The Commercial Energy Codes Support Program

Enhanced Energy Code Compliance, 2014 CARD Grant

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Takeaways…

1. Increase awareness of the pilot program & how it could benefit you
2. What work is being done in other states around commercial code support
3. What future work or opportunities might come from this study

What We Will Cover:

Context

- What other states are doing
- Issues & challenges that we are focused on

Program Anatomy

- Introduction to & the intent of the pilot program
- Walk-thru of program approaches & the audiences
- Tools & processes

Evaluation

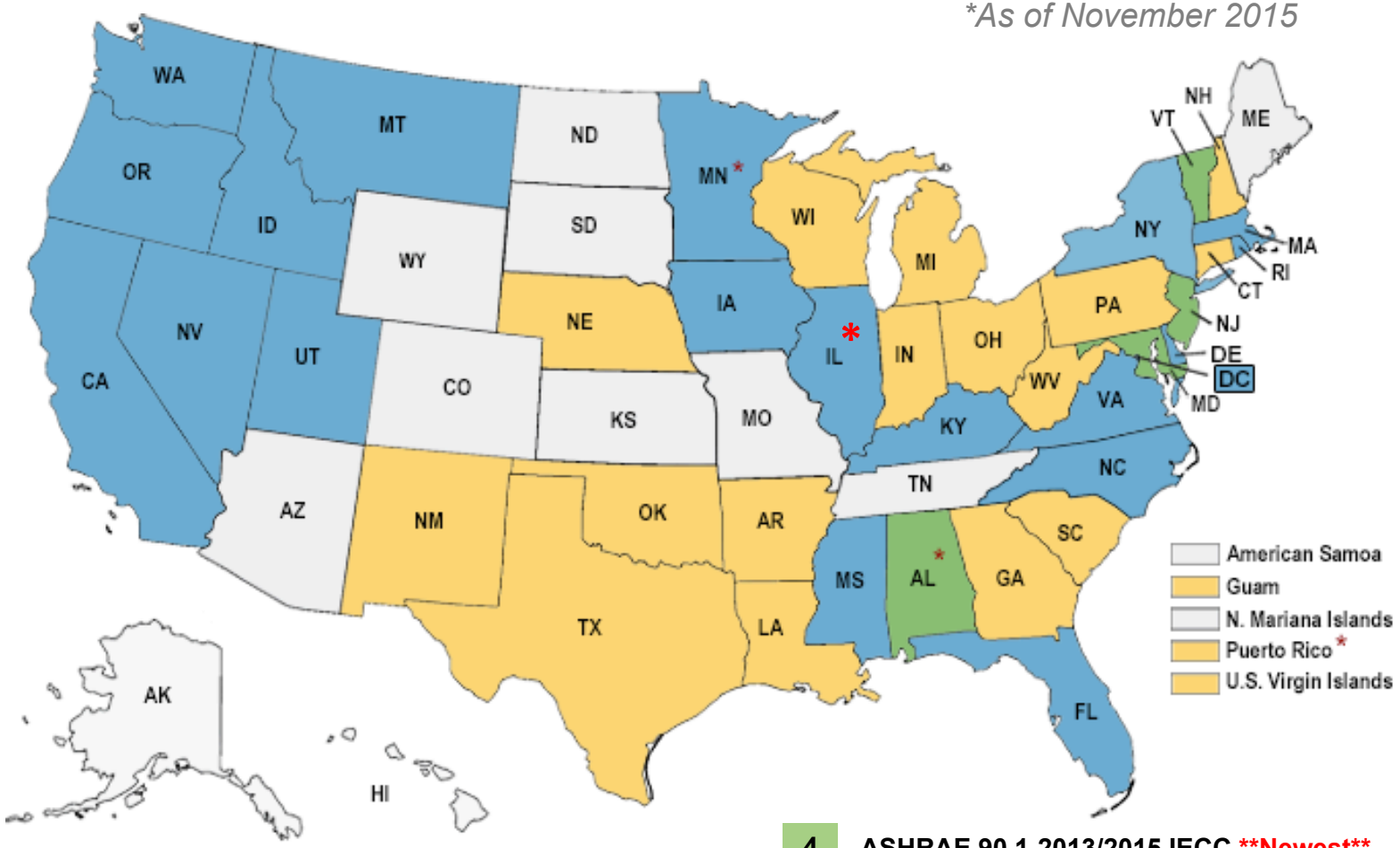
- Benefits to participants & potential opportunities for utilities & cities
- What information the study will be evaluating & questions we will be answering

- Audience questions & discussion

Context:
Other States & Issues to Address in MN

Trends in Commercial Energy Code

*As of November 2015



4	ASHRAE 90.1-2013/2015 IECC **Newest**
20	ASHRAE 90.1-2010/2012 IECC
19	ASHRAE 90.1-2007/2009 IECC
13	Older or no statewide code

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Trends in Commercial Energy Code

- Moving towards whole-building requirements
- MN Commercial Energy Code has **two** compliance path options - 1st time in MN *(Effective as of June 2, 2015)*

