



STANDARD

ANSI/ASHRAE/IES Standard 90.1-2013
 (Supersedes ANSI/ASHRAE/IES Standard 90.1-2010)
 Includes ANSI/ASHRAE/IES Addenda listed in Appendix F

Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P Edition)

See Appendix F for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the IES Board of Directors, and the American National Standards Institute.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely documented, consensus action on requests for change to any part of the standard. The change addendum forms, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site (www.ashrae.org) or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE Web site (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org, Fax: 404-321-5478, Telephone: 404-636-8400 (toll-free), or toll-free 1-800-527-4753 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

© 2013 ASHRAE ISBN 1041-2336

Illinois Energy Code Compliance Implementation Plan

SAG MT Savings Working Group
 July 22, 2020





Agenda

- Codes as MT background
- Barriers and opportunities identified in IL study
- Implementation plan period activities
- Savings potential + persisting savings
- Evaluation

SAG Involvement

- *The allocation of attributable Net Program Savings between the participating utilities will need to be determined by the utilities and IL SAG*
- *The method of evaluation, measurement and verification will ultimately be determined by the evaluators and IL SAG*
- *Identify additional questions that need to be answered after this presentation*

Opportunities for Claimed Savings

Energy Code Compliance



Source: *Attributing Building Energy Code Savings to Energy Efficiency Programs (2013)*, Institute for Market Transformation, Institute for Electric Innovation, Northeast Energy Efficiency Partnerships

Benefits

Why Utilities are Interested in Energy Codes

- **Short term**
 - Portfolio savings
 - Less low-hanging fruit
- **Long term**
 - Ever-accruing demand savings
 - Less stress on the grid
 - Better buildings
 - Opportunity to engage customers in a new way

Market Transformation

IL Energy Code Compliance

- Proposed code compliance effort would be the first MT demonstration project.
- As MT project it will show:
 - Increased compliance rates can result in measurable energy savings for any given set of code requirements
 - MT often uses “adoption into code” as final market penetration goal, thus **code compliance is important to realize true Market Transformation potential**

General Reminders

Energy Code Compliance

- 100% compliance is rare
- Compliance rates vary widely per state, jurisdiction and region
- Reasons for noncompliance vary per locale
- Targeted assistance from a trusted source and regular stakeholder engagement has achieved good improvement results (MEEA, KY) over just training programs

Energy Codes Utility Programs

Other States and Utilities

Rhode Island and Massachusetts

- National Grid

Arizona

- Salt River Project

Iowa

- Cedar Falls Utility

California

- Pacific Gas and Electric Company
- San Diego Gas and Electric
- Southern California Edison
- Southern California Gas

What and Why

Understanding Energy Code Compliance

✓	What		Why	Residential Compliance Field Study
✓	What		Why	Commercial Compliance Field Study
	What	✓	Why	Illinois Energy Codes Compliance Collaborative

IL Code Compliance Studies

Residential 2018-2019

- 2015 IECC
- Studied 8 key items
- Analysis by PNNL

Summary of Residential Trends

- Blower door rates are compliant with 2015 and 2018 IECC – but are all builders testing?
- Lighting compliance is fairly good
- Ceiling, frame wall cavity insulation R-value high noncompliance
- Quality of insulation installation can improve
- Performance path utilized more than anticipated

Summary of Residential Trends

- U-factor and SHGC is generally compliant
- Duct systems are leaky
- Heated basements are typically not insulated properly
- Some jurisdictions not enforcing the current state energy code

Potential Residential Savings

PNNL Measure-Level Analysis

Rank by Potential Energy Savings by Measure (1= Most Potential)

Rank (MMBTU)	CZ 4 & CZ5
1	Exterior Wall Insulation*
2	Duct Leakage**
3	Ceiling Insulation*
4	Heated Basement Insulation*
5	Air Sealing
6	High Efficacy Lighting

