Market Transformation - Proposed options and evaluation considerations for Stretch ENERGY Codes

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Table of Contents

[Market Transformation - Proposed options and evaluation considerations for Stretch ENERGY Codes 1](#_Toc83913437)

[Introduction 4](#_Toc83913438)

[Background 4](#_Toc83913439)

[Current Illinois Code 5](#_Toc83913440)

[Illinois Energy Code Compliance 5](#_Toc83913441)

[Stretch Codes 6](#_Toc83913442)

[The Illinois Climate and Equitable Jobs Act (CEJA) 6](#_Toc83913443)

[Other Policy Considerations On Stretch codes 8](#_Toc83913444)

[Jurisdictions Adopt a State-created Stretch Code 8](#_Toc83913445)

[Jurisdictions Creating Their Own Commercial Stretch Codes 8](#_Toc83913446)

[Market Challenges in Building Energy Codes Advancement and Compliance 9](#_Toc83913447)

[Market Transformation Overview 10](#_Toc83913448)

[Review of Market Transformation 10](#_Toc83913449)

[Estimating Savings from a Market Transformation Initiative 11](#_Toc83913450)

[Energy Codes as Market Transformation 12](#_Toc83913453)

[Potential Program Elements 13](#_Toc83913454)

[Utility Role in Energy Codes 13](#_Toc83913455)

[Utility Programs for Code Advancement 14](#_Toc83913456)

[Suggested Utility Initiated Research 15](#_Toc83913457)

[Advocacy for Advancing Policy 17](#_Toc83913458)

[The Creation of Utility Programs to Support Implementation 17](#_Toc83913459)

[Utility Programs for Stretch Code Support 18](#_Toc83913460)

[Target Market 19](#_Toc83913461)

[Logic Model 20](#_Toc83913462)

[Key Elements of Market Transformation Evaluation 20](#_Toc83913463)

[Timing of claimed savings 21](#_Toc83913464)

[The Delphi Panel Process 24](#_Toc83913465)

[Evaluation of Policy Advancement 25](#_Toc83913466)

[Evaluation Overview 25](#_Toc83913467)

[Gross Technical Potential 27](#_Toc83913468)

[Gross Energy Savings 28](#_Toc83913469)

[Net Savings 30](#_Toc83913470)

[Net Program Savings 31](#_Toc83913471)

[Evaluation of Stretch Code Support Programs 33](#_Toc83913472)

[Evaluation Overview 33](#_Toc83913473)

[Compliance Baseline 34](#_Toc83913474)

[Gross Technical Potential 35](#_Toc83913475)

[Net Program Savings 35](#_Toc83913476)

[Allocation of Energy Savings 36](#_Toc83913477)

[Evaluation cost 37](#_Toc83913478)

[Appendix A: Logic Model 37](#_Toc83913479)

[Appendix B: Examples of Similar Programs/Evaluations 39](#_Toc83913480)

Introduction Illinois utilities can claim energy savings for incentivizing new construction buildings to be built beyond current energy code. The claimed savings are based on the baseline of the base energy code. When the energy code is updated to a more stringent code, the base energy code changes. If a municipality mandated that buildings in their jurisdiction be built to a more stringent standard, a utility could provide program support to assist the building community or code officials to build to that stretch code; however, utilities may only be able claim energy for the elements of the building design that are *beyond* the mandated energy code.

Yet that precedent may be changing since building codes are recognized as an effective way to move the market towards more efficient buildings. Several states have energy efficiency programs that are designed to influence the building energy code and allow the utility administering the program to claim savings through market transformation initiatives. California utilities have been actively influencing codes and standards since the late 1990s. States that have more recently developed code programs include Arizona, Massachusetts, Rhode Island and Vermont.

Several Illinois utilities are considering ways that they can help advance stretch code policies and provide support programs. They have contracted with Slipstream and MEEA to explore how such programs could be developed. A key element is to work with the IL Stakeholder Advisory Group to identify the pathways towards utilities to claim savings for code advancement and support, and the evaluation methods that would be used to confirm those savings.

Background

This document proposes key elements of evaluation for market transformation of stretch code programs. The Slipstream/MEEA team presented to the IL SAG on March 17th on stretch codes, in relation to how utilities might be able to claim savings for policy advancement and policy support. The team was asked to convene with a smaller SAG working group. The smaller group met on May 7th to discuss pathways for utilities to claim savings. Out of that meeting, the MEEA/Slipstream team was tasked to collaborate with the evaluation teams (Guidehouse and Opinion Dynamics Corporation) to develop evaluation pathways for the SAG Market Transformation Working Group to consider. For this first draft of this document, we focus on evaluation pathways for stretch codes. Once we have agreement on stretch code pathways, we can apply similar approaches for building performance standards (BPS) for existing buildings.

Current Illinois Code

In Illinois, commercial and residential buildings follow the Illinois Energy Conservation Code which is based on the International Energy Conservation Coded (IECC). While the Capital Development Board is responsible for administering the code and the code update process, local jurisdictions are responsible for enforcing the code. Additionally, local governments *are allowed* to adopt stricter energy codes for *commercial* buildings. Local governments *are not allowed* to adopt stricter *residential*codes unless the codes were adopted prior to May 15, 2009 or if a municipality has a population of 1,000,000 or more (Chicago, essentially).[[1]](#footnote-2) For purposes of this document which focuses on stretch codes, we will only be focusing on the energy codes for *commercial* buildings.

The Capital Development Board is required by the Energy Efficient Building Act to review and adopt the most current IECC within one year of its publication date, which makes it one of the more aggressive energy codes in the country (depending on state amendments). The state energy code is updated every three years. The adoption process is currently underway to update the residential and commercial energy codes based on the 2021 IECC. The new energy codes will become the statewide energy code sometime in 2022.

Illinois Energy Code Compliance

Numerous compliance field studies across the U.S. have shown that full compliance with energy codes is rarely achieved. Energy code compliance baseline studies for single-family residential buildings and commercial buildings were completed in Illinois in 2019. These code compliance studies can be used to establish the baseline levels of non-compliance, can help inform program design elements, and identify missed savings. The studies can also be used to calculate the Gross Technical Potential savings for stretch code advancement and compliance support programs and their future evaluation. As will be discussed further in this document, similar statewide compliance studies should be repeated periodically to provide consistent evaluation data and information for program updates.

The 2018-2019 Illinois Energy Code Compliance Studies found that non-compliance existed in some measures with the Illinois state energy code. About one-fourth of the 40 building sites sampled did not satisfy the requirements for four specific key items. Table 1 outlines identified areas of improvement in that study.

Table 1. Identified Commercial Areas of Improvement in Plan Review and Construction Verification[[2]](#footnote-3)

|  |  |
| --- | --- |
| Category | Identified Non-Compliance |
| Daylighting and interior lighting controls | Non-compliance in interior lighting shutoff controls (13 of 40 buildings). Ten buildings did not satisfy the daylighting control requirements. |
| Exterior lighting | Almost one-fourth of the buildings did not meet the key item exterior lighting power density requirement. |
| Various HVAC controls and functional requirements | 15 buildings had HVAC controls or functionality key item requirements that were not up to code. |
| Envelope insulation | Six of the buildings did not meet the wall insulation R-value requirement and four did not meet the roof insulation R-value requirement. |

Based on non-compliance with the state code, it can be reasonably assumed that increases in energy efficiency in a stretch code in the same areas will likely also result in non-compliance, at least initially. These are areas that utilities can target for a support program. The utility can also use this information to make informed decisions about advancing energy code policies.

Stretch Codes

A stretch code, also known as a “reach code”, is a locally mandated code or alternative compliance path that defines a higher level of energy efficiency or sustainability than the adopted base code. Until recent legislation, stretch codes policies did not exist in Illinois.[[3]](#footnote-4) Municipalities have been allowed to define their own stretch energy code for their commercial buildings, but no municipalities have taken that step to date.

The Illinois Climate and Equitable Jobs Act (CEJA)

In September 2021, the Illinois Climate and Equitable Jobs Act (CEJA) was passed that directs the Illinois Capital Development Board (CDB), which manages the state building energy code adoption process, to create a residential and commercial stretch energy code that can be adopted by individual municipalities. This would enable municipalities to improve on the state building energy code. Having a state-created stretch code provides consistency amongst jurisdictions (with only two energy code options rather than an unlimited amount if each jurisdiction creates and adopts their own) and allows flexibility for jurisdictions to choose to adopt it. Once formally adopted by a municipality, the stretch code takes the place of the state energy code and establishes the minimum energy efficiency requirements for new construction, additions, and major renovations. The evaluation pathway provided in this document assumes that the stretch code as defined by CEJA will be the mechanism in Illinois to move stretch codes advancement and support programs forward. The stretch code energy efficiency targets (called a “site energy index”) are set in the CEJA legislation and update every three years, but CDB will determine the actual code requirements that meet those targets.