  1. ASHRAE 90.1-2010

     PERFORMANCE & PRESCRIPTIVE OPTIONS

  2. International Energy Conservation Code (IECC) 2012

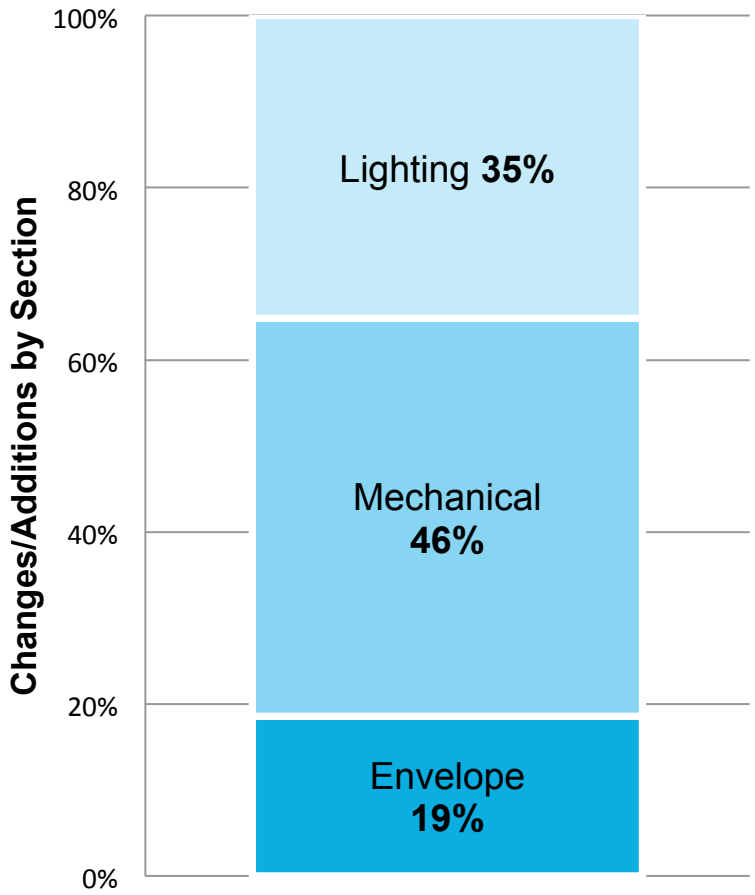
     PERFORMANCE & PRESCRIPTIVE OPTIONS

  **MN specific amendments made to IECC version*

- ASHRAE 2010/IECC 2012 have more significant changes an the previous 2 code iterations
- Other states have seen increasing use of IECC path (friendly for small-medium projects)

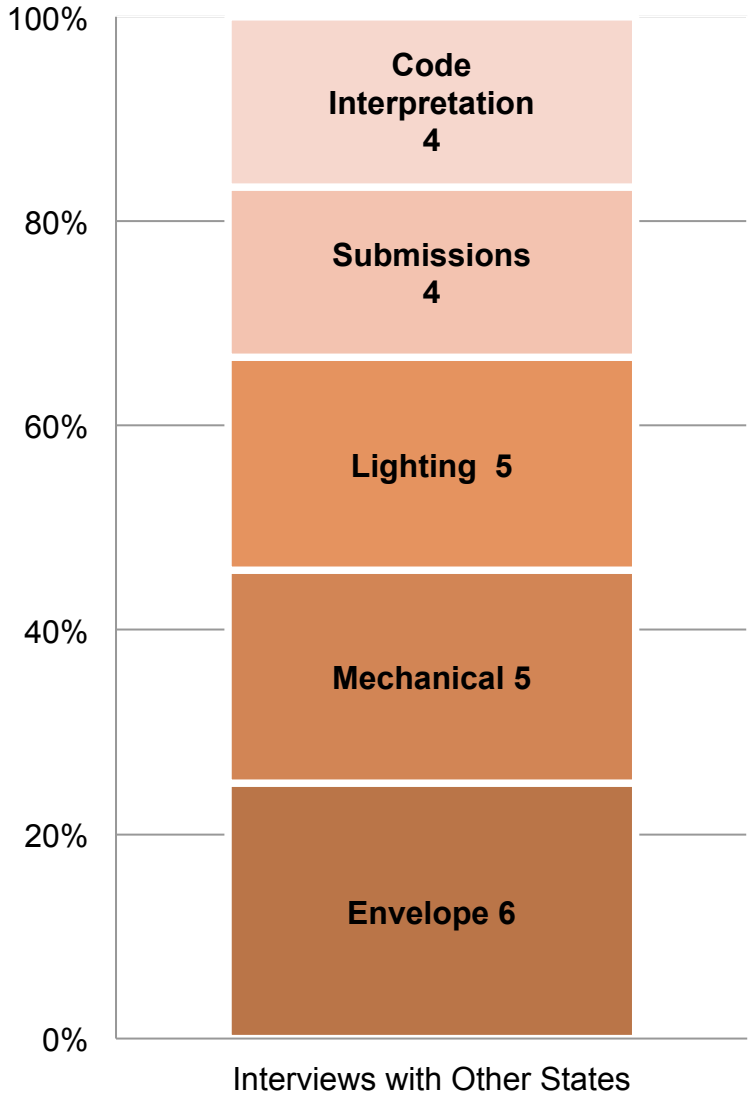
Major Changes & Additions

- Lighting controls & sensors
- Window areas & orientation
- Wall & slab U-values
- Duct construction & leakage testing
- Outdoor air temperature reset controls, zone controls & VAV box reheat limits
- Commissioning thresholds
- *Additional Efficiency Package* Requirements