*Includes R-Values and quality of insulation installation

** Duct leakage in unconditioned space

IL Code Compliance Studies

Commercial 2018-2019

- 2015 IECC
- Studied 22 key items
- Analysis by Cadmus and Madison Engineering

Commercial Study

Opportunities for improvement

- **Commercial Areas of Improvement: both in plan review and construction review**
- Daylighting and interior lighting controls
- Exterior lighting
- Various HVAC controls and functional requirements
- Envelope insulation

Code Compliance Studies

Reasons for Noncompliance

Barriers to energy code compliance include:

- Lack of education and awareness
- Lack of enforcement
- Resource constraints

(Energy Codes are not a priority or do not need to be enforced)

Gross Technical Potential

Code Compliance

Residential 1st Year Savings		
	kWh	Therms
Total Impact	5,487,539	2,364,759

Commercial 1 st Year Savings		
	kWh	Therms
Total Impact	7,894,135	107,735

Implementation Plan Activities

Program Framework

Energy Code Compliance

1. Residential and Commercial Field Study
 - Basis for measuring improvement
 - Identifies specific compliance improvement opportunities
2. Integrated Compliance Support Program
 - Develop a suite of programs targeted at identified compliance improvement opportunities
3. Evaluation – To Be Determined
 - Delphi panel*
 - Field Study can be conducted at pre-determined cycle (e.g., every six years)*
 - Utilize Collaborative for program feedback*

**Option for evaluation*

Basic Elements

- Direct technical support
- Target training and education
- The Energy Codes Compliance Collaborative

Program Elements

Commercial & Residential

- Collaborative: Stakeholder engagement, program dissemination and feedback
- Circuit Rider: Building department visits, participation in industry groups, phone and email support
- Training: Classroom, in-field, webinar
- Resources: Website, checklists, field guides, FAQs, pocket guides, short videos, code books
- Jurisdiction Assistance: Plan review, software training, supporting use of third-party specialists in code compliance

Implementation Plan

Target Market

- **Target Market 1 (TM1):** Design and construction industry (residential and commercial): Builders, subcontractors, material supply houses, site superintendents, energy modelers, HERS raters, building scientists, architects, engineers and designers that design and build residential and commercial buildings.
- Homebuilders Associations, ASHRAE, the ICC, AIA and the lighting and mechanical subcontractors associations

