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

**Developed by:** Slipstream | MEEA | Guidehouse

Background:

This document serves as a working document to propose key elements of evaluation for market transformation of stretch code program and building performance standard (BPS). The Slipstream/MEEA team presented to the IL SAG on March 17th on stretch codes and BPS, 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.

Definitions

**Stretch code:** 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. For purposes of this document, we are only considering stretch codes for commercial new construction or major renovations. We exclude residential because state law prohibits building energy codes beyond the base code in that building sector.

Currently, stretch codes policies do not exist in Illinois[[1]](#footnote-2). Municipalities are allowed to define their own stretch energy code for their commercial buildings, but no municipalities have taken that step to date. However, statewide legislation was introduced during the 2020-2021 Legislative Session to provide us with a preview of potential options. The stretch code as introduced would require the state to create a stretch code option, which would then become the required energy code for jurisdictions that chose to adopt it. Having a state-created stretch code provides consistency amongst jurisdictions (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 or not choose to adopt it. The evaluation pathways will reflect that specific policy; in our overview below, we highlight areas where the evaluation options vary based on stretch code policy defined.

**Building Performance Standard (BPS):** Policy that sets energy use or carbon emissions thresholds for commercial buildings within a jurisdiction. Typically, this policy is a progression from benchmarking ordinances that require a subset of commercial building properties to benchmark and disclose their energy performance. In Illinois, there currently are only two jurisdictions with benchmarking ordinances (Chicago and Evanston) and no municipalities that have enacted BPS.

Focus of this document:

For the first draft of this document, we primarily focus on evaluation pathways for stretch codes. Once we have agreement on stretch code pathways, we can apply similar approaches for BPS.

Market Transformation Overview

Per discussion on stretch codes and BPS in earlier SAG meetings, stretch codes and BPS policies should be considered as Market Transformation (MT) initiatives. While there may be elements of Resource Acquisition Programs (RAP), there are a number of characteristics of such programs that follow the MT framework. Based on Attachment C of the IL Technical Resource Manual (TRM), we provide characteristics of stretch code and BPS programs that follow the Market Transformation Theory Umbrella.

Table : Stretch code policies and market transformation characteristics

|  | Market Transformation Characteristic |
| --- | --- |
| Scale | Entire new construction commercial market |
| Target | All consumers of the new construction commercial market |
| Goal | Structural changes in the market leading to long term savings |
| Scope of Effort | There are multiple levels of utility engagement |
| Level of Program Administrator Control | PA’s are only one set of actors. |
| Evaluation and Measurement | 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 planned and implemented over a 10-20 year timeframe |

Attachment C of the IL TRM outlines three key factors when estimating MT savings:

1. Total market savings that result from the entire market adoption of a stretch code or BPS
2. Natural Market Baseline, or Naturally Occurring Market Adoption (NOMAD), which is an estimate of the market as if there were not utility-funded activities to support a stretch code or BPS
3. Removal of Resource Acquisition Program (RAP) operating in the same market to avoid double counting.

The chart in Figure 1 below provides an overview of how market transformation is approached and measured.

Figure : Framework for Market Transformation 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 that is conducted on a regular basis in that the 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.

Utility Involvement

For purposes of this discussion, we consider two primary ways that utilities can be involved in these policies with intent to claim savings for their efforts:1) Policy influence/advancement and/or 2) Program support for stretch code and base code compliance. As will be described further below, these two activities should be evaluated separately to quantify overall energy savings.

Claim savings for policy influence/advancement

Utilities can be involved in influencing or advancing the policy in a few ways, described below:

* Development of a study report that includes:
  + Market Analysis. Includes market structure, technical feasibility, market availability, current practices, market impacts, economic assessments, or economic impacts
  + Energy Analysis including that quantify statewide energy savings potential. The Phase 1 report includes an initial estimate of energy savings if a stretch code policy were in place.
* Participate in or influence adoption of stretch code at municipal level
* Participation in policy development processes either statewide and/or municipal level

Claim savings for program support or stretch code (or base code) compliance

Complying with an above-code policy that has been passed by the local jurisdiction (where it would then become the minimum code). The opportunity for compliance/support with a stretch code does not occur until a policy is passed by a local jurisdiction. Compliance with the state base energy code, if a program existed to address the base energy code, would be calculated separately. Examples of program support activities could include:

* 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 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
  + Engagement by participation in industry groups
  + Resource development and delivery for checklists, field guides, FAQs, bulletins, pocket guides, online tools
  + Circuit rider specialist support in code compliance, possibly employing third-party experts
* Development of energy efficiency resource hub to provide one place where information can be accessed.