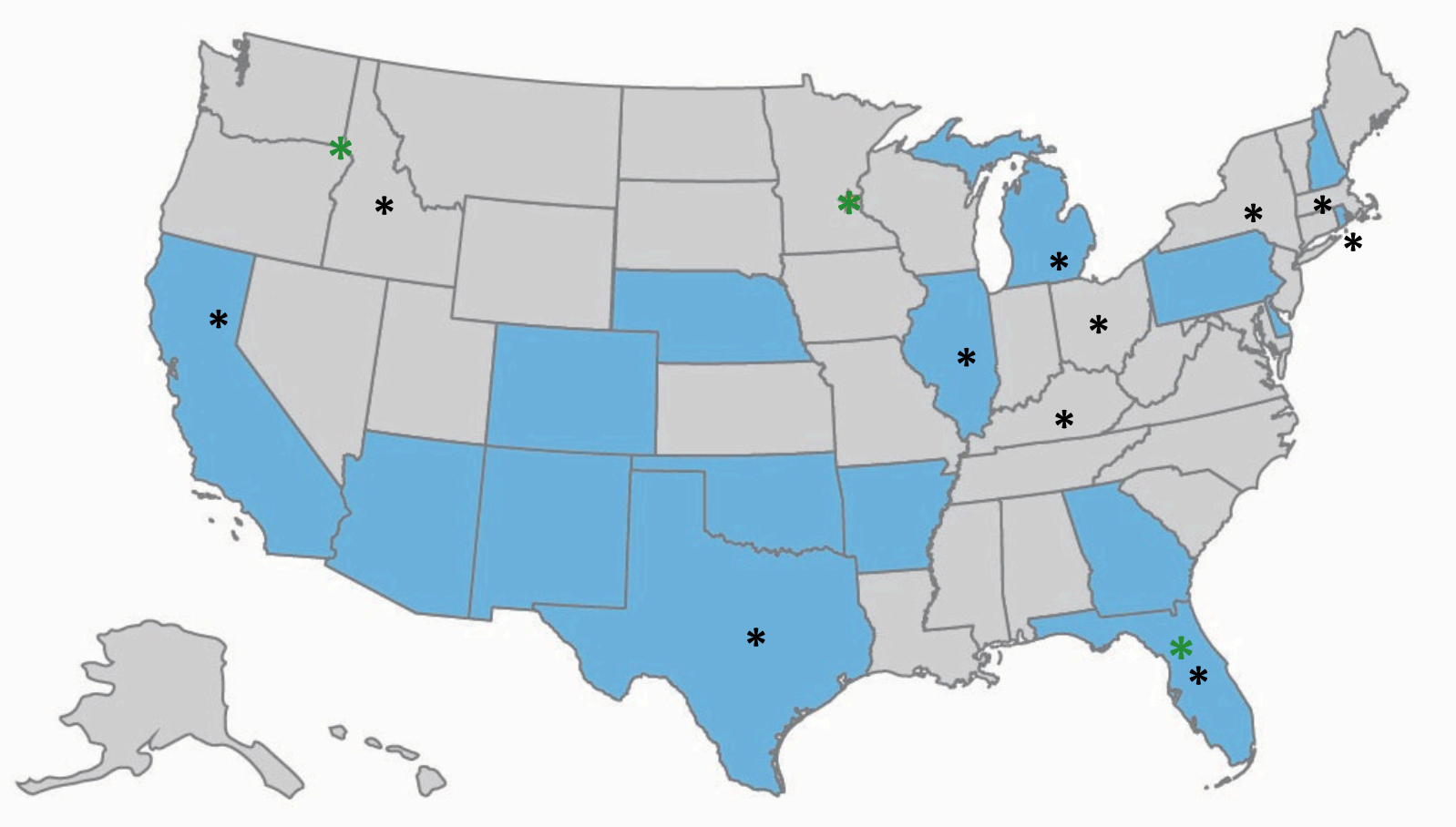
Code Implementation Feedback

- Interviewed code officials from other states already adopted ASHRAE 2010/IECC 2012
- 6 states, 11 cities
- Submission documentation noted as area needing support
- No Service Hot Water requirements flagged



Approaches in Other States

1. Compliance studies
2. Increased training
3. Programs



* Developed/developing Residential energy code support

* Developing/studying Commercial energy code support

Example 1 | Georgia

- Creating compliance support through tools
  (Residential & Commercial)
- Developed software & web-based compliance tools
- Construction guides outline best practices
  (drawing details & photos)