The language for the commercial stretch code in the CEJA bill denotes that the energy efficiency increases each three-year code cycle so that it eventually meets a site energy index no greater than 0.39 of the 2006 International Energy Conservation Code by 2031. The site energy indices for the new Illinois stretch code are outlined in Table 2. A site energy index is essentially the relationship of any energy code to the 2006 IECC, as calculated and defined by the Pacific Northwest National Laboratory (PNNL). With this system, a score of 1.0 is equal to the 2006 IECC/ASHRAE 90.1-2004, and scores that are lower than 1.0 consume less energy than the 2006 IECC/ASHRAE 90.1-2004. The residential 2021 IECC is estimated to be around 40% more efficient than the 2006 IECC, giving it a score of 0.60. According to the Pacific Northwest National Laboratory (PNNL), the current energy code in Illinois has a site energy index of 0.76 for residential and 0.66 for commercial. Using those numbers to meet the stretch code initial targets, the residential stretch code would need to improve in energy efficiency by 34.2% and the commercial stretch code by 9.1% compared to the current Illinois energy code. The bill language specifically calls out that these targets must be met by conservation measures only, and “excludes net energy credit for any on-site or off-site energy production.”

Table 2. Commercial Targets for Stretch Code in CEJA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Stretch Code Version | Implementation Date | Site Energy Index | Performance Targets | Code Created By |
| 2024 Commercial Stretch Code | December 31, 2023 | **0.60** | At least 40% more efficient than 2006 IECC | Set by CDB by July 31, 2023 | |
| 2026 Commercial Stretch Code | December 31, 2025 | **0.50** | At least 50% more efficient than 2006 IECC | Set by CDB in 2025 | |
| 2029 Commercial Stretch Code | December 31, 2028 | **0.44** | At least 56% more efficient than 2006 IECC | Set by CDB in 2028 | |
| 2032 Commercial Stretch Code | December 31, 2031 | **0.39** | At least 61% more efficient than 2006 IECC | Set by CDB in 2031 | |

While the stretch code in this scenario may be statewide, it is still up to the local jurisdiction to adopt it and then enforce its compliance. This leaves a straightforward path of action for utilities to be involved in stretch code advancement and support with a CEJA Stretch Code.

Other Policy Considerations On Stretch codes

While a CEJA Stretch Code is a likely path forward for many jurisdictions, there may be other different policy mechanisms and timelines available in Illinois. These may affect the evaluation and attribution process in addition to the program support elements themselves.

Jurisdictions Adopt a State-created Stretch Code

Having a state-created stretch code provides consistency amongst jurisdictions (e.g., only two or three energy code options rather than an unlimited amount if each jurisdiction creates and adopts their own) and allows flexibility for jurisdictions to choose or not choose to adopt it. A state-created stretch code also helps with predicting potential energy savings and creating technical support programs. One example of this would be a jurisdiction adopting the CEJA Stretch Code. Another example would be if the state created a different stretch code through its typical code adoption cycle[[4]](#footnote-5) as an optional Appendix chapter. This would mean a jurisdiction would still have the state energy code but would have adopted an optional Appendix chapter to supplement it. This could include, for example, the 2021 IECC Net Zero Appendix CE. Because of the CEJA legislation, this option is not as likely to happen, but could be an option if the state wanted to provide a state-created beyond-code option before the CEJA Stretch Code creation deadline (December 31, 2023).

Jurisdictions Creating Their Own Commercial Stretch Codes[[5]](#footnote-6)

Currently a jurisdiction can choose to create its own commercial stretch code that is more stringent than the state base energy code. In this case, if the utility has been involved, that jurisdiction may have to be evaluated for Advancement on a case-by-case basis. The language in CEJA may limit jurisdictions in being able to do this other than adopting the state-developed commercial stretch code[[6]](#footnote-7). However, depending on local laws, a jurisdiction may be able to change energy requirements through zoning laws, sustainability funding requirements, or Planned Unit Development criteria.

Market Challenges in Building Energy Codes Advancement and Compliance

With the backdrop of Illinois policy described above, we summarize a few key barriers to both advancing stretch codes as well complying effectively with stretch codes, both of which can be addressed by utilities as described further below.

**Business and contractor community tend to push back against new regulation and updates to the code.** There is a learning curve with new codes, and some within the contractor or business community will not want to add new regulations to their list of priorities. They may believe that their customers do not want to build higher performing buildings and believe these policies will lead to reduction in business.

**Municipalities have limited resources to understand and enforce more complex code.** Energy codes are enforced by code officials that are funded through municipality budgets. Staff time and resources are limited to enforce the code completely as well as learn how to enforce increasingly more complex codes.

**Design and construction contractors are not aware of updated or more complex codes**. As new energy codes are adopted, building professionals need to take time to understand the implications on their current building practice.

**Enforcement professionals may not prioritize energy code compliance.** Some code officials may not consider energy codes to be the same priority as other life safety codes (such as fire codes).

**Higher upfront costs for some energy efficiency investments.** With some higher efficiency building technologies or methods, there can be a higher incremental cost as compared to less efficient alternatives.

Market Transformation Overview

Review of Market Transformation

As defined by the Market Transformation (MT) Savings Framework of the Attachment C in the IL TRM, MT is defined as “Market Transformation is the strategic process of intervening in a market to create lasting change that results in the accelerated adoption of energy efficient products, services and practices.” While there may be elements of a MT initiative that reflect elements of a standard Resource Acquisition Program (RAP), there are several key differences that delineate the two. Table 3 follows the descriptions provided in Attachment C and provides a comparison between the two, especially highlighting ways that stretch code programs might have a larger market, longer timeframe, and different level of PA control as compared to RAPs. As described in Attachment C, the “much longer time frame for MT initiatives and the lesser degree of program administrator control can be difficult to reconcile with policy rules that are focused largely on the precise quantification of annual savings.” With this backdrop, the Slipstream/MEEA team presented our initial research on stretch codes to the IL SAG Market Transformation Working Group on March 17th, 2021. At that time, there was general consensus that we should develop options for stretch codes to be considered a Market Transformation initiative. Subsequent meetings have further refined this expectation.

Table 3: Stretch code policies and market transformation characteristics

|  | Resource Acquisition Program | Market Transformation |
| --- | --- | --- |
| Scale | PAs service territory | Entire new construction commercial and high-rise multifamily market |
| Target | Whoever can be induced to participate | All consumers of the new construction and major renovation commercial market |
| Goal | Near-term savings | Structural changes in the market leading to long term savings |
| Scope of Effort | Results from a single program | There are multiple levels of utility engagement |
| Level of Program Administrator Control | PAs can control the pace, scale, geographic location, and can usually identify participants | PAs are only one set of actors. |
| Evaluation and Measurement | Energy use and savings, participants, free-ridership, and sometimes spillover | Interim and long-term indicators of market progress and structural changes, attribution to the program and cumulative energy impacts |
| Timeframe for planning, savings measurement, and cost-effectiveness | Typically based on annual or multi-year planning and reporting cycle savings | Typically planned and implemented over a 10-20 year timeframe |

Estimating Savings from a Market Transformation Initiative

As with any estimation of savings, evaluators need to develop a counterfactual of energy consumption if the program did not exist. In a typical energy efficiency program like a furnace replacement, for example, the baseline energy consumption is that of a low-efficiency furnace that is being replaced. The incremental savings are based on a set of assumptions of the amount of energy a higher efficiency furnace would consume. For an MT initiative, which is not tied to specific customers but rather an entire market, the counterfactual is an estimation of how the *market itself* would have moved without that MT initiative in place, known as either the Natural Market Baseline or the Naturally Occurring Market Adoption (NOMAD). Figure 1 provides a graphical overview of how market transformation is approached and measured, highlighting both the natural market baseline but also the longer time horizon we would expect from an MT initiative. Attachment C cites these as two key elements to for estimating MT savings, along with the removal of RAP operating in the same market to avoid double counting.