Implementation Plan

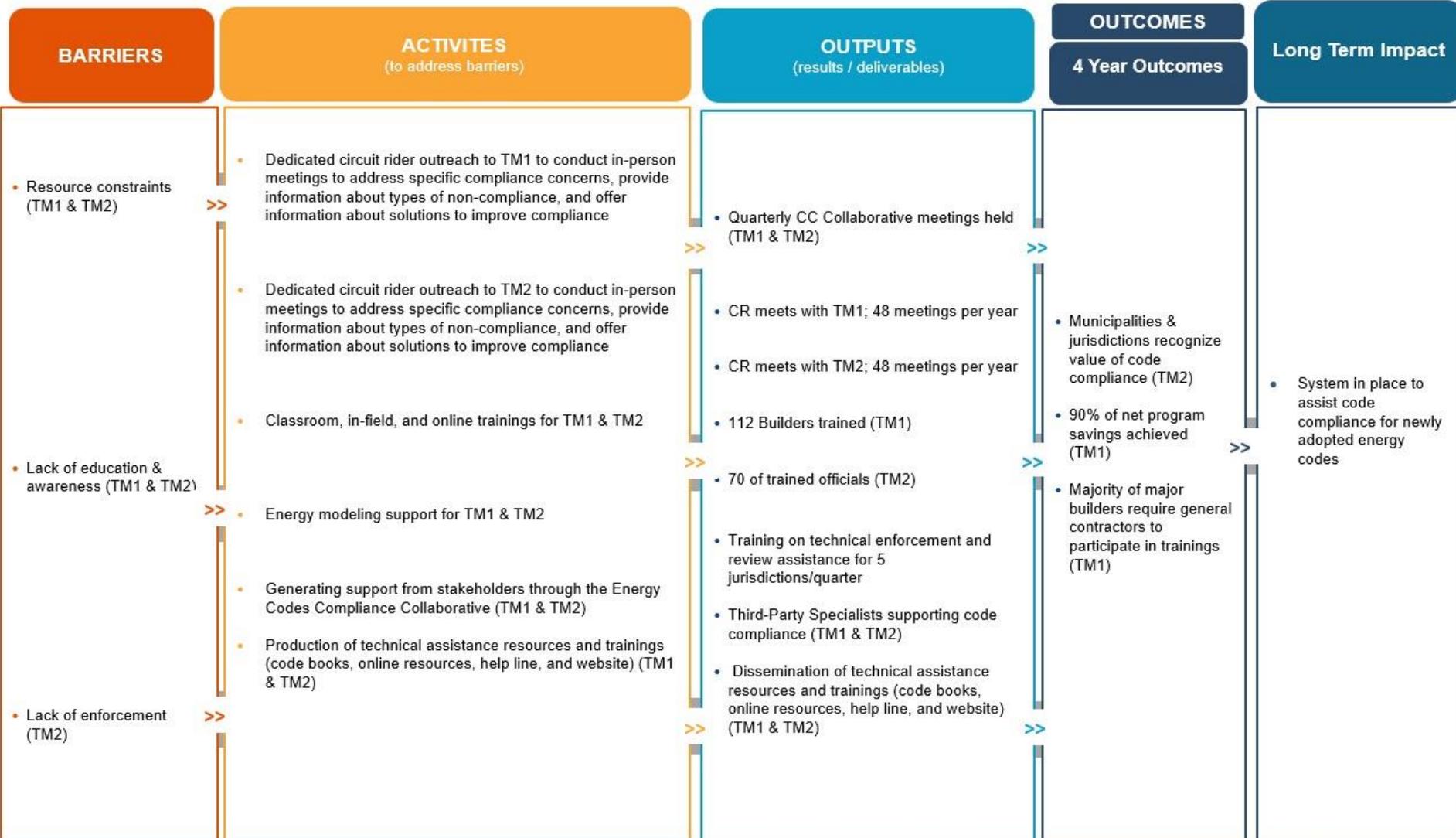
Target Market

- **Target Market 2 (TM2):** Enforcement industry (residential and commercial): Local building departments, code officials and jurisdictional employees that review, permit and inspect energy code requirements.
- Local and state chapters of the International Code Council (ICC), ASHRAE, Illinois Council of Mayors, Metropolitan Mayors Caucus, Illinois Capital Development Board and the numerous state and local code official associations in Illinois.