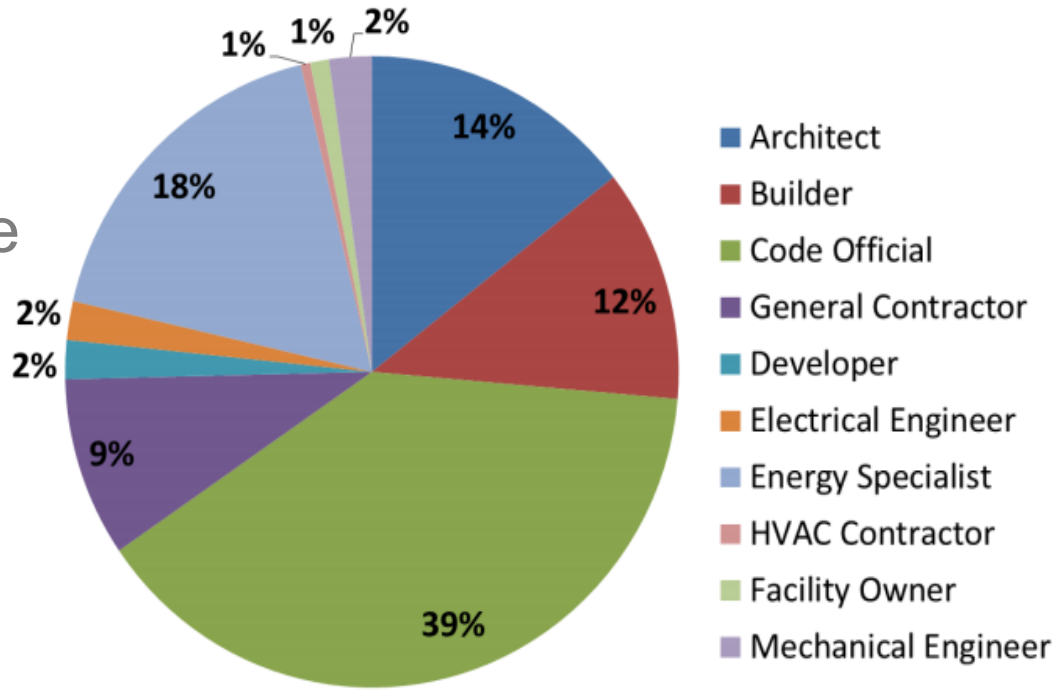
Example 1 | Florida

- Lack of resources at municipal levels & high commercial permit volume
- Launched Circuit Rider Program in 2014
  (Residential & Commercial)
- Program provides support now & gathers info on how to provide focused technical support in the future
  - Provide technical assistance on energy code plan reviews
  - Help local code offices share best practices
  - Helping provide education around existing buildings
  - Working with building departments to better define enforcement responsibilities

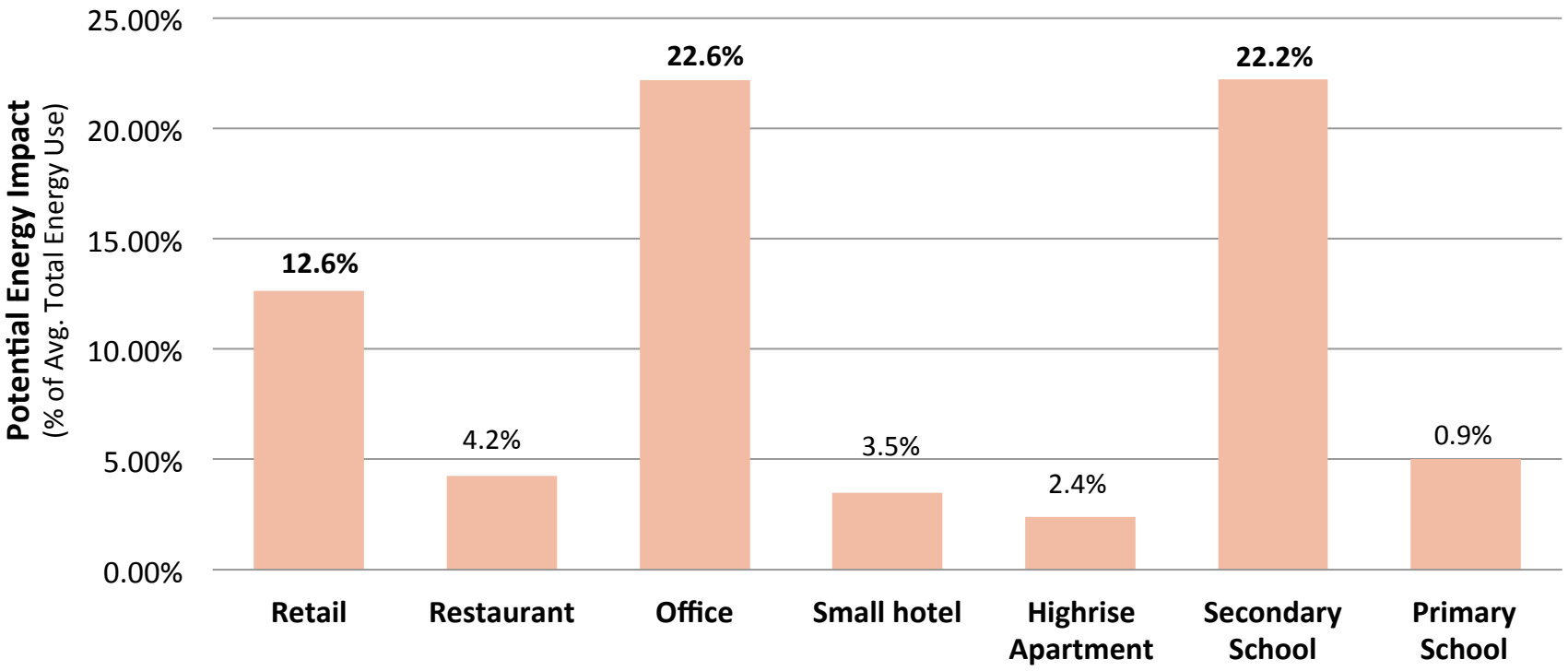
http://www.seealliance.org/

Example 2 | **Rhode Island**

- Providing field training to field professionals & code officials (Residential & Commercial – emphasis on residential)
- Building Science Seminars
- Circuit Rider Technical Assistance
  - Plan Review
  - Project team meetings
  - Assistance by phone