Figure 1: Framework for Market Transformation Savings



While MT initiatives are recognized to have longer time frames of impact and several actors playing a role in the transformation, there are generally accepted methods to estimating and attributing savings. As described in Attachment C, MT evaluation relies on Theory-Based Evaluation (TBE) which is based on a theory of how an intervention is expected to produce results. Theory-based evaluation, as described in the Attachment C, “1) attempts to understand if observed changes in the market are consistent with those that would be expected if the initiative were successful, and 2) seeks to understand an intervention’s contribution to those market changes.” The evaluation framework differs from a traditional RAP evaluation in that evaluators are quantifying market effects using information that is not always easily quantifiable and requires the use of the preponderance of evidence approach, rather than proof. For most MT initiatives, NOMAD and attribution can only be established qualitatively, even while effort to quantify impacts should be made. As stressed in Attachment C, MT interventions may have different levels of certainty compared to RAPs. For this reason, it is important to come to consensus on approach and maintain transparency around the limits of both the qualitative and quantitative aspects of this evaluation.

Energy Codes as Market Transformation

Market transformation initiatives are intended to make changes in the market over time with the ultimate goal of lasting market change. One of the long-term goals can be for a specific initiative or measure to be placed into code language or to be seen as meeting code, thus ensuring it will penetrate the entire market, ie. “lasting change.” Advancing a code change or stretch code adoption, rather than waiting for market adoption of a particular technology or product, is in itself market transformation.

Additionally, energy code compliance support programs play an essential role in stretch code advancement MT initiatives. If this stretch code or policy is not achieving 100% compliance, that lasting market change may not be as lasting or as penetrating as hoped. Thus, compliance support programs make energy code changes and their included market transformation pieces meaningful. If code compliance rates are low, there is little gained in updating the code to new efficiency levels or including more efficient technologies. But if enhanced compliance activities create an environment where compliance is high and continues to create support for MT measures included in new codes, then the drive to change code combined with compliance improvement can generate an increased amount of savings overall.

Perhaps more importantly is the infrastructure a compliance support program provides. Any MT initiative related to getting new measures adopted into new codes could have some of the same components as a code support program – a collaborative or technical advisory committee; outreach to code officials, builders, designers, and energy raters; highly developed program marketing channels; connections to manufacturers and distributors; and a mechanism for training on the selected technology - all of which are provided through a code support program. If there are MT initiatives that are moving new measures into new codes, the benefits of having an ongoing, centralized program that maintains these connections with the building industry, as opposed to starting from scratch with each initiative, is clear - both in terms of efficacy and cost.

Potential Program Elements

This section serves as the introduction to potential program elements for advancement and compliance support of stretch codes. These are a conceptual framework for programs, and details would need to be finalized. This potential program design reflects findings of Illinois compliance studies and builds off the success of other training programs.

Utility Role in Energy Codes

While utilities do not typically help enforce or develop energy codes, utilities already play a key role in implementing programs that help their customers use less energy. For example, traditional energy efficiency programs, referred to in this document as Resource Acquisition Programs (RAP), typically target a specific technology (e.g. LED lighting) or an individual building (e.g. new construction design assistance).

For energy codes, utilities can play a role in in two ways: 1) supporting the policy advancement through technical guidance and policy development, and/or 2) stretch code support through programs that provide technical assistance and incentives after an above-code option has been adopted by a jurisdiction. The current utility program structure is well suited to effectively provide research and development on stretch code impacts, training for building professionals and officials, and incentives to bring down first costs of more stringent codes.

Each role that a utility can take requires a different evaluation of impact. Stretch code policy advancement has an evaluation process that focuses on the participation of utilities in advancing the policy, while code support focuses on the technical resources and trainings that utilities can provide to increase compliance with the stretch code. We go in further detail of the level of evaluation recommended below.

Utility Programs for Code Advancement

Utilities have unique opportunities to be involved in influencing code advancement. We divide these opportunities into three parts: 1) utility-initiated research, 2) advocacy for advancing policy, and 3) the creation of utility programs to support implementation. The amount of savings attributed to the utilities would be a direct reflection of the amount of effort and influence put forth by the utilities (methods for attribution will be described in detail in the sections on Evaluation of Policy Advancements and Evaluation of Stretch Code Support Programs). Table 4 provides a summary of examples of utility influence and participation actions, with further elaboration on each below.

Table 4: Categories of Influence and Utility Participation Actions in Stretch Code Adoption

| Category of Influence | Utility Participation Action |
| --- | --- |
| Utility-Initiated Research | Funding and conducting research on market analysis, energy analysis, cost-effectiveness, and statewide impacts |
| Develop revisions to code language that can be used in stretch codes |
| Reviewing of public documentation and information |
| Advocacy for Advancing Policy | Vocally (or in chat) participating in discussion at public or decision-making meetings |
| Attending public meetings (information-gathering with little-to-no participation) |
| Writing and submitting comments |
| Creating, providing and/or presenting information to a group or key stakeholders |
| Convening stakeholder meetings to develop technical aspects/policy language |
| Submitting policy language or recommendations for consideration of adoption |
| Funding and conducting participation in public processes on behalf of the utilities |
| Giving public testimony in support/against specific policy language/idea |
| Utility program development | Promising technical support or incentives via a utility program to support policy implementation |
| Creating specific utility program to fit policy implementation needs |

Suggested Utility Initiated Research

Utilities may advance research for each stretch code measure in the form of a study report, which may contain:

* **Introduction:** Brief overview of the historical work that informed the study report.
* **Measure Description:** Details on the measure and areas it affects.
* **Market Analysis:** Includes Market Structure, Technical Feasibility, Market Availability, Current Practices, Market Impacts, Economic Assessments, Economic Impacts.
* **Energy Analysis:** Includes Assumptions, Methodology, and Per-Unit Impact.
* **Cost Effectiveness:** Includes Methodology, Energy Cost Savings, Incremental First Cost, Lifetime Incremental Operation and Maintenance Costs, and Cost Effectiveness Results
* **Statewide Impacts:** Analysis includes first-year savings for each city affected by the proposed stretch code.
* **Revisions to Code Language:** Precise language to be used in the stretch code.

The introduction would describe how utilities and other stakeholders advocate for code advancement and information on all relevant stakeholders, that were involved in the proposed new measure. The measure description would include a brief description of the proposed measure and which building types it would affect and an explanation of the proposed technology and how it saves energy. It may include a table highlighting the measure name, type of requirement, modified code sections, modified appendices, and whether compliance software will need to be modified as a result of the proposal. This section includes significant background information on the proposed update including a recap of existing technologies, relevant literature, existing applicable code measures, comparable code measures in other states, and DOE efforts/standards in this area. Also included in this section is a detailed breakdown of the changes in code language that will accompany the proposal i.e., which specific sections are impacted and the regulatory context surrounding these sections.

The market analysis may start with a market structure analysis where surveys and other market data are utilized to estimate how many units will be impacted due to the new measure. An examination of the technical feasibility, market availability, and/or current practices would include examining the ability of the markets to supply the proposed measure, potentially applicable products currently on the market, potential inspection challenges with these products, and the long-term impacts of these products on building systems, occupant health and comfort, etc. Market impacts and economic assessments would examine potential impacts on market actors such as builders, building designers, energy consultants, building owners and occupants, building inspectors, etc. Market impacts and economic assessments would also explore how the code might affect occupational health and safety as well as overall state employment. An economic impacts analysis would include a detailed study on the labor market impact of the proposal (creation/negation of jobs and businesses). Economic impacts would also look at the competitive effects of the proposal, and whether it will benefit in-state business as a whole. Investigate the impact on the budgets of state and local government entities.

The energy analysis may begin with stating energy analysis assumptions and detail the methodology, including how the savings per measure will be calculated, and what engineering method will be used e.g., prototypical building energy modeling. The per-unit energy impact analysis of a proposed stretch code may be calculated, generally using the previous minimum-compliance code as a baseline for the analysis. Results may be provided in a per-unit or per-square foot (SF) energy savings for both gas and electricity.

A cost effectiveness study may begin with the cost effectiveness methodology which describes how energy savings and measure costs will be monetized. Ideally inflation, discount rate, avoided energy cost, equipment and labor costs, operation and maintenance (O&M) costs, and water costs would all be considered. Externalities and non-energy benefits may be part of the cost effectiveness analysis methodology and a lifecycle analysis may be employed. Energy cost savings may be calculated and would consider avoided energy cost and avoided peak reduction as well as include all fuels affected and other utility costs, such as water. Incremental first cost which is the initial cost of the measure including material and labor minus the baseline cost may be calculated. Lifetime incremental O&M costs, which are the O&M costs over the lifetime of the measure, minus the baseline O&M costs, would ideally be included. The overall outcome of the cost effectiveness study would be lifecycle analysis results on a per-unit or per-SF basis.