Logic Model Energy Code Compliance

TM1 = Building Industry; TM2 = Enforcement Industry

Logic Model – Code Compliance



Implementation Plan

Budget

Illinois Statewide Code Compliance Program Budget Estimate

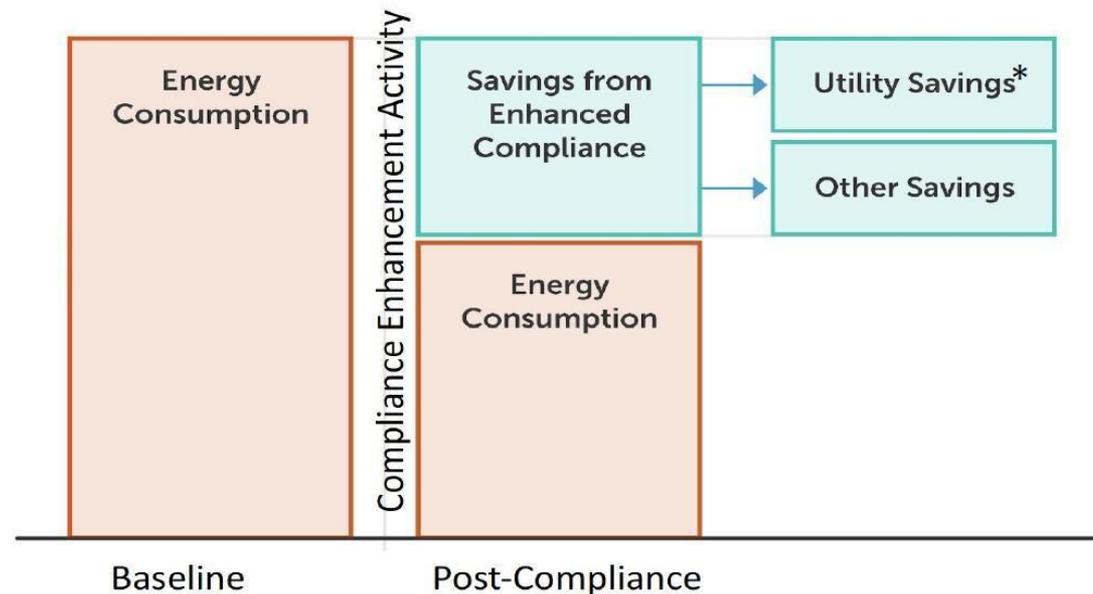
	12 months (Jan-Dec 2021)	18 months (Jul 2020-Dec 2021)	48 months (Jan 2021-Dec 2024)
PROJECT TOTAL	\$ 417,755.40	\$ 626,633.10	\$ 1,671,021.60