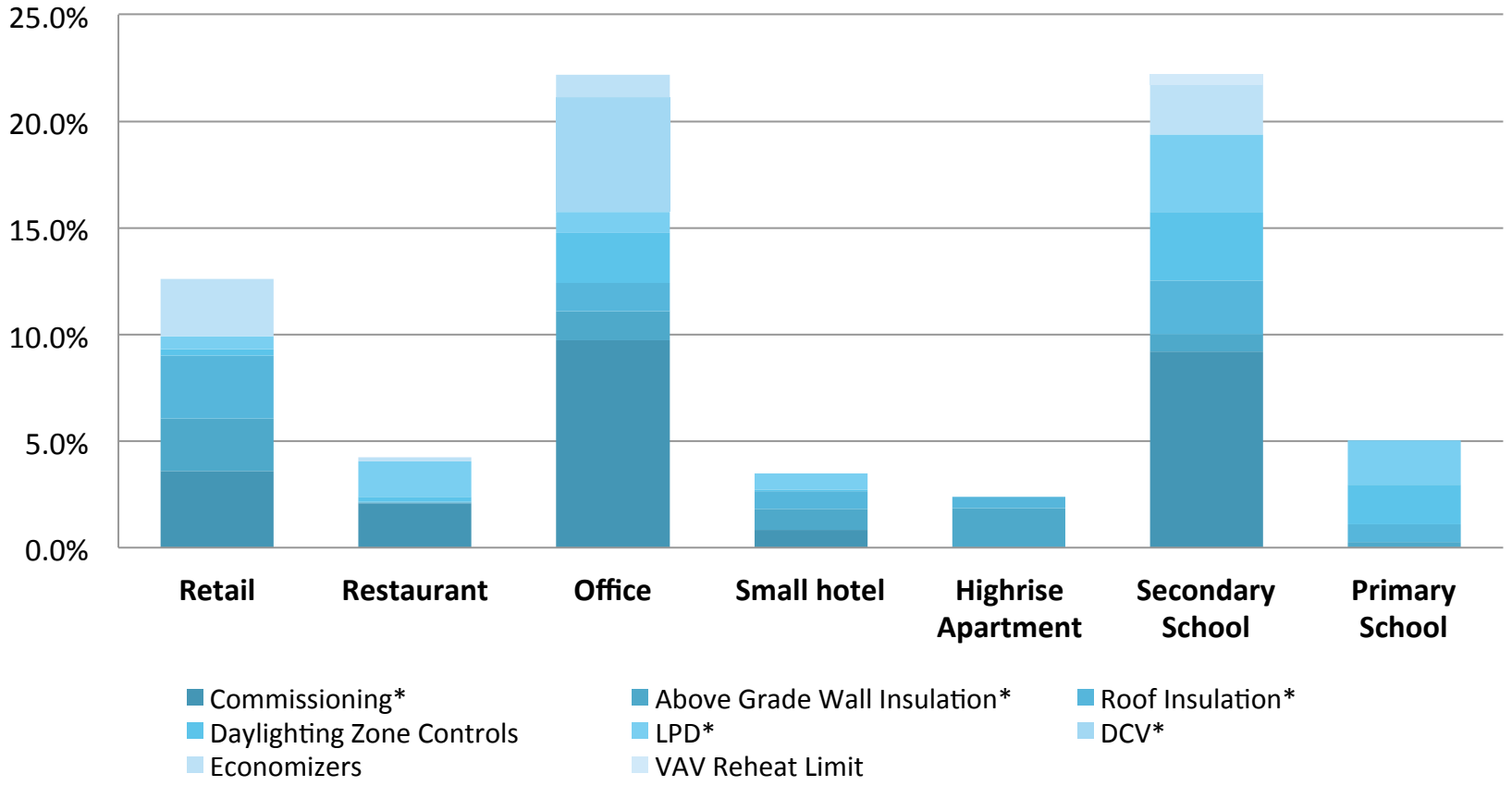


Energy Impact by Building Use



Energy Impact by Measure & Building

Percentage of energy use normalized (impact/SF)



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**Refining analysis to include duct leakage & damper leakage

Minnesota Interviews

Professional Type	Metro Area	Greater MN	Total	Knowledge of New Code
Code Officials	3	4	**7**	Moderate/Low
Architects	4	1	**5**	
Engineers	3	0	**3**	
Builders	1	1	**2**	