A statewide impacts analysis would include first-year savings for each city affected by the proposed stretch code. The statewide analysis would also consider synthesis of market forecasts, per-unit cost and energy estimates, and other relevant policy changes to generate overall financial and energy impacts of the code update over the first program year. If applicable, other impacts such as water, materials, and health could be examined.

Revisions to code language would detail the precise language to be used in the stretch code. Any references used would be included in the revised code language. Any changes to compliance manuals and compliance documents would also be described.

Advocacy for Advancing Policy

Once this research is conducted, utilities may provide influence by creating, providing and/or presenting that information to a group or key stakeholders. The process by which a stretch code is adopted at a municipal level is driven by a specific municipality’s policy-making process. A utility is uniquely positioned to be involved and influence the process for stretch code adoption.

Utility representatives can attend and actively participate in public meetings where they might show verbal support or be available to answer questions. Utilities can provide a review of public documentation and information, and respond to that public documentation by writing and submitting their own comments. Utilities can play a role in convening stakeholder meetings to share the technical aspects and/or policy language developed in the study reports described above. Similarly, utilities can public testimony in support/against specific policy language/idea or submit policy language or recommendations for consideration of adoption.

Additionally, this is a market transformation program, which is by its nature intended on influencing the entire market, not just those that are interacting with the program. Many jurisdictions do not want to be the first adopters or actors of certain initiatives, and will claim that other jurisdictions adopting first influence their desire and political ability to pass ordinances themselves.

The Creation of Utility Programs to Support Implementation

A common barrier to passing policies like stretch codes is a lack of technical assistance and support to implement the policy once passed. This hinderance can result in the weakening of a policy or ultimately halt its adoption. Policies have a much better chance of advancing if there is a promise of a program that will support implementation and compliance. One step utilities can take is to vocally support policies that they have the ability to support through a utility program. Another is to make the intention of program creation known to stakeholders. The ultimate step is to create that specific utility program to fit policy implementation needs, which is outlined in the next section.

Utility Programs for Stretch Code Support

While the policy advancement work that a utility takes part in begins *before* a stretch code policy is adopted by a state or a municipality, the stretch code support program takes place once a policy is *adopted*. The opportunity for compliance/support with a stretch code does not occur until a policy is passed by a local jurisdiction. A stretch code support program works to increase compliance with an above-code policy that has been passed by the local jurisdiction (where it would then become the minimum code). The evaluation of the stretch code support program would be considered a separate evaluation from the code advancement and would examine utility activities that explicitly address helping customers meet the stretch code. While the evaluations would be separate, many of the same assumptions and data points would be used in both evaluations and we recommend planning for both.

To date, Illinois does not have *base* energy code utility support program in place, although this concept was brought to the IL SAG in 2019-2020. If the stretch code is not universally adopted across Illinois, these stretch code support programs could synergistically also help customers comply with state base energy code. There are significant levels of efficiencies to having both a base code support program *and* a stretch code support program because many of the same activities implemented for a stretch code support program would likely impact base code compliance. The activities such as technical assistance, training programs or the development of an energy efficiency hub/compliance collaborative all can increase the compliance rates of either the state base or stretch codes. Additionally, the evaluation for a stretch code program already includes evaluation of base code compliance, making the combination of the two more cost-effective. This document is focused on stretch code only, but the decision to combine both a base code compliance program and a stretch code compliance program is still a point that could use further discussion.

There are several ways that utilities could support stretch code compliance, described in further detail below:

**Training program targeting code officials, contractors or city staff to address knowledge gaps about specific measures and/or ways to comply with stretch code.** These training sessions can highlight new additions to the code, explain more confusing aspects of the code, or demonstrate test techniques for determining compliance. Utilizing data gathered in previous baseline studies, training sessions can target historically low-compliance, potentially high-impact areas.

**Technical assistance for professionals that may be unsure of how to comply with or assess the compliance of a specific code requirement**. This could include:

* Technical support answering code-related questions via email or over the phone, with responses being tracked annually and provided to evaluators
* Participation in industry groups to offer technical assistance and outreach
* Resource development and delivery for resources that can assist all target markets, which could include compliance checklists, field guides, FAQs, bulletins, pocket guides, online tools
* Supporting a circuit rider, or a third-party specialist (that is not a building code official or an installer) that is available to all building code officials, that can work with multiple jurisdictions to provide technical
* Development of energy efficiency resource hub/compliance collaborative to provide one place where information can be accessed.

Target Market

There are several stakeholders involved in a utility-supported code advancement or code support program. We delineate these stakeholders, or target markets, into three main groups: the jurisdiction/policy-maker sector (TM1), the design and construction industry (TM2), and the enforcement industry (TM3); each is described and defined below.

**Jurisdiction/Policy-Making Sector**  **- Target Market 1 (TM1):** . TM1 includes entities and persons that are involved in policy development and adoption. This can include state energy code development, such as the Illinois Capitol Development Board (CDB), Illinois Energy Codes Advisory Council, and public stakeholders involved in that process. It can also include jurisdiction-level code development or adoption bodies, such as city/county councils, mayors, sustainability managers, and/or working groups (e.g., the City of Chicago Decarbonization Working Group). TM1 may also be reached indirectly and leveraged through priority organizations like local and state chapters of the International Code Council (ICC), ASHRAE, Illinois Council of Mayors, Metropolitan Mayors Caucus, and the numerous state and local code official associations in Illinois.

**Design and construction industry** **- Target Market 2 (TM2)**: This includes builders, subcontractors, material supply houses, site superintendents, energy modelers, building scientists, architects, engineers, and designers that design and build commercial buildings. While self-selected individuals in the construction industry may be familiar with utility above-code programs, the target market for this program is all construction industry actors – everyone has a stake in code adoption and ultimately code compliance. This significantly larger target market can be reached through involvement with the Illinois Energy Codes Compliance Collaborative and leveraged through direct outreach to priority organizations such as local and state chapters of Homebuilder Associations (HBA), American Institute of Architects (AIA),, ASHRAE, International Code Council (ICC), Illinois Plumbing and Heating Association, and Illinois Green Alliance. Additional outreach could also be conducted to the Association of Licensed Architects, Illuminating Engineering Society, Lighting Controls Association, International Association of Lighting Designers, Building Performance Institute (BPI), Associated General Contractors of America, and others. In the commercial industry, ASHRAE, the ICC, AIA, and the lighting and mechanical subcontractor associations likely have the most influence.

**Enforcement industry - Target Market 3 (TM3):**This includes local building departments, code officials, and jurisdictional employees that review, permit, and inspect energy code requirements. This target market has an outsized influence over the construction of new buildings relative to their small numbers, and have both influence in adoption and compliance. Enforcement industry stakeholders in Illinois may not have direct contact with utility programs and thus represent a new opportunity for utility customer outreach. This target market can be reached through involvement with the Illinois Energy Codes Compliance Collaborative and leveraged through priority organizations like 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

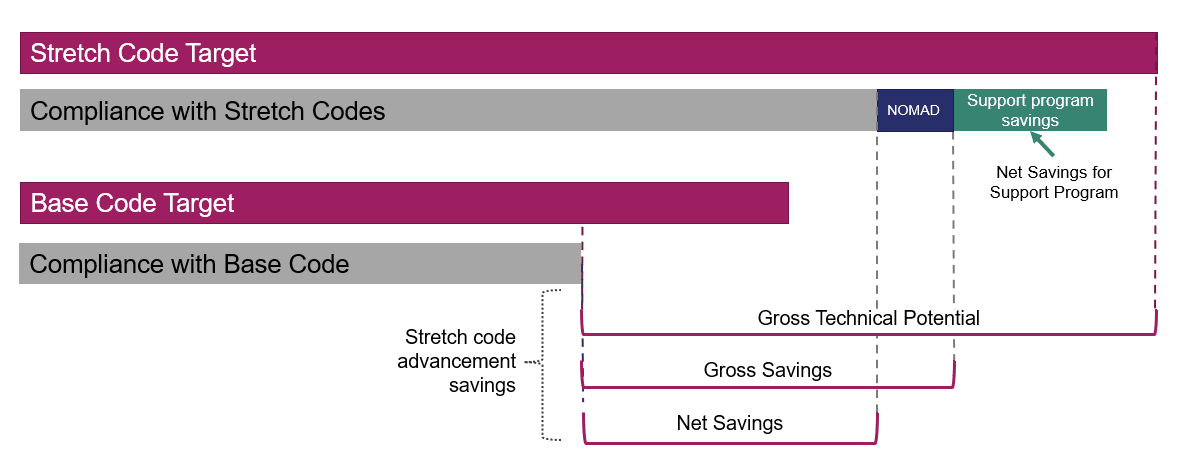
With the background outline here, we developed a logic model that summarizes the conditions, constraints, actions, and outcomes we expect to see with a stretch code market transformation initiative. This logic model is attached to this document in Appendix A.

