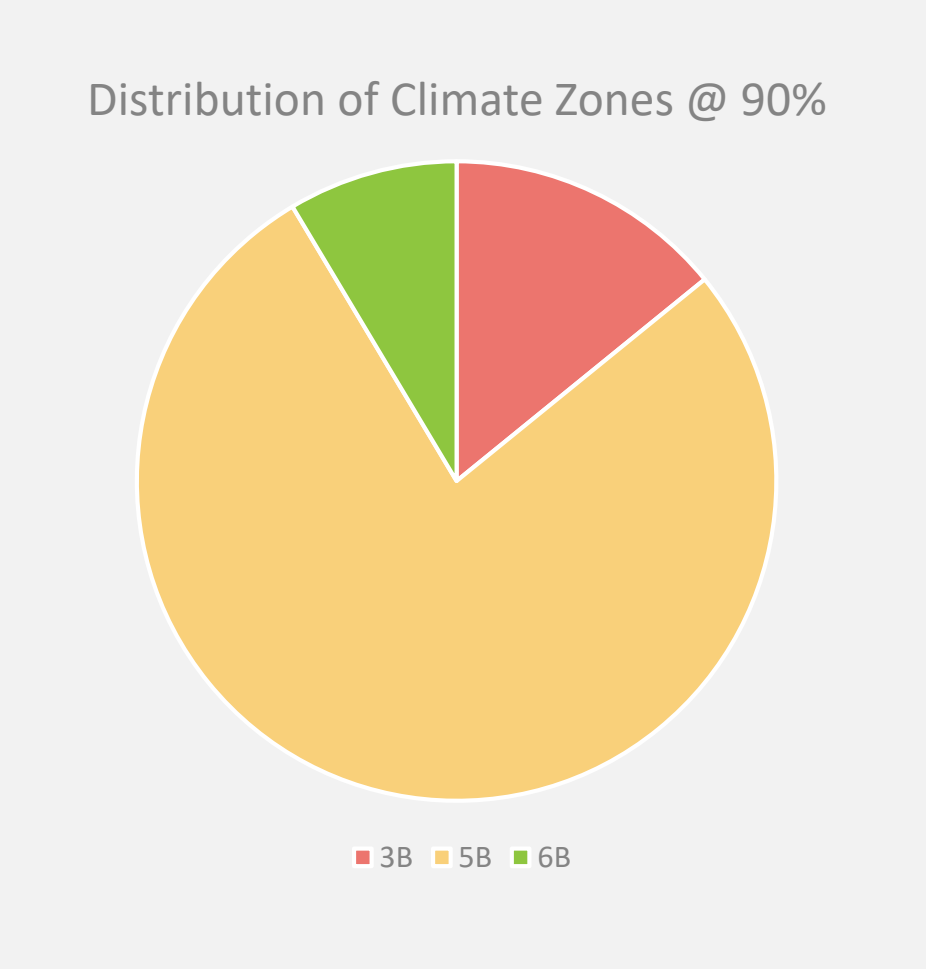
CZs at 90% Cut Off



CZ	Permits	% Permits
3B	2195	14%
5B	11,998	77%
6B	1332	9%

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Sampling Plan **Questions**

Are we covering enough of the state under a 90% cut off?

Do we think the distribution accurately reflects the climate zones?

Anything else we should consider?

Does data appear accurate?

Did we miss any places?

Are we comfortable with distribution?

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Selecting the Sample Plan

Why might you like one plan over another?

- Compactness / Expansiveness
- Density of permits
- Include or exclude a specific place
- Geographic distribution

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Proposed **Sample ****

Location	Count			
Herriman, Salt Lake County	4		Riverton, Salt Lake County	1
Lehi, Utah County	4		Santaquin, Utah County	2
St. George, Washington County	4		Cedar City, Iron County	3
South Jordan, Salt Lake County	6		Mapleton, Utah County	1
Eagle Mountain, Utah County	4		Farmington, Davis County	1
Saratoga Springs, Utah County	3		Ivins, Washington County	3
Vineyard town, Utah County	3		Weber County Unincorporated Area, Weber County	2
Washington, Washington County	1		Plain City, Weber County	1
Bluffdale, Salt Lake County	2		Millcreek, Salt Lake County	1
West Jordan, Salt Lake County	2		Washington County Unincorporated Area, Washington County	1
Cache County Unincorporated Area, Cache County	3		Midway, Wasatch County	1
Syracuse, Davis County	3		Santa Clara, Washington County	1
Wasatch County Unincorporated Area, Wasatch County	2		Park City, Summit County	1
West Haven, Weber County	2		Cottonwood Heights, Salt Lake County	1
			Total	**63**

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**This sample was discussed and changes proposed at the stakeholder meeting. A final sampling plan will be posted on acceptance by DOE and PNNL

QUESTIONS?

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Utah **Adjustments**

Specific items to look at :

Additional field data collection?

Additional analysis questions?

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Construction **Methods**

Are there construction practices that are different in the west/southwest that we didn't see in the first set of studies that are important/prevalent enough to drive focus on?

STANDARD:

Wood frame cavity insulation construction.