Program Anatomy:
Pilot Approach, Process, & Tools

PILOT
2015-2017

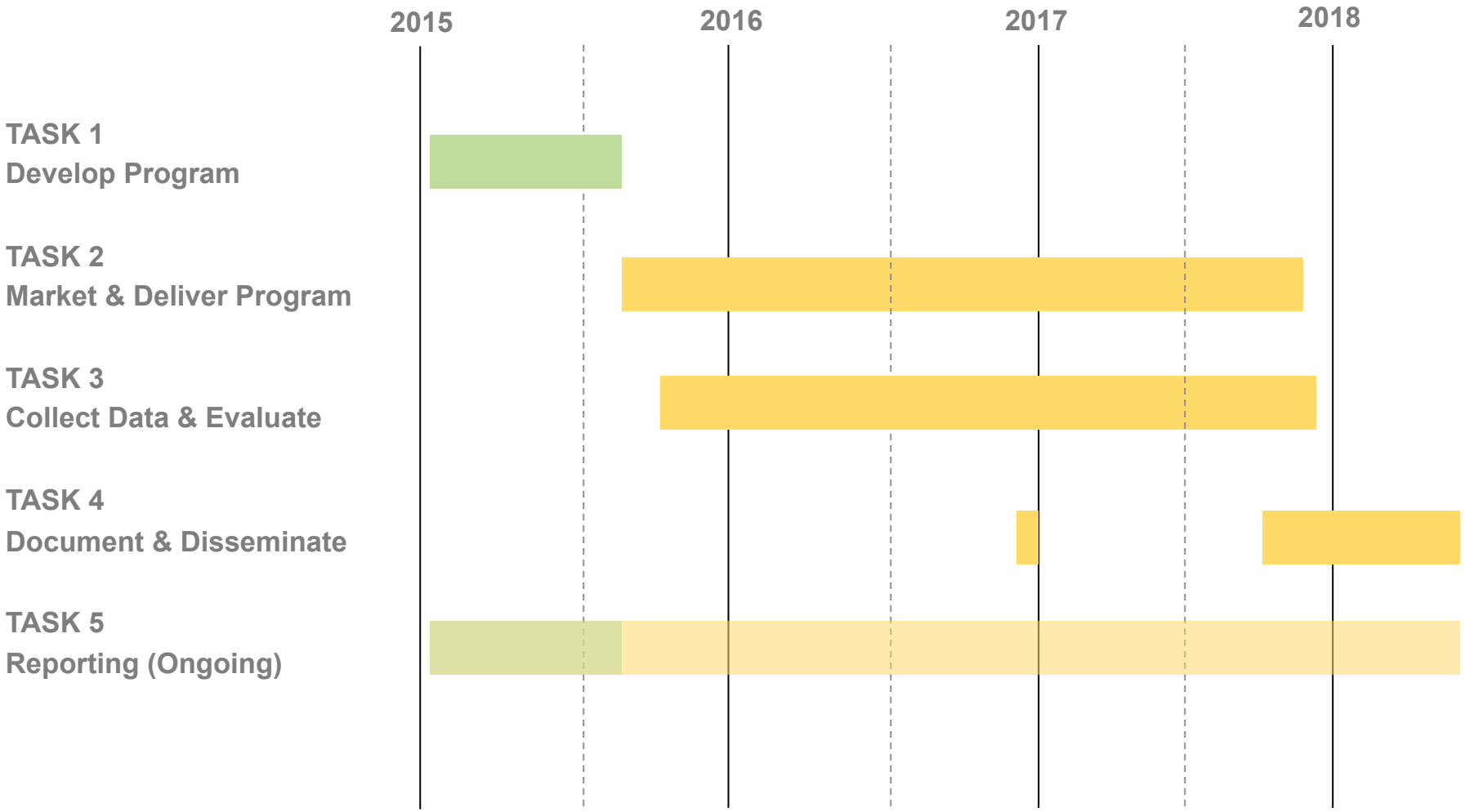
The Commercial Energy Codes Support Program

PRIMARY OBJECTIVE | Establish a successful precedent for CIP funded commercial energy code compliance programs in Minnesota

ACTIVITIES |

- Develop & deliver 2 **targeted**, parallel pilot approaches
- Evaluate the energy savings & cost-effectiveness of these approaches; post-participant surveys
- Document lessons learned to guide potential program design
- Evaluate the potential for a 2nd Tier whole-building path

Project Timeline



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*Anticipated research end dates

Approaches & Scope

- Test the energy savings impacts of 2 approaches under 1 program umbrella

Commercial Energy Codes Support Pilot	
Pilot Approach 1	**Pilot Approach 2**
Small/Prescriptive Building Projects	Large/Complex building projects
Project Teams: Architects, Engineers, & Contractors	Cities: Building Officials & Planning Departments
Participate (test): ~30 Observe (control): ~30	Participate (test): 10-15 Observe (control): na

What Guided Program Development?

INFORMED APPROACH 1 & 2

- Identify code measure issues
- Targeting building use types & sizes
- Identifying the energy impact intersection
- Interest from the field/industry
- Selecting a *Tier 2* energy standard
- Project volumes in Partner cities & Minnesota