Evaluation Framework

For each of the two ways that utilities can be involved, there are related but different efforts to evaluate impact and attribute savings to that utility effort. The first evaluation framework we present below addresses evaluation of ***policy advancement*** efforts and how those efforts move the market over time. The second evaluation framework specifically looks at ***code support programs*** that may increase code compliance with the state base code or with the stretch code. These evaluations should happen concurrently, although the elements of each are different and are outlined below.

Timing of claimed savings

When the energy savings can be claimed is an important consideration for this evaluation framework. For this straw 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, i.e. for stretch codes, when the NOMAD meets (and achieves 100% compliance with?) the stretch code goal. However, since the evaluators will be considering NOMAD every 3 years or during a code cycle update, the end date for claimed savings can also be reevaluated at that time, but we suggest unless evidence shows substantial differences in NOMAD, the end date for claiming savings should be constant.

Evaluation of Policy Advancement

Figure 2 is the overarching framework for each piece of evaluating policy advancement of stretch codes, with each piece described in further detail below.

Figure : Process for Evaluating Policy Advancement

Gross Technical Potential

The first step in a MT evaluation is to calculate the overall or gross technical potential of the market. For stretch codes, this would include the new construction market, while for BPS, this would include existing commercial buildings that would be affected by a BPS policy.Geographic boundaries of the technical potential are dependent on the stretch code policy, whether it is statewide or adopted by each municipality. We expect the geographic boundaries to ultimately be statewide, even if no statewide policy is enacted, as more and more municipalities adopt stretch code policies. However, the evaluation would only apply to geographic boundaries affected by the current policy, such as the cities that adopt the stretch code. If the stretch code policy later gets adopted statewide, there would be a new evaluation to determine the utility contribution to the statewide code adoption.

Stretch codes policies may require buildings to meet codes through 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.[[2]](#footnote-3)

Below are the key pieces of evaluation activities to estimate gross technical potential, which include the Unit Energy Savings estimation and the number of applicable units in the commercial new construction market:

* **Review of Primary Sources:** Utility documentation provides the starting point for these analyses. They may include the study reports, described above, as well as documentation detailing utility actions supporting code advancement. Documents provided may include Excel workbooks, relevant research materials, market data sets, or memos explaining methods and assumptions.
* **Gap Analysis:** Evaluators may request or seek out additional data where utility documentation appears incomplete.
* **Unit Savings 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. 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.
* **Unit Quantity Evaluation:** Reputable third-party sources may be brought in here to supply market data allowing for consistent new construction predictions. 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. This includes primary data collection to understand what effect the policy advancement has had on the market. In the case of stretch codes, the evaluators need to understand if the policy adoption has led to the market adoption of the more advanced building codes. 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).

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. Once the sample plan is created, the evaluators would seek out the following information to generate estimate 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**

Net Savings

Evaluators need to calculate net savings through the determination of Naturally Occurring Market Adoption (NOMAD). This phrase is used interchangeably with Natural Market Baseline and refers to the approximation of what would happen in the market if a program or policy were not in place. 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, called a Delphi Panel, 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. There would be three rounds of questions relating to the NOMAD, with questions progressing from general questions to specific questions to decision making. The panel determines other market mechanisms and level of influence that drives the policy advancement. 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 to the utility involvement. This attribution factor is developed by a panel of experts. The panel is presented with the relevant evidence, including rulemaking dockets, activity and role reports from utilities, and stakeholder interviews. If the weighted scores differ by more than 10% than the utility estimates, the impact evaluators conduct additional research.The weighted score is a fixed percentage determined for the entirety of the program. The weights and scores are developed in three areas:

* **Development** **of Compliance Determination Methods**
  + Investigates development of reliable test methods for energy consumption, the assessment of existing test methods to use for code measures and the development of reliable methods for estimating performance. For example, if stretch code increases HVAC fan efficiency, the utility could develop a measurement and verification protocol, including a sampling protocol. Then the utility could establish a methodology or software to apply measurements to an annualized energy consumption pattern across various building types. If the stretch code policy requires a whole-building approach, rather than prescriptive measures, this would be verified by the compliance documentation necessary for that approach.
  + Investigates the development of a method for estimating energy savings including algorithms for calculating those energy savings, and development of compliance software or modules capable of accurate analysis.
* **Development of Technical Information**
  + Investigates the definition of the measure, drafting standard language and presenting ideas or recommendations on the standard.
  + Calculates the energy and peak demand savings by market studies, engineering studies, and energy modeling calculations determines the costs and cost-effectiveness via cost research and cost‐effectiveness analysis.
* **Feasibility of Meeting the Standard**
  + Documenting the market readiness of the standard
  + Documenting that the standard does not impose unreasonable and avoidable costs to end users
  + Documenting no significant health and environmental externalities

A panel of experts convene to determine attribution scores. The panel is presented with the relevant evidence, including rulemaking dockets, activity and role reports from utilities, and stakeholder interviews. If the weighting scores differ by more than 10% than the utility estimates, the impact evaluators conduct additional research.