Estimated Savings & Attribution

Energy Savings Attribution

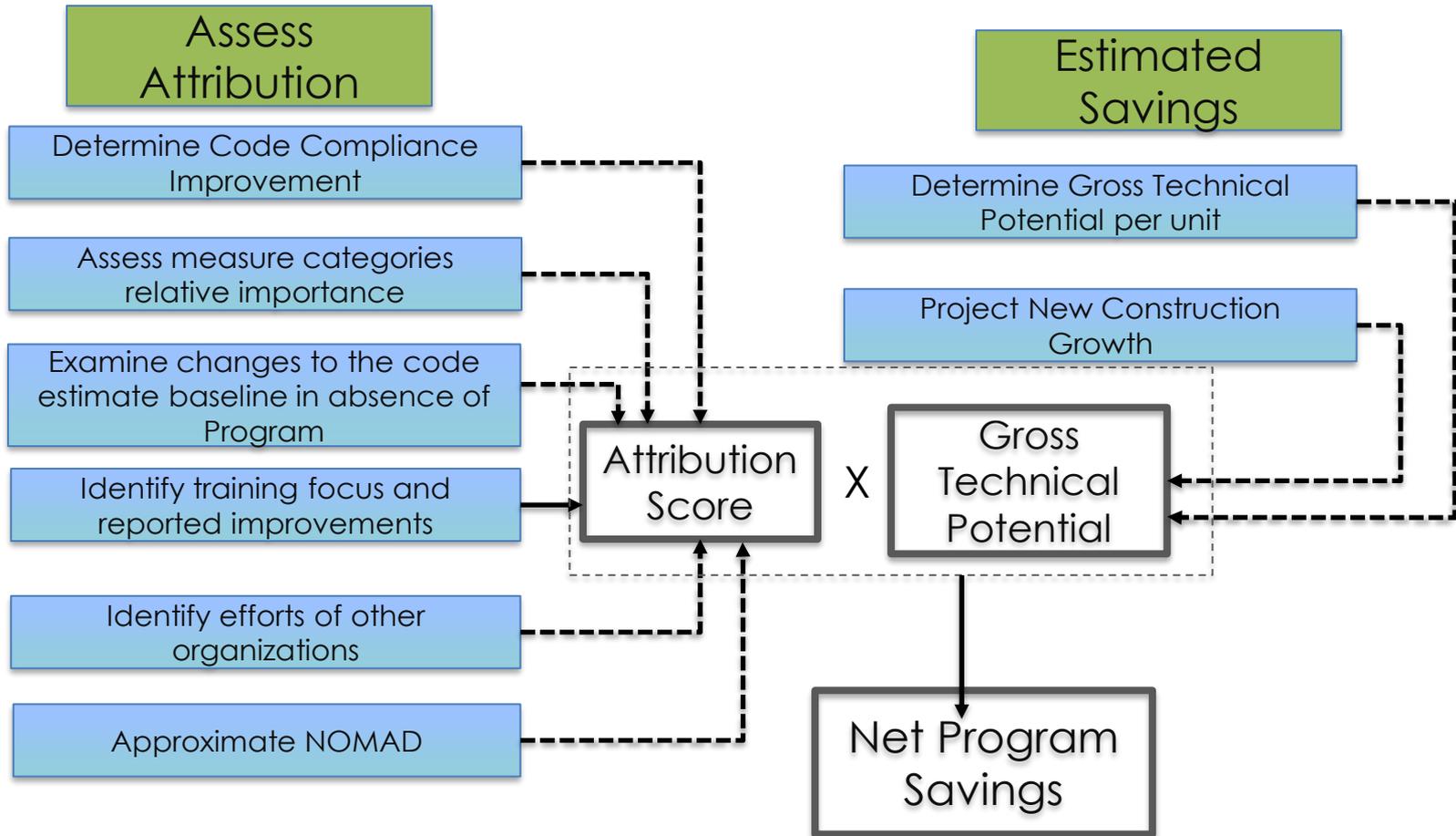
Code Compliance

Energy Savings from Enhanced Compliance



*Note intersection with Attachment A of TRM Volume 4 Section 5.4 on NTG for code compliance

Attribution Study Approach 1



Rhode Island CCEI Attribution and Saving Study

Gross Technical Potential

Code Compliance

Residential 1st Year Savings		
	kWh	Therms
Total Impact	5,487,539	2,364,759

Commercial 1 st Year Savings		
	kWh	Therms
Total Impact	7,894,135	107,735

Estimated Achievable Savings

Methodology

- Internal MEEA review of measures
- Determined maximum percentage of compliance for each measure
- Reviewed each other's recommendations and reassessed based on market trends, Collaborative input, ease of compliance with measure
- Used conservative estimates
- Annual 1% declined savings credit for NOMAD*

Illinois Draft MT Savings in the Technical Reference Manual (2020 IL TRM v8.0 Vol. 4_June 20, 2019_DRAFT):

https://s3.amazonaws.com/ilsag/MT_Savings_Paper_Final_08-23-2019.pdf



Estimated Attributable Savings

Methodology

- Determined 90% could be attributable to program
- Unlikely to be 100%
- Circuit rider and stakeholder strategy is much more effective than training programs
- Have since learned that 80% is recommended in TRM when a decision can not be made

Estimated First Year Savings

Residential Code Compliance

Units	GTP	2021	2022	2023	2024	Net Achievable
therms	2,364,458.04	219,329.79	364,485.81	360,681.52	263,332.98	1,207,830.10
kWh	5,487,539.40	566,313.11	805,082.10	815,116.77	581,001.12	2,767,513.10

Table 4. Yearly & Total Incremental Net Program Achievable Savings - Residential Code Compliance January 2021 through end of 2024

Units	GTP	2021	2022	2023	2024	Net Program
therms	2,364,458.04	197,396.81	328,037.23	324,613.37	236,999.68	1,087,047.09
kWh	5,487,539.40	509,681.80	724,573.89	733,605.10	522,901.01	2,490,761.79

Table 5. Yearly & Total Net Attributable Program Savings - Residential Code Compliance January 2021 through end of 2024

Estimated First Year Savings

Commercial Code Compliance

Units	GTP	2021	2022	2023	2024	Net Achievable
therms	107,734.91	10,444.85	13,138.87	12,496.62	10,564.86	46,645.20
kWh	7,894,134.90	806,667.75	1,152,613.39	1,063,159.44	859,383.99	3,881,824.57