Collecting Code Issues

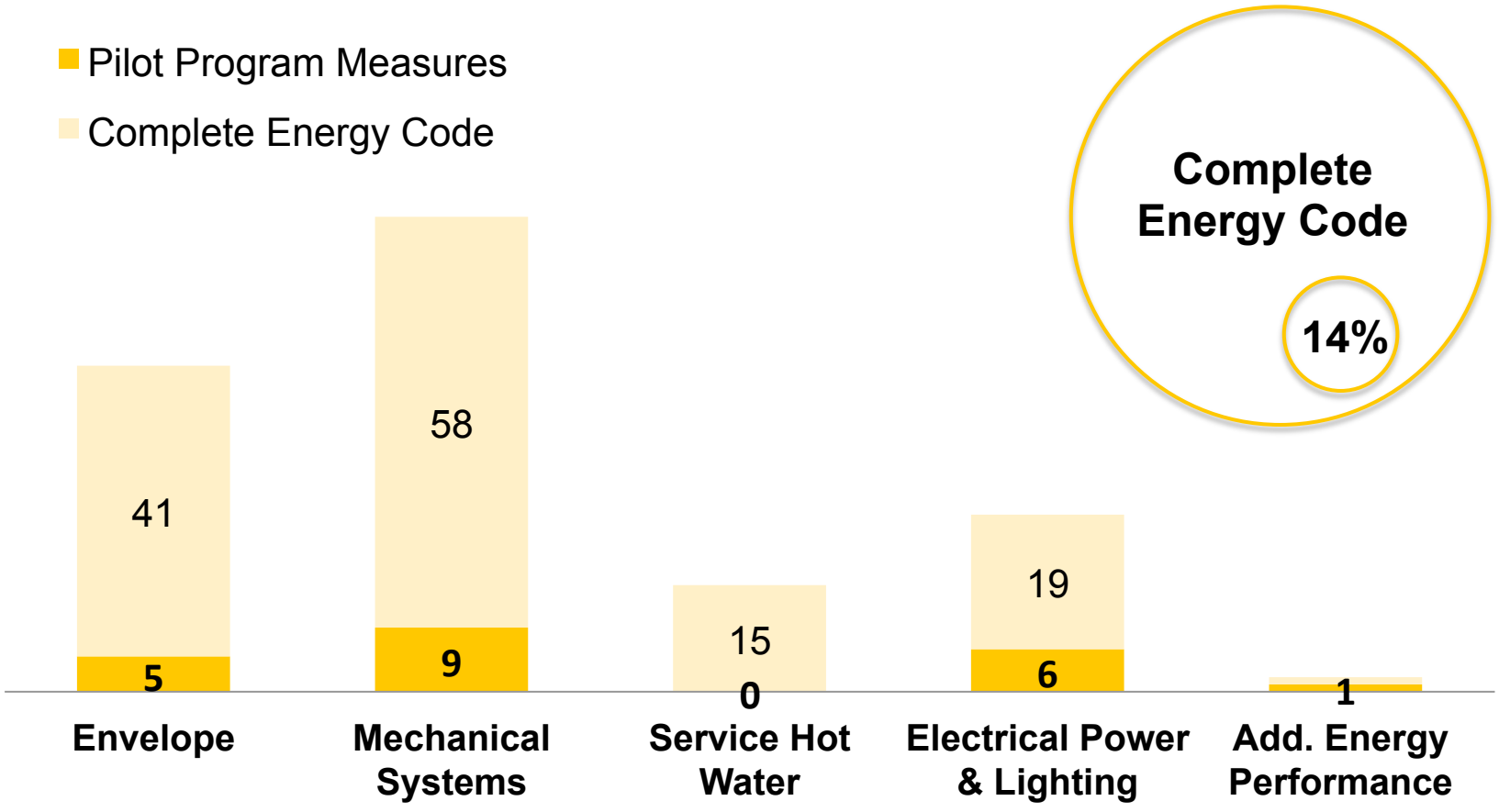
NEW CODE:

- Interviewed 13 out-of-state code officials (IECC 2012)
- New and updated requirements

EXISTING CODE:

- Analyzing Dept. of Labor & Industry data (2013 study)
- Conversations with code officials:
  - Metro-area
  - Greater-Minnesota
- Interviews with Minnesota architects, engineers & builders

Scope of Program Measures



**Varies depending on counting method. This looked at ASHREA & IECC.*

Program Design

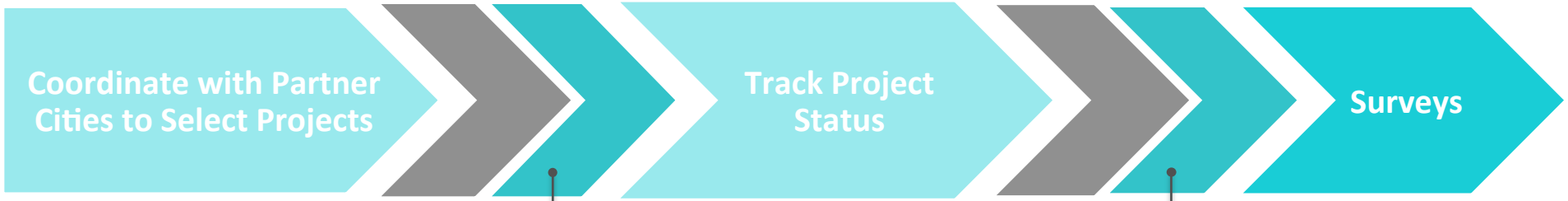
City Plan Reviews & Building Inspections

Approach 1 | **Small / Prescriptive Projects**

DESIGN TEAM SUPPORT

Approach 2 | **Large / Complex Projects**

CODE STAFF SUPPORT



Program Incentive

City Plan Reviews & Building Inspections

Approach 1 | **Small / Prescriptive Projects**

DESIGN TEAM SUPPORT

	Project Client	Design Team**
Tier 1 | **Meet all Program Requirements***	**$500**	**$275**
Tier 2 | **Meet Program Requirements** *and* **Meet ASHRAE Advanced Energy Design Guidelines***	**$250**	**$200**