Key Elements of Market Transformation Evaluation

For policy advancement and code support programs, there are related but distinct efforts to evaluate impact and attribute savings to utility actions. Both evaluation efforts need to estimate the technical potential, the savings that occur because of either advancement efforts or program support, and the counterfactual to estimate what would have happened if the utility-supported advancement or program did not happen. ***Policy advancement*** evaluation specifically looks at utility efforts to move policies forward and how those efforts move the market over time. ***Code support programs*** evaluate utility efforts that help increase compliance with the stretch code. The evaluation elements presented here were developed with consideration of experience of similar evaluated programs in programs in California, Massachusetts, Rhode Island, and Arizona.

The graphic in Figure 2 breaks down the pieces of evaluation elements to highlight how the technical potential and gross savings take into consideration not only the differential in energy savings between stretch codes and base energy codes, but also how compliance levels are incorporated into the potential savings. The support program savings are incremental above the policy advancement and are focused entirely on quantifying impacts of code support programs that result in increasing compliance of the code (either base energy code or stretch code). This proposal focuses on the stretch code support program, rather than the base energy code support, but many of the same utility-supported efforts can help customers increase compliance in both energy codes and we recommend considering how both compliance support programs can be implemented and evaluated.

Figure 2: Base and stretch code evaluation illustration

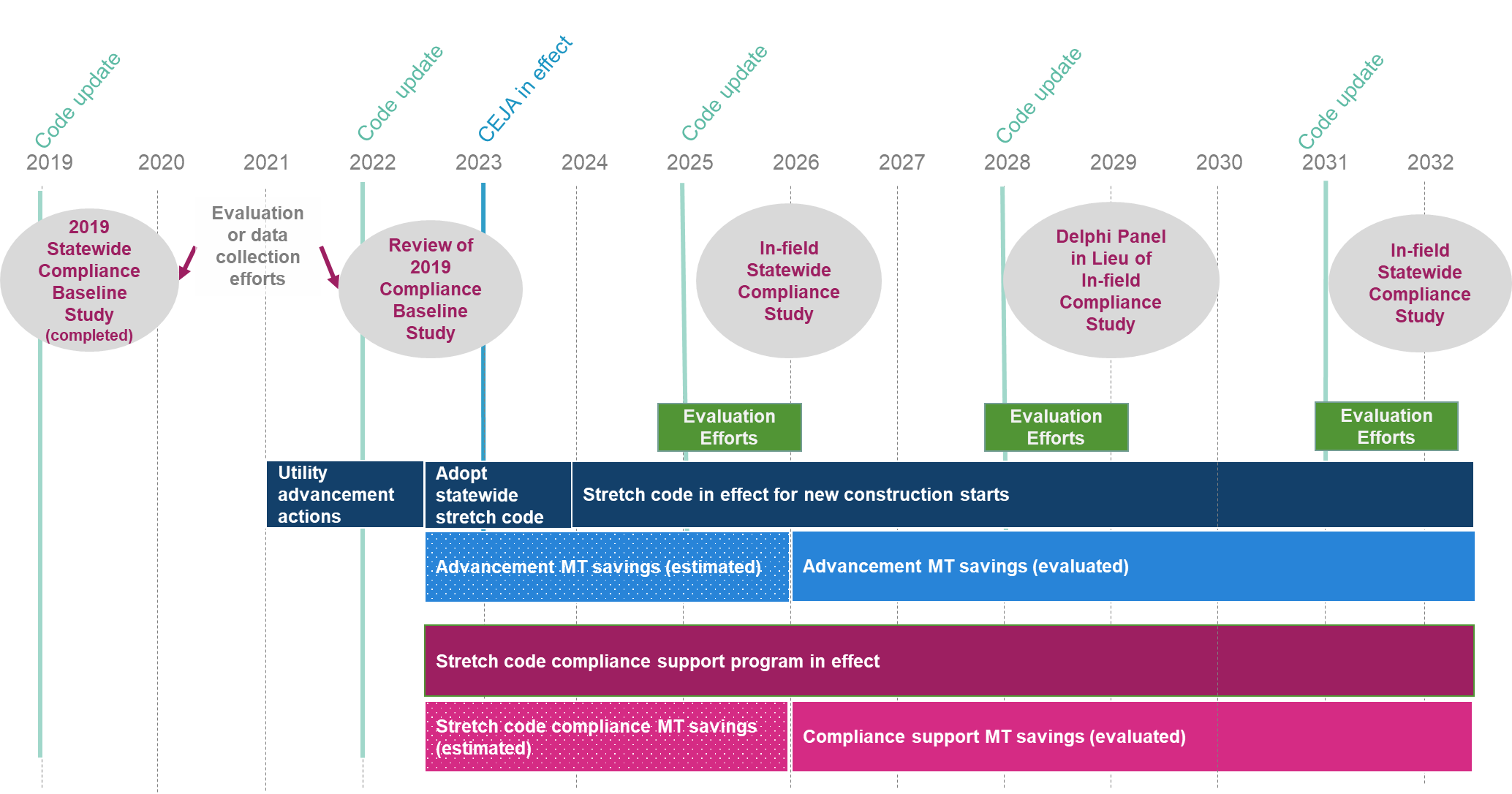


Timing of claimed savings

For this proposal, energy savings can start being claimed retroactively after the first year an MT program is in place. The claimed savings could technically end when the market is transformed when the NOMAD meets (and achieves 100% compliance with) the stretch code goal. As part of the evaluation cycle, valuators will consider NOMAD every 3 years or during a code cycle update. The end date for claimed savings should be reevaluated at that time, but we suggest unless evidence shows substantial differences in NOMAD, the end date for claiming savings should be constant.

It is important to note that even with the recently-passed CEJA legislation, municipalities may adopt stretch codes at different times. In contrast to utility programs that are rolled out service territory-wide at the same time, a stretch code MT initiative will need to take into account individual municipalities that may adopt policy at their own political speed. We expect that some cities, like Chicago or Evanston which have been considering the implementation of building policies for many years, to adopt stretch codes sooner than other municipalities. These municipalities would be considered for inclusion in this MT evaluation and the evaluation would be limited to their geographies. Over time and especially with policy advancement efforts by utilities as outlined above, we expect to see more municipalities adopt stretch code policies. While a major evaluation effort and estimation of NOMAD may take place every 3 years, for those municipalities that adopt policies in the non-NOMAD years, evaluators may consider a smaller effort that estimate potential impact based on limited or secondary data provided to the evaluators. Figure 3 provides an illustration of the timeline of evaluation and data collection efforts if one municipality were to adopt a stretch code and the utility has an advancement or compliance program in place.

Figure 3: Illustration of Evaluation Timeline and Process



To illustrate the process further, Figure 4 shows a potential scenario for claiming savings in a municipality that adopts a stretch code in 2024. Prior to 2024, the already-existing resource acquisition programs use the State Energy Code as the baseline above which to claim savings. In 2024, the Stretch Code becomes the new baseline for those resource acquisition programs. In this scenario, the Stretch Code targets increase until meeting Net-Zero in 2032. The savings available to the utility to claim for the MT Stretch Code Advancement lie between the State Energy Code and the Stretch Code Target, and are calculated by subtracting the NOMAD and other influences (which are determined by Delphi panel). Non-compliance with the Stretch Code will exist each time the Stretch Code is updated, which in this scenario is every three years. The savings available to the utility to claim for the MT Stretch Code Compliance Support lie between the Stretch Compliance level (determined by Delphi panel and/or compliance field studies) and the Stretch Code Target. It is unlikely that 100% compliance will ever be achieved, as shown in the image.

Figure 4: Illustration of Stretch Code MT Claimed Savings Over Time with Typical Resource Acquisition Programs

Chart

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The timing of the evaluation will be limited by the ability to collect data on base and stretch code compliance after the passing of the new stretch code, which impacts the evaluation of policy advancement and code support. Additionally, the implementation of the new stretch code may be delayed if buildings with permits prior to the stretch code adoption are allowed to build to the previous statewide code, grandfathering of the old code, and ignore the stretch code. Collection of the code compliance data may take one to two years after adoption of the stretch code and the evaluation of policy advancement and code support may take an additional six to nine months depending on how quickly stretch code applies to all buildings, when compliance data is available, and if the market transformation evaluation begins in parallel with the compliance studies.