Allocation

The estimated level of savings will be allocated to individual utilities for those utilities to claim savings for policy advancement and policy support. Since the geographic territory for a statewide policy would be larger than any one individual utility territory, we recommend allocating energy savings to individual utility sponsors based on proportion of sponsor funding. This method, similar to how California allocates claimed savings, allocates the market adoption of stretch code or BPS policies based on the share of funding spent by the sponsoring utilities service territories.

Evaluation of Code Support Programs

The evaluation of the code support program would examine utility activities that explicitly address helping customers meet the stretch code. If the stretch code is not universally adopted across Illinois, these code support programs could also help customers comply with state base energy code. The activities such as technical assistance, training programs or the development of an energy efficiency hub all increase the compliance rates of either the state base or stretch codes.

These savings 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. The evaluation itself would be divided into three parts:

* **Baseline Identification:** Compliance baseline is ascertained through the baseline study that reviews construction practices of a sample set of buildings.
* **Gross Technical Potential:** Calculated gross technical potential per unit as well as projecting the future new construction market.
* **Portion of Gross Technical Potential Savings Achieved:** Evaluators assemble a Delphi panel to determine the impact of compliance program efforts.

Compliance Baseline

* Evaluators must determine a compliance baseline from which they can assess the impacts of utility activities.
* Baseline calculations should take advantage of existing market data, and with sufficient funding utilities may also undertake compliance studies of their own.
* Where knowledge gaps still exist, Delphi panels or other determination strategies may be used to estimate compliance rates.
* Ideally, 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. This can defer the costs of a compliance study being needed every code cycle update.

Gross Technical Potential

* The potential energy savings must be assessed before assigning credit for utility activities
* 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 sub-section such as lighting LPD, lighting controls, insulation, etc. Savings provided on a per-unit or per-sf basis individually for each measure.

Delphi Panel

Evaluators assemble a Delphi panel to determine the impact of compliance program efforts. The panel may be comprised of industry experts including building plans examiners, building commissioners, architects, design engineers, mechanical engineers, consultants, or academics.

This panel 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.

Figure 3 illustrates the process that the Delphi panel takes to determine code compliance effects and program impacts.

Figure 3: Process for energy code compliance determination by Delphi panel

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 should be broken down into individual estimates for sub-sections of the code such as lighting power density, thermal shell insulation, mechanical controls, etc. Figure 4 illustrates how the Delphi Panel fits into the overall program evaluation, in an example from Massachusetts’s code compliance support program.

Figure : Example graphical flow of Delphi Panel for Massachusetts



Policy Considerations On Stretch codes

There are different policy mechanism and timelines available in Illinois. These may affect the evaluation and attribution process in addition to the program support elements themselves. Below are a few considerations.

One-off Stretch Codes

Stretch codes may be adopted on a typical code cycle and also updated on a typical code cycle (e.g., every three years), but they may also be adopted only one time. In the case that a stretch code is adopted as a one-off stretch code, it is important to ensure that the state base energy code does not eventually surpass the stretch code in efficiency. This should be considered in policy creation, evaluation and adoption. Best practice would be to adopt a step code or mandate an automatic update happens every three years, like the state base code in Illinois.

Step Codes

If the state develops, or a jurisdiction creates, a “step” code, future code changes can be predicted. For example, the current language 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 0.25 of the 2006 International Energy Conservation Code by 2031.This can assist with predicting potential energy savings.

Jurisdiction Creating Their Own Commercial Stretch Codes[[3]](#footnote-4)

Currently a jurisdiction can choose to create its own commercial stretch code that is more stringent that the state base energy code. In this case, if the utility has been involved, that jurisdiction may have to be evaluated separately. That jurisdiction passing an ordinance may also end up influencing other jurisdictions to either adopt similar standards or create their own; that influence should be awarded to utilities in some fashion, even if they did not directly participate in the new ordinance adoption process.

Jurisdictions Adopting a State-created Stretch Code

The stretch code as introduced in CEJA would require the state to create a stretch code option, which would then become the required energy code for jurisdictions that choose to adopt it. The state could also choose to create a stretch code through its typical code adoption cycle[[4]](#footnote-5) as an optional Appendix chapter. Having a state-created stretch code provides consistency amongst jurisdictions (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 or not choose to adopt it. A state-created stretch code also helps with predicting potential energy savings.

1. Chicago had an additional cool roof provision for some new commercial buildings, which can be considered a “stretch code” by some definitions. [↑](#footnote-ref-2)
2. https://ilsag.s3.amazonaws.com/IL-Utility-Stretch-Codes-BPS-Phase-1-Report-Oct-2020.pdf [↑](#footnote-ref-3)
3. If a municipality wants to have a single-family residential stretch code, it must first be created through the state or legislatively. [↑](#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)