Focused Tools

Example 1| Making Early Design Decisions

- Scenario: Restaurant renovation
- Tools help guide decisions around mechanical & lighting system controls that will be needed so that chiller sizing & cost can be estimated most accurately early in design

BUILDING MECHANICAL SYSTEM REQUIREMENTS	**Duct Sealing & Testing**	**IECC & ASHRAE:** Sealing to class A applies to all ducts and plenums with a pressure class rating. Leakage testing is required in systems with static pressures above 3 inches water column (750 Pa).	**Multifamily**	Sealing applies to all buildings Testing seldom applies--only if high pressure ductwork.
			Offices	
			Restaurants	
			Retail Spaces	
	Supply-Air Temperature Reset for Multizone Systems*	**IECC:** This applies to multizone HVAC systems EXCEPT zones with <300 cfm air flow. Is not required if reheat is via site recovered heat or site solar. **ASHRAE:** This applies to multizone HVAC systems EXCEPT when total system fan nameplate hp ≤ 5 hp (including exhaust fans). Is not required if reheat is via site recovered heat or site solar.	**Multifamily**	Seldom applies--only if multizone hvac system with reheat.
			Offices	Applies to multizone systems with reheat.
			Restaurants	Seldom applies--only if multizone hvac system with reheat.
			Retail Spaces	

Focused Tools

Example 2 | Documentation Best Practices

- Scenario: Office new construction
- Tools layout CD & spec documentation best practices making plan reviews, simplifying plan review revisions & inspections

	MEASURE	REQUIRED INFORMATION (when applicable)	DOCUMENTATION BEST PRACTICE	PROJECT TEAM CHECK-OFF	CEE REVIEWER CHECK-OFF
BUILDING ENVELOPE	Roof Insulation R-Value	1. The R-value of all insulating roof assembly components (at least the min. & max.).	1. In addition to insulation thickness, clearly note the minimum R value on the drawings. Also clearly note the minimum thickness for tapered insulation.		
	Above Grade Wall Insulation	1. Indicate the R-value for all wall/wall assembly components for which any part of the wall is above grade.	1. Include the R-vaklue of the wall assembly or assembly component in the an Assembly Schedule.		
	Slab Edge Insulation	1. Indicate the slab material, thickness, and total R-value of the slab *OR* the depth below grade at the top of the slab.	1. Include this information on the architectural drawings.		
	Window U-Factor	1. All window or window assembly and door or door assembly U-factors.	1. All window or window assembly and door or door assembly U-factors.		

Recruitment to Date

	Participating Projects	Control (Observed)
Small Building Projects (Approach 1)	4 (1/month avg.)	2 (1/2 month avg.)
	Mostly restaurant & retail; has been some demand for assembly building types	
Large Building Projects (Approach 2)	2	na
	Partnerships with cities help plan for future projects; 3-4 more in the pipeline currently	

Evaluation:
Benefits, Evaluation Questions, & Future Impact

What Data Is Being Collected?

- Project Team Discussions & Observations
- Preliminary Plan Review
- Permit (final) Plan Review
- On-site Verification
- Post-Participation Surveys (cities & project teams)

Benefits: Small Buildings Approach 1

Design/Project Team Participants *(primary audience)*

- Fewer requirements that require design modification post city plan-review
- Reduced need for change orders after CD completion
- A better performing building for client/owner
- CONTINUE?? (Megan)

Benefits to Cities

- Cleaner review process for City plan reviewers
- Better match between CDs & built conditions to make inspections easier

Benefits: Large Buildings Approach 2

Benefits to Cities *(primary audience)*

- Improve systematic review documentation to help increase ease of inspections
- Provide technical support & share best practices across cities

Design/Project Team Participants

- Flag requirements that are not yet familiar
- Provide pre-plan review to reduce post-review revisions & labor costs
- Share documentation best practices that ease translation to on-site construction

Energy Impact Analysis: Pilot

1. Approach 1: Small Buildings of Specific Types
   - Primary – Participants Vs Control
     - Plan documentation
     - On-site verification
     - Extra info for energy savings simulations (e.g. efficiency level, quantity)
   - Secondary – Changes in Design in Response to Program
2. Approach 2: Large/Complex Buildings
   - Primary – Deficiencies at Plan Review
   - Secondary – Field verification

Energy Impact: Full Program Considerations

- Determining Baseline for Comparison
  - Fixed or Variable
  - Level of Rigor
- Program Impact
  - When small sample
  - Field verification
    - Sampling Rate vs design documentation
- Free Rider/Free Driver Impacts

Evaluation of Program Design

1. Major Factors of Uptake & Conversion
   - Types of communication?
   - Project type, size, or team?
   - Changes over time as new code is more familiar?
2. Impact of Tools & Support
   - Which impacted energy savings the most?
   - What phases made the most impact?
3. Value of Services Provided
   - Appropriateness of incentive quantity & recipients
   - Likeliness to participate again
   - Value to the cities / code professionals

Future Impact Opportunities

Utilities

- What parts of the pilot interest you most?
- How could these findings inform existing programs?
- Are there other questions that should be considered?
- Interest in creative program funding opportunities?

Cities

- REVISE (Megan?)

THANK *you!*

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