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HVAC **Sizing**

Do we have enough information on dry and hot climates enforcement and right sizing of equipment? All previous states were moist climates (A)

Right-J Worksheet

<< < prev zone

ACCA MANUAL J EIGHTH EDITION

1	Room name	Entire House
2	Exposed wall	240.0 ft
3	Ceiling height	8.0
4	Room dimensions	
5	Room area	1750.0 ft²

	Ty	Construction number (Select any cell then click here)	U-value	Or	HTM (Btuh/ft²) Heat	HTM (Btuh/ft²) Cool	Area (ft²) or perimeter (ft Gross	Area (ft²) or perimeter (ft N/P/S	Load (Btuh) Heat	Load (Btuh) Cool
6	W	15B-10sfc-2	0.083	n	0.305	1.129	560	492	189	397
	G	1D-c2ow	0.570	n	2.850	19.32	40	0	114	773
	D	11D0	0.390	n	1.950	11.19	28	28	55	313
	W	15B-10sfc-2	0.083	e	0.305	1.129	400	368	142	303
11	G	1D-c2ow	0.570	e	2.850	41.39	32	0	91	1965
	W	15B-10sfc-2	0.083	e	0.305	1.129	560	484	185	388
	G	1D-c2ow	0.570	e	2.850	21.64	48	0	137	1039

STANDARD:

Manual J Calculation

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Anything **Else?**

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Education + **Outreach**

Previous study included:

Energy Code 101 trainings

Specialist trainings (focused on code officials, mechanical trades, etc)

Fact Sheets

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Utah Initial **Ideas**

In person and online access to all training modules

Online FAQ for questions

Spanish language translation

Jurisdictional admin/enforcement PILOT

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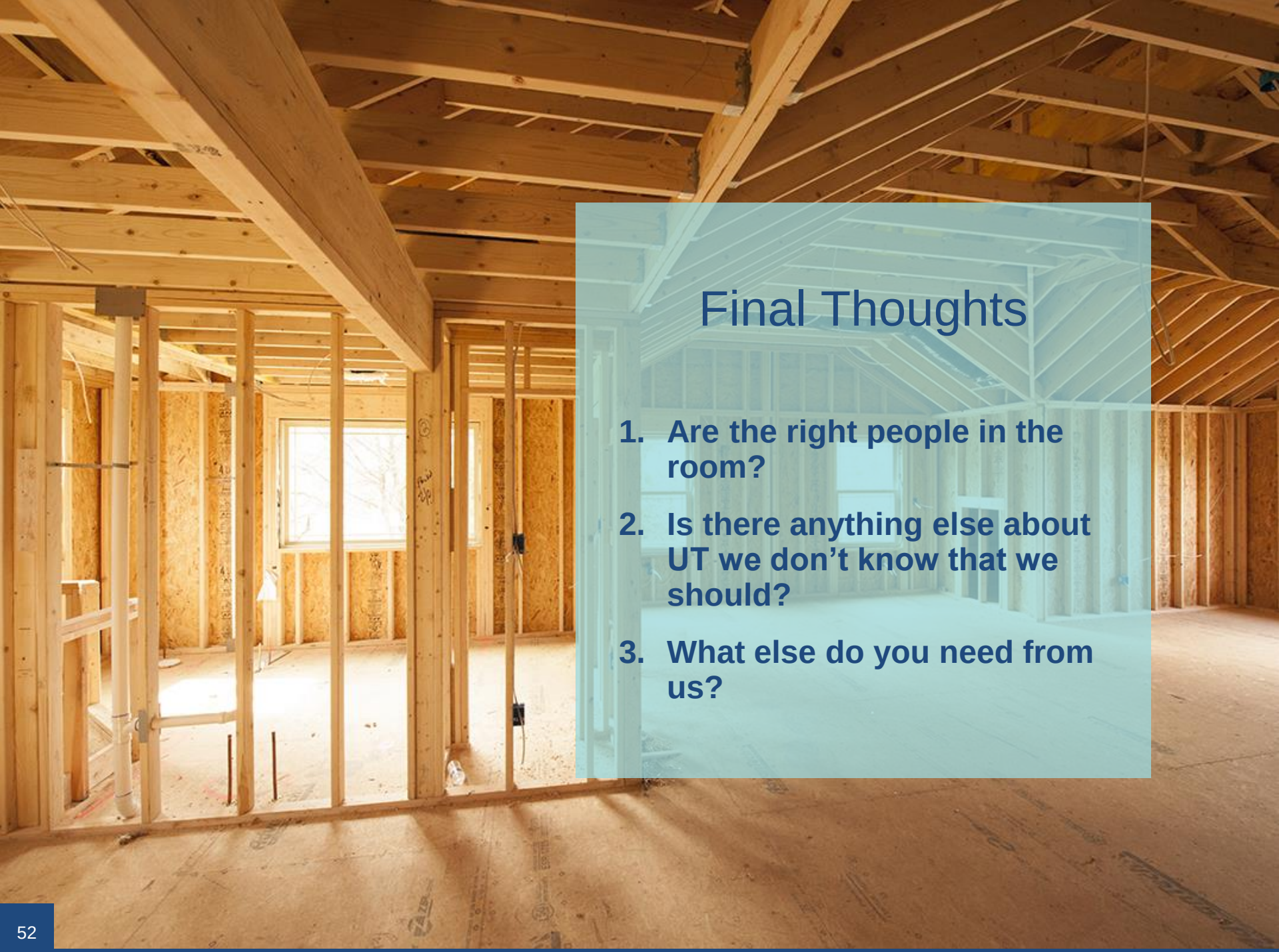
Jurisdictional Admin **PILOT**

Big Idea: People know what's required to comply with the code (education is not needed) and will respond to increased enforcement

Potential policies:

1. Fines
2. Plan Review Stringency/Checklists
3. Inspections Stringency/Checklists
4. Withhold CO



Final Thoughts

1. **Are the right people in the room?**
2. **Is there anything else about UT we don't know that we should?**
3. **What else do you need from us?**

Contact Us

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