The Delphi Panel Process

A key piece of the evaluation framework is the employment of a group of subject matter experts that can determine key assumptions as a group, known as a Delphi Panel. It is a common practice in MT programs to utilize a Delphi panel process, and this approach will be mentioned numerous times throughout this document. A Delphi panel is a group of experts in the new construction and codes industry that reviews evidence and information and develops compliance numbers through a consensus-building process. A Delphi panel can be used to estimate potential MT savings and provide feedback on program success, compliance levels reached, and program attribution. In energy code support programs, a Delphi panel may also used to estimate compliance with an energy code rather than conducting a full field study.

Delphi panels have successfully been employed in Rhode Island, Massachusetts, and California. Depending on complexity, the Delphi process itself can take just a few days to reach convergence, with three or four iterations being the norm. If convergence is not easily reached, additional rounds in the Delphi method continue (as needed) until convergence is achieved, based upon criteria predetermined by the evaluation team. It is important to utilize people that are experts in the industry, but to minimize bias, members of the Delphi panel cannot be employees of the Program Administrators or the Program implementation contractor. Below is an example of potential panel representation, based on the panel representation from Massachusetts. The Program Evaluator typically oversees the Delphi Panel process.

While non-bias is the goal when choosing participants, in order to utilize experts with experience working on the ground in the construction industry, it is impossible to completely remove all bias. The Delphi panel process may create guidelines about financial interest, may choose to throw out top and bottom response outliers, or employ other methods in order to maintain a more neutral outcome.

Table 5. Delphi Panelist Representation example from Massachusetts,

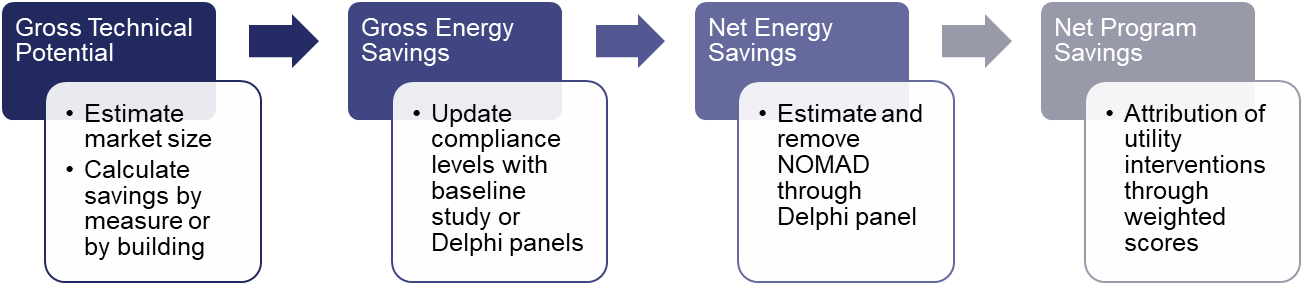
|  |  |
| --- | --- |
| Panelist Representation Category | Number of panelists |
| Building efficiency consultants working in IL | 5 |
| Building efficiency consultants working outside of IL | 2 |
| Code officials working in IL | 3 |
| Utility new construction program managers outside of IL | 1 |
| Evaluators working nationally | 2 |
| Other – mix of local and national efficiency experts | 3 |
| Total | 15 |

Evaluation of Policy Advancement

In this section, we focus on how a stretch code policy advancement program might take place and how evaluators would quantify savings that a utility can claim. We first provide an overview of the key actions that a utility would be expected to take in order to play an active role in policy advancement. We then walk through the methods for evaluation, based on experience in evaluating advancement programs found elsewhere in the country as well as the IL TRM Attachment C which provides recommendation on how MT initiatives should be evaluated.

Evaluation Overview

As stated above, evaluation of an MT initiative requires a determination of the natural market baseline as well as market effect over time of the initiative. This process, described visually in Figure 5, starts with a determination of the gross technical potential to determine current conditions from which to start evaluating program effect. From there, evaluators need to understand the level of compliance with the stretch code, estimate the naturally occurring market transformation (NOMAD), and calculate an attribution score to identify net program savings. Each piece described in further detail below.

Figure 5: Process for Evaluating Policy Advancement 

The time critical portion of this evaluation process is attaining updated compliance levels through baseline or compliance studies so that gross energy savings can be determined from gross technical potential. Once a new stretch code is adopted, there will be a lag in time before sufficient building stock adhering to the new stretch code is available. The policy advancement evaluation should be timed so that the determination of gross energy savings happens shortly after compliance data is available.

While the Delphi panel approach may be taken occasionally, it would need to be grounded in actual baseline/compliance studies at least every other code update cycle. If a municipality adopted stretch code in the middle of a code adoption cycle, as opposed to the beginning of the code adoption cycle, then a Delphi panel would determine compliance rates for the new stretch code area.

Gross Technical Potential

Establishing the gross technical potential for energy savings is the critical first step in determining and evaluating the overall savings from a code advancement program. This is the starting point from which evaluators can calculate savings.

The first step in a MT evaluation is to calculate the overall or gross technical potential of the market. For stretch codes, this would initially include the new construction and major renovation market for the whole state as if every municipality had adopted a stretch code and achieved 100% compliance. Calculating the initial GTP statewide is necessary because the state represents the entire market able to be transformed, and because the information available to calculate the GTP and evaluate the success of stretch code compliance is statewide, rather than jurisdiction-specific, data. The Gross Technical Potential could then be calculated for each utility’s service territory and further for a municipality that is expected to adopt the stretch code, either based on energy consumption, estimated construction permits in each territory, or a combination of both. Savings for code advancement ultimately should still only be claimed within a utility’s service territory and for those municipalities that have adopted the stretch code.

Stretch codes policies may require buildings to meet codes through either prescriptive measures or through a whole-building reduction in energy. The way the policy is written will drive methods of estimating gross technical potential. For Slipstream/MEEA’s Phase 1 Report of Energy Stretch Code & Building Performance Standard Programs for Illinois (presented to IL SAG MT Savings Working Group on March 17th, 2021), we presented methods and calculations of gross technical savings that reflects similar methods provided here, with utility specific potential and whole-building energy reduction approach.[[7]](#footnote-8)

Below are the key pieces of evaluation activities to estimate gross technical potential, which include the Unit Energy Savings (if the stretch code is adopted in a more prescriptive, measure-based approach), a whole building savings estimation, and the number of applicable units in the commercial new construction market:

* **Review of Primary Sources:** Best practices of policy advancement would include thorough research of the proposed stretch code prior to its adoption. Research activities would include secondary research, market analysis, energy analysis, cost effectiveness, potential impacts to municipalities considering the stretch code, and draft code language. Utilities are uniquely positioned to assist and provide policy advancement research, but regardless of the source of policy advancement research documentation provides the starting point for these analyses. The Gross Technical Potential would leverage the policy advancement research with regards to the gap analysis, unit savings evaluation, and unit quantity evaluation. Documents provided may include Excel workbooks, relevant research materials, market data sets, or memos explaining methods and assumptions. This may include, but is not limited to, the 2018-2019 Illinois Energy Code Compliance Studies, utility-specific baseline studies and potential studies.
* **Gap Analysis:** Evaluators may request or seek out additional data where utility documentation appears incomplete.
* **Unit Savings Evaluation:** depending on the stretch code policy, the unit savings could be approached with a per measure estimation (in the case of a measure-based policy) or a whole building estimation (if the stretch code requires a whole building or EUI energy reduction). If stretch code policies are prescriptive in nature, each measure should be evaluated independently, while a whole-building energy reduction approach would be evaluated once per code update cycle. Based on the recently signed CEJA language, we recommend following the whole building approach, but we provide both methods here:
  + **Measure-based Evaluation:** Evaluator reviews engineering algorithm or energy model inputs, assumptions, and methodology to determine accuracy of utility estimates. Where necessary, evaluators pursue secondary research and recreate unit savings to develop their own UES estimates.
  + **Whole Building Savings Estimation:** To estimate a whole building energy savings potential, evaluators would review models created in the policy advancement phase by building type. The original models could be developed by a utility or another policy advocate using an established comprehensive building energy simulation models such as EQuest, Trane Trace, or Carrier HAP. For each building type a statewide code compliant model would be developed as well as a stretch code compliant model. The models would be run for the 8,760 hours in a typical weather year and compared for potential savings by building type.
* **New Construction Market Estimation :** Reputable third-party sources may be brought in here to supply market data allowing for consistent new construction predictions. For example, Dodge Data may be employed to arrive at market data.