Table 6. Yearly & Total Net Achievable Savings - Commercial Code Compliance January 2021 to 2025

Units	GTP	2021	2022	2023	2024	Net Program
therms	107,734.91	9,400.36	11,824.99	11,246.96	9,508.37	41,980.68
kWh	7,894,134.90	726,000.98	1,037,352.05	956,843.50	773,445.59	3,493,642.11

Table 7. Yearly & Total Net Attributable Program Savings - Commercial Code Compliance January 2021 through end of 2024

Estimated Cumulative Savings

2021-2024 Through Measure Life

	Electricity (kWh)		Gas (therms)	
	Residential	Commercial	Residential	Commercial
Total Cumulative Persistent 2021-2024 for Measure Life	47,966,707	39,376,257	30,460,426	84,208
90% Attribution	43,170,037	35,438,631	27,414,384	75,788
Total Net Program Estimated Savings	78,608,668 kWh		27,490,172 therms	

Table 8. Total Estimated Net Program Savings - Cumulative Persistent Through Lifetime of Measures

Evaluation Potential Approach*

Steps	Residential	Commercial
Determine actual code compliance improvements	Baseline study approximately every 6 years; use Delphi panel every 3 years	Baseline study approximately every 6 years; use Delphi panel every 3 years
Assess measure categories' relative importance and assign weight	<ul style="list-style-type: none"> • REM/Rate Model • US DOE Field Studies • Illinois 2018-2019 Field Studies 	<ul style="list-style-type: none"> • PNNL Checklist • US DOE Field Studies • Illinois 2018-2019 Field Studies
Examine changes to the code to estimate baseline compliance in the absence of the program	Depends upon energy code. Illinois update occurs every 3 years; next goes into effect in early 2022 but official changes won't be available until state adoption process is finished (2021)	Depends upon energy code. Illinois update occurs every 3 years; next goes into effect in early 2022 but official changes won't be available until state adoption process is finished (2021)
Identify Codes Compliance program impacts, such as training focus and areas where trainees reported improvements	<ul style="list-style-type: none"> • Hours of training provided • Surveys from participants • Interview of Code officials • Online trainings available 	<ul style="list-style-type: none"> • Hours of training provided • Surveys from participants • Interview of Code officials • Online trainings available
Identify efforts of other organizations that may have contributed to improved compliance	<ul style="list-style-type: none"> • Existing resources by ICC, SEDAC and IL EPA • Only needed if existing efforts changed since field studies 	<ul style="list-style-type: none"> • Existing resources by ICC, ASHRAE, SEDAC and IL EPA • Only needed if existing efforts changed since field studies
Approximate NOMAD	Depends upon energy code. Illinois update occurs every 3 years; next goes into effect in early 2022 but official changes won't be available until state adoption process is finished (2021)	Depends upon energy code. Illinois update occurs every 3 years; next goes into effect in early 2022 but official changes won't be available until state adoption process is finished (2021)

*Method of evaluation is ultimately determined by the evaluators



Cost-Effectiveness Considerations

Code Compliance

- Incremental costs should not apply to codes. Building to code should be included in the cost of any project and it should not incur any additional costs that are passed onto the occupant; theoretically every builder and designer is working from the same set of minimum requirements.
- Measure life from TRM Volume 8*

*A few measures did not exist yet in TRM; those assumptions are in Appendix



Next Steps

SAG Involvement

- *The allocation of attributable Net Program Savings between the participating utilities will need to be determined by the utilities and the IL SAG.*
- *The method of evaluation, measurement, and verification will ultimately be determined by the evaluators and the IL SAG.*
- *Identify additional questions that need to be answered after this presentation*

Questions?

Alison Lindburg
alindburg@mwalliance.org

Chris Burgess
cburgess@mwalliance.org

Midwest Energy Efficiency Alliance