Gross Energy Savings

Evaluators next estimate the energy savings that results from policy advancement or influence and specifically what compliance rates for the standard will look like over time. Estimating gross energy savings includes primary data collection in the form of compliance studies to understand what effect the policy advancement has had on the market. Because code compliance studies have shown that not every building adheres to the base codes, we expect that not every building would immediately achieve 100% compliance with stretch code strategies where adopted, and therefore compliance with the stretch code needs to be incorporated into the energy savings calculations and claimed savings timeline. This analytic step should take place after one to two years of the stretch code being in place. Data gathering through compliance studies also can be applied to evaluation of compliance support programs, which will be described in further detail below.

To estimate compliance with the stretch code, the data collection process begins with a sampling plan which will stratify the market by building type and size, with buildings weighted by presence in the market and potential energy savings. This sampling plan reflects the fact that evaluators cannot verify code compliance for every new construction building. Once the sample plan is created, the evaluators would seek out the following information to generate estimates of gross energy savings:

* **Research of Building Department Records** 
  + Architectural, electrical, and mechanical drawings
  + Construction details and specification books
* **Site Data Collection** 
  + Building configuration, footprint dimensions, orientation, and area of each activity type (square footage)
  + HVAC equipment and distribution system specifications (type, quantities, and efficiency rating)
  + Envelope insulation material and thickness (R-value)
  + Lighting densities and control types.
* **Interviews with Facility Personnel**

For each building in the sample, evaluators determine measure by measure, or by whole building if that is the compliance mechanism used, whether the stretch code is followed. Compliance rates are aggregated across all sampled buildings, and then extrapolated to the population to estimate overall compliance rates for each stretch measure. Gross Energy Savings for each measure is the Product of each measure’s Gross Technical Potential multiplied by the measure’s compliance rate. Finally, the overall Gross Energy Savings is the sum of all measures’ Gross Technical Potential.

When estimating the Gross Energy Savings, stretch code compliance will be calculated on a statewide basis, since code compliance is typically measured by state and is cost-prohibitive to conduct in any one jurisdiction via field study. Once determined for the state, evaluators divide the savings by jurisdiction based on number of new construction starts, similar to the method used to estimate Gross Technical Potential. A Delphi panel can fill in missing pieces based on local advancement and using local sources of information. Jurisdiction-level savings is finalized in the Net Savings step.

Net Savings

For Stretch Code Advancement, the jurisdictions that have advanced stretch code policies will be evaluated to determine Net Savings. Each will be evaluated against the stretch code they have adopted (likely the CEJA Stretch Code, or potentially a stretch code of their own making). Each case will incorporate a compliance rate as determined by statewide studies and a Delphi panel.

As described above, evaluation of market transformation initiatives requires the estimation of savings that may have occurred in absence of the policy or initiative in place, or NOMAD. As described in the Attachment C of the IL TRM, NOMAD needs to be removed from the gross energy savings so that savings are not counted that would have naturally happened even without utility interventions. There is a recognition that calculating NOMAD is “probably the most challenging piece of estimating savings from MT because it is a prediction of the future that will never actually exist and therefore can’t be measured.” The IL TRM encourages involving evaluators and stakeholders throughout this process to ensure transparency in the methods and judgement used to estimate the total policy advancement impact.

As done in other jurisdictions, such as California, we recommend leveraging subject matter experts to determine NOMAD. This approach, described above in the section on the Delphi Panel process, employs a group of experts to review existing data and quantify the natural market baseline. For this evaluation, we recommend the evaluator as a Delphi facilitator who is impartial and most familiar with research and data collection. The panel of experts should all have relevant knowledge and experience for NOMAD. As typical of Delphi panel processes, there would be multiple rounds of questions relating to the NOMAD, with questions progressing from general questions to specific questions to decision making. The panel would use a market adoption estimation approach such as fitting a Bass curve for the diffusion of innovation over time to historical market adoption data from subsequent baseline studies. The panel would consider other market mechanisms and how their influence would drive NOMAD. This may include:

* **Non-Utility EE Advocacy:** Usually run in parallel to utility activities, such as MEEA.
* **Utility Incentive Programs**: Quantifying the effect of resource acquisition programs.
* **Statewide Base Code:** Advances in the statewide code may affect NOMAD.
* **Compliance Intervention:** If stakeholders are actively engaging in code compliance support.

Net Program Savings

The next analytic step takes the net savings value determined above and applies an attribution factor, also known as an attribution score, related to the utility involvement. Prior to evaluation, the levels of influence and participation may be preliminarily weighted and estimated by a participating utility. Once evaluation begins influence and participation are discussed, weighted, and ultimately determined by a Delphi panel of experts who establish attribution scores of utility involvement in policy advancement. The panel is presented with the relevant evidence, including utility-supported research, rulemaking dockets, activity and role reports from utilities, and stakeholder interviews. The Delphi panel may consider items such as amount of time spent, fiscal involvement (e.g., funding a study), and achievable level of influence from action.

The weights and scores for attribution are developed in three areas described above in Utility Programs for Code Advancement , which includes utility-initiated research, advocacy for advancing policy, and the development of utility programs to support implementation. At the panel’s discretion, each of the three attribution areas may be further divided for weighting and scoring. For example, utility-initiated research may be divided into development of technical information and feasibility research on meeting the standard. The attribution factor is derived from the weighted scores. If the weighted attribution scores from the Delphi panel differ by more than 10% than the utility estimates, the impact evaluators will conduct additional research.The attribution factor is derived from the weighted scores.

Table 6: Examples of utility participation and categories of influence

|  |  |  |
| --- | --- | --- |
| Category of Influence | Participation Action | Documentation Examples |
| Utility-Initiated Research | Funding and conducting research on market analysis, energy analysis, cost-effectiveness, and statewide impacts | Scope of work and financial receipt for research papers, final research studies and supporting documentation |
| Develop revisions to code language that can be used in stretch codes | Meeting minutes, email discussions, written language revisions and rationale or included in research papers. |
| Reviewing of public documentation and information | List of reviewed public documentation and information and following actions or included in research papers. |
| Advocacy for Advancing Policy | Vocally (or in chat) participating in discussion at public or decision-making meetings | Meeting minutes |
| Attending public meetings (information-gathering with little-to-no participation) | Meeting minutes, calendars |
| Writing and submitting comments | List of comments, email discussions, written comments and rationale |
| Creating, providing and/or presenting information to a group or key stakeholders | Meeting minutes, calendars, stakeholder list, presentations |
| Convening stakeholder meetings to develop technical aspects/policy language | Meeting agendas, meeting minutes, calendars, stakeholder list, presentations, email discussions, written language, stakeholder survey |
| Submitting policy language or recommendations for consideration of adoption | Submission receipt, email/physical copy of submission, policy language |
| Funding and conducting participation in public processes on behalf of the utilities | Scope of work and financial receipt, list of public meetings and participation in processes, meeting minutes, stakeholder survey |
| Giving public testimony in support/against specific policy language/idea | Testimony language, meeting minutes, stakeholder survey |
| Utility program development | Promising technical support or incentives via a utility program to support policy implementation | Meeting minutes, presentations, email discussions, written or testimony language, stakeholder survey |
| Creating specific utility program to fit policy implementation needs | List and details of program components specifically designed to support stretch code |

Finally, the attribution score is multiplied by the net savings to attribute the advancement savings derived in earlier evaluation steps. This is ultimately the savings values that will be allocated to utilities.

Evaluation of Stretch Code Support Programs

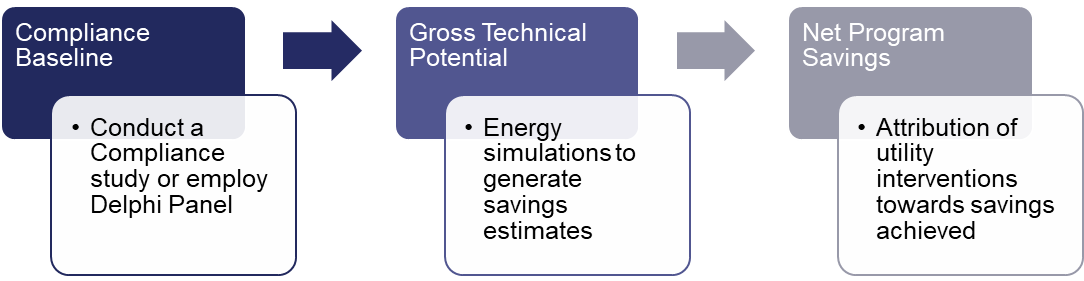
Evaluation Overview

Similar to the stretch code advancement evaluation, the methods of evaluation for codes support include an estimate of overall technical potential and savings from utilities programs, although the emphasis is on the compliance rates of meeting stretch codes standards rather than the stretch codes themselves compared to the base energy codes. We expect that while not every building would immediately achieve 100% compliance with stretch code strategies where adopted, the inclusion of utility-support programs will increase compliance over time. Savings from code support programs need to be evaluated whenever the statewide or stretch code is updated. However, additional evaluations can take place in between code update cycles, especially if utilities are introducing new methods to increase code compliance. Many elements of this evaluation can be combined with evaluation efforts of policy advancement to streamline data collection costs.

Note that while this section focuses on compliance support to meet the stretch code, many of the same program elements (i.e. training and technical assistance) could be used for meeting the base energy code, especially in utility service territories where there are both municipalities that have adopted stretch codes and others that have not. The program elements could serve both of these markets to help designers and building teams meet and code official enforce either the base energy code or stretch code.

The evaluation itself would be divided into three parts 1) compliance baseline identification; 2) Gross Technical Potential, 3) Savings Achieved through Program Efforts. Each part is described in further detail below.

Figure 6: Evaluation overview for stretch code support programs



Compliance Baseline

The first step to calculate the savings that can be attributed to a stretch code compliance support program is to identify the baseline compliance with the stretch codes. Evaluators must determine a compliance baseline from which they can assess the impacts of utility activities. The baseline calculations, which reviews construction practices of a sample set of buildings, should take advantage of existing market data, and with sufficient funding utilities may also undertake compliance studies of their own. As mentioned above, an Illinois-specific compliance baseline study was conducted and completed in 2019. This baseline study can be used as a starting point to determine the compliance moving forward.

Where knowledge gaps still exist, Delphi panels or other determination strategies may be used to estimate compliance rates. One such example is if a Stretch Code Support Program were in place before or at the beginning of stretch code adoption. In such cases a Delphi panel would have to determine if prior compliance rates, either compliance with the statewide code or an earlier version of the stretch code, would be applicable for the baseline of the new stretch code. The Delphi panel may conclude that the baseline compliance rates would need to be adjusted from the referenced compliance rate. Note that a baseline study is initially done to establish a starting point to measure from in the future, and to identify the areas where compliance is needed. It may also be called a “baseline compliance study” because it is establishing the baseline of compliance. Subsequent studies are called “compliance studies” to measure how much compliance improvement has been achieved since the initial baseline study.

Ideally, a compliance baseline should be completed every code cycle update. However, there is existing precedent of conducting a baseline field study every 6 years, with a Delphi panel employed during the third year when a code is updated. By using a Delphi panel instead of a full compliance study can reduce the total costs of this part of the evaluation. Running Delphi panels (especially when they can be done virtually) cost significantly less money than performing field studies, so they are the less expensive alternative to running field studies every cycle.

Gross Technical Potential

The gross technical potential of a stretch code support program must be assessed before assigning credit for utility activities. This technical potential is calculated based on an assessment of the baseline studies and compliance studies combined with code requirements and future new construction market data. Baseline studies and compliance studies are combined with code requirements and expected construction data to determine the total energy left on the table due to non-compliance with the current codes.

Building energy simulations for prototypical buildings are used to generate potential savings values for each code end use sub-section such as lighting LPD, lighting controls, insulation, etc. Savings provided on a per-unit or per-sf basis individually for each measure. The combination of building type market presence, division of energy by end use sub-section for each building type, and compliance rates for each building type end use sub-section would be aggregated to determine the overall noncompliance with energy code.

In programs that combine Stretch Code Support with Policy Advancement, non-compliance is already determined in the Compliance Baseline section of the Policy Advancement evaluation. In the evaluation of Policy Advancement, the difference between Gross Technical Potential and Gross Energy Savings is removing non-compliance. This non-compliance becomes a goal of the Compliance Support program, and thus the estimated Gross Technical Potential. This guarantees there is not double counting of savings between the Advancement and Support aspects of the program.

Net Program Savings

Evaluators assemble a Delphi panel to determine the energy impact of stretch code compliance program efforts. Similar to the Delphi panels used in the code advancement evaluation, the panel may be comprised of industry experts including building plans examiners, building commissioners, architects, design engineers, mechanical engineers, consultants, or academics. Data collected to inform savings estimations include collecting surveys, recording number of attendees and number of circuit rider visits for program participants. Figure 7 demonstrates methods for determining Net Program Savings through use of a Delphi panel.

Figure 7: Example graphical flow of Delphi Panel (based on Massachusetts code support evaluation)



The Delphi panel, based on their experience and the data collected, then determines energy code compliance levels under two scenarios:

1. Current code compliance once the code support program is in effect.
2. Assuming there was never a code compliance support effort.

The difference between the two compliance estimates generated by the Delphi Panel determines the percent of overall compliance attributable to utility program efforts. These estimates could be broken down into individual estimates for sub-sections of the code such as lighting power density, thermal shell insulation, mechanical controls, etc. (if data is available on a measure-level basis). The portion of gross technical potential savings achieved is multiplied by the Gross Technical Potential to calculate final net program savings.

Allocation of Energy Savings

Because MT programs look at the entire market as a whole for potential savings, the claimed savings will be distributed amongst the participating utilities. This allocation will occur for both the evaluation of policy advancement and evaluation of stretch code support programs. The estimated level of savings will be allocated to individual utilities for those utilities to claim savings for policy advancement and policy support. As stated above, the gross technical potential will be estimated statewide with the technical potential capped for each utility, based on proportion of customers, proportion of energy production, proportion of estimated new construction starts, or a combination of those.

Each utility will only be able to claim savings within its service territory and applying only those savings that are attributable to the actions it took to advance the code. In the case of policy advancement, a utility can claim savings only for savings within the municipality which adopted the stretch code; for stretch code compliance support programs, the evaluation may identify savings beyond a municipality that has an adopted code, but the savings would still be limited to service territory boundaries. In the case of a municipality that shares utility service with more than one investor-owned utility, the allocation is based on proportion of energy building energy savings by fuel type.

Evaluation cost

The cost of evaluation will be determined by the evaluator based on the final evaluation scope. Costs could include the cost of the evaluation team’s time and resources, and facilitation and coordination of the Delphi panel. One method of balancing cost with accuracy would be to utilize Delphi panels in lieu of conducting compliance field studies every code cycle. Thus, the cost of compliance field studies could be included every six years (rather than every three years); these costs may end up being lower than the initial compliance baseline field studies (2018-2019 Illinois Energy Code Compliance Studies) because the methodology has been created.[[8]](#footnote-9) Many data-gathering steps for evaluation of policy advancement and of compliance support are similar and can be streamlined to reduce costs. We also recommend the collection of supporting documentation of utility involvement immediately to streamline the evaluation process.

Appendix A: Logic Model

Appendix B: Examples of Similar Programs/Evaluations

Example of calculating Net Program Savings by assessing Attribution and multiplying it by estimated Gross Technical Potential in the Rhode Island Net Program Savings for Code Compliance Enhancement Initiative. *Source: NMR Group, Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study, 2017.*

Text

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1. The language recently passed in CEJA will change this. See Section on Stretch Codes. [↑](#footnote-ref-2)
2. *2018-2019 Illinois Energy Code Compliance Studies, 2019.* [↑](#footnote-ref-3)
3. Chicago had an additional cool roof provision for some new commercial buildings, which can be considered a “stretch code” by some definitions. [↑](#footnote-ref-4)
4. The IL Capital Development Board has currently begun the IL Energy Code Adoption Process as of June 30, 2021, and the new code is expected to be effective by June 2022. [↑](#footnote-ref-5)
5. If a municipality wants to have a single-family residential stretch code, it must first be created through the state or legislatively. [↑](#footnote-ref-6)
6. Chicago should still be able to adopt its own different stretch code. [↑](#footnote-ref-7)
7. https://ilsag.s3.amazonaws.com/IL-Utility-Stretch-Codes-BPS-Phase-1-Report-Oct-2020.pdf [↑](#footnote-ref-8)
8. If the utilities decide to create a support program for state base energy code compliance, the cost of the statewide compliance field studies could be shared amongst the two programs – base energy code and stretch code. [↑](#footnote-ref